ENVIRONMENTAL STATEMENT

VOLUME 2

WEST LANGARTH, THREEMILESTONE, TRURO

PREPARED FOR
INOX GROUP AND HENRY BOOT DEVELOPMENTS

AUGUST 2014

PCL PLANNING

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1.0 Introduction

1.1 Overview

1.1.1 A multi-disciplinary team drawn from a number of specialist consultancies has compiled this Environmental Statement. The team and their roles are set out in Table 1.1 below.

Table 1.1 Consultancy Team

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Responsibility</th>
<th>Company</th>
<th>Contact</th>
<th>e-mail address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall EIA Management and Coordination</td>
<td>Richard Bailey</td>
<td>PCL Planning Ltd</td>
<td>01392 363812</td>
<td><a href="mailto:r.bailey@pclplanning.co.uk">r.bailey@pclplanning.co.uk</a></td>
</tr>
<tr>
<td>1. Introduction</td>
<td>Richard Bailey</td>
<td>PCL Planning Ltd</td>
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<td><a href="mailto:r.bailey@pclplanning.co.uk">r.bailey@pclplanning.co.uk</a></td>
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<tr>
<td>2. Planning Policy Framework</td>
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<tr>
<td>3. Key Issues</td>
<td>Richard Bailey</td>
<td>PCL Planning Ltd</td>
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<tr>
<td>4. Proposed Development, Sustainability and Construction</td>
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<td>01392 363812</td>
<td><a href="mailto:r.bailey@pclplanning.co.uk">r.bailey@pclplanning.co.uk</a></td>
</tr>
<tr>
<td>5. Consideration of Alternatives and Scheme Evolution</td>
<td>Richard Bailey</td>
<td>PCL Planning</td>
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<tr>
<td>6. Landscape and Visual</td>
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<td>7. Ecology and Nature Conservation</td>
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</tbody>
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### Chapter 8. Traffic and Transport

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>Company</th>
<th>Contact</th>
<th>e-mail address</th>
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</thead>
<tbody>
<tr>
<td>Stuart Choak</td>
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<td>0117 302 7560</td>
<td><a href="mailto:Stuart.Choak@curtins.com">Stuart.Choak@curtins.com</a></td>
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### Chapter 9. Dust and Air Quality

<table>
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<tr>
<th>Responsibility</th>
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<th>Contact</th>
<th>e-mail address</th>
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<tbody>
<tr>
<td>Annie Danskin</td>
<td>URS</td>
<td>0131 347 1100</td>
<td><a href="mailto:annie.danskin@urs.com">annie.danskin@urs.com</a></td>
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</table>

### Chapter 10. Noise and Vibration

<table>
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<th>Responsibility</th>
<th>Company</th>
<th>Contact</th>
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</thead>
<tbody>
<tr>
<td>Peter Davies</td>
<td>URS</td>
<td>0207 963 9810</td>
<td><a href="mailto:peter.davies@urs.com">peter.davies@urs.com</a></td>
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### Chapter 11. Water resources, Flood risk and drainage

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>Company</th>
<th>Contact</th>
<th>e-mail address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jim Tamblyn</td>
<td>Horizon</td>
<td>01392 826111</td>
<td><a href="mailto:jt@horizon-ce.co.uk">jt@horizon-ce.co.uk</a></td>
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### Chapter 12. Cultural Heritage

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>Company</th>
<th>Contact</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Steven Weaver</td>
<td>CgMs</td>
<td>01242 259290</td>
<td><a href="mailto:steven.weaver@cgms.co.uk">steven.weaver@cgms.co.uk</a></td>
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</table>

### Chapter 13. Socio economic

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>Company</th>
<th>Contact</th>
<th>e-mail address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richard Bailey</td>
<td>PCL Planning</td>
<td>01392 363812</td>
<td><a href="mailto:r.bailey@pclplanning.co.uk">r.bailey@pclplanning.co.uk</a></td>
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</table>

### Chapter 14. Cumulative Effects

<table>
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<th>Responsibility</th>
<th>Company</th>
<th>Contact</th>
<th>e-mail address</th>
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</thead>
<tbody>
<tr>
<td>Richard Bailey</td>
<td>PCL Planning</td>
<td>01392 363812</td>
<td><a href="mailto:r.bailey@pclplanning.co.uk">r.bailey@pclplanning.co.uk</a></td>
</tr>
</tbody>
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**EIA Process**


1.1.3 Planning Practice Guidance (March 2014), which replaced Circular 02/99, provides guidance on EIA procedures and the preparation of Environmental Statements.
Screening and Scoping

1.1.4 It was decided by the applicants that the proposals, having regard to the potential scope of environmental issues to be considered as well as in combination issues as a result of wider development proposed in the area, that the development was likely to constitute 'EIA development' in accordance with the EIA Regulations. In this regard the applicants decided to volunteer an EIA and a Screening Opinion under Regulation 5 of the EIA Regulations was not sought from Cornwall Council.

1.1.5 Prior to the preparation of this ES an EIA Scoping Request was prepared by the applicants and issued to Cornwall Council (5 February 2014) under Regulation 13 of the EIA Regulations. The purpose of this request was to agree the scope of the EIA and the specific content of the subsequent ES, in particular, the scope of subject chapters and Technical Appendices contained herein.

1.1.6 A copy of the Scoping Request is provided at Volume 3, Technical Appendix 1.1. Cornwall Council’s Scoping Opinion was provided in a letter dated 3 March 2014. A copy of the Scoping Opinion is provided at Volume 3, Technical Appendix 1.2.

Format

1.1.7 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 of the assessment. It should be read in conjunction with the accompanying Technical Appendices that are set out in Volume 3.

1.1.8 The EIA Regulations also require a Non-Technical Summary (NTS) of the ES. The NTS forms Volume 1 of this ES. It explains in brief the main components and findings of the ES for the benefit of those unfamiliar with the EIA process.
1.1.9 Copies of the ES and NTS can be seen at:

Cornwall Council
Planning and Regeneration
Pydar Street
Truro
Cornwall
TR1 1EB

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

PCL Planning Ltd
1st Floor
3 Silverdown Office Park
Fair Oak Close
Clyst Honiton
Exeter
EX5 2UX

1.2 Site Location and Description

1.2.1 The site extends to circa 17.64 hectares (ha) and currently comprises of five agricultural fields (four arable and one pasture) and an agricultural building. There are a number of hedgerows and trees within and around the boundaries of the site. The northern boundary of the site is formed by small watercourse/stream that is a tributary of the River Kenwyn.

1.2.2 The site does not contain or form part of any statutory designations (such as Areas of Outstanding Natural Beauty, Sites of Specific Scientific Interest, etc.). The site lies to the north of a designated World Heritage Site.

1.2.3 The site is located to the north of the A390 (which runs along the southern boundary) and lies adjacent to the wider mixed use Langarth proposal, which received outline planning permission (PA11/06124) in July 2013. It is also within close proximity (less than 1 km) of the consented Stadium for Cornwall site, which now has detailed planning permission. The application site is therefore adjacent to land included in the Council’s ‘Land North of A390/Threemilestone’ development brief (2012).
1.2.4 The site is located approximately 1 km north west of the Langarth Park and Ride, 1.5 km to the north west of Threemilestone, 2 km west of Treliske and 6 km west of Truro city centre. A bus service operates along the A390 providing access to these locations.

1.2.5 Threemilestone provides access to a variety of services and facilities, which include; a school, a convenience store, post office, pharmacy, medical practice, car dealership, repair garage, several takeaways/cafes and a social club. Additionally, the Threemilestone retail and industrial parks are approximately 1 km from the site.

1.2.6 Truro is the largest settlement in Cornwall and 16% of the county’s jobs are located within the Truro and Roseland area. There are a range of employment opportunities present at Truro and there is a broad range of services and facilities including schools, doctors, dentists and leisure provision.

1.2.7 At Treliske there is a range of retail, employment and leisure provision. Additionally, the Royal Hospital Cornwall is within 2 km of the site on outskirts of Treliske.

1.2.8 The position of the site adjacent to the Langarth proposal and within close proximity of Threemilestone means that the sport, food and drink, community and retail uses proposed will benefit a large number of residents (both existing and prospective) and will be easily accessible.

1.2.9 The site location will also provide (and will further once Langarth has been constructed) the prospective residents of the West Langarth scheme with good accessibility to services, facilities and employment.
2.0 Methodology and Assessment Criteria

2.1 Methodology and Assessment Criteria

2.1.1 This ES adopts common assessment criteria and terminology. The general approach is set out in Volume 3, Technical Appendix 2.1. Individual topic chapters in this ES have used this approach, unless otherwise stated.

2.1.2 In relation to cumulative effects, specifically this ES contains an assessment of two types of effect:

1. The combination of individual effects (e.g. noise, dust, traffic, visual) from the development on a particular receptor; and
2. Effects from several developments, which individually might be insignificant, but when considered together would create a significant cumulative effect

2.1.3 The first type of cumulative effects are dealt with solely in Chapter 14 of this ES. In terms of second type of effects these are dealt with in each of the technical chapters (Chapters 6 to 13) with an overview summary provided in Chapter 14.

2.1.4 The schemes included (unless specifically stated otherwise in a technical chapter) for the assessment of cumulative effects are identified in the table 2.1.
### Table 2.1 – Cumulative Schemes

<table>
<thead>
<tr>
<th>Scheme/Proposal</th>
<th>Status</th>
<th>General description of scheme</th>
<th>Additional Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Langarth Farm proposal including Stadium</td>
<td>Approved (PA11/06124 and</td>
<td>Mixed use development comprising circa 1,500 dwellings, drinking establishment, hotel, employment floorspace, care home, park and ride extension, primary school, community space and associated public open space and infrastructure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Langarth Farm - Stadium</td>
<td>Approved (PA11/06125 plus</td>
<td>Erection of 10,000 person stadium including ancillary office, hospitality floorspace, hotel and infrastructure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PA12/09036)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maiden Green</td>
<td>Live application (PA14/00703)</td>
<td>Mixed use development of 650 dwellings (including extra care), school, employment space, convenience shop, community pavilion, infrastructure works, landscaping and public open spaces; district centre including supermarket, petrol station, retail units, community hall, restaurant and café uses, hotel, crèche, medical centre, mobile library parking, parking and servicing.</td>
<td>Supermarket not included in cumulative assessment as only one will ultimately be built-out</td>
</tr>
<tr>
<td>Willow Green</td>
<td>Live application (PA13/10454)</td>
<td>Mixed use development comprising 435 dwellings, nursing home, school, food store, petrol station, community hall, public house and public open spaces</td>
<td>Foodstore not included in cumulative assessment as only one will ultimately be built-out</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Land between A390, the P&amp;R and Willow Green Farm</th>
<th>Approved (PA12/11527)</th>
<th>Erection of 80 bed hotel, commercial units and associated car parking and servicing plus residential development (approximately 93 dwellings)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollards</td>
<td>Live application (PA14/03065)</td>
<td>Residential development of up to 78 dwellings with associated open space and infrastructure</td>
<td>This application proposes up to 78 units and is expected to make up for a shortfall on the wider Langarth site which has permission for up to 1,500 units</td>
</tr>
<tr>
<td>Former Richard Lander School redevelopment</td>
<td>approved PA12/10941 / (live amended application PA14/05421)</td>
<td>Proposed residential development comprising demolition of existing buildings, the erection of 226 dwellings, formation of vehicular accesses, parking and associated works and the provision of public open space</td>
<td>The live application essentially involves the same scheme - both propose 226 dwellings.</td>
</tr>
</tbody>
</table>
3.0 Key Issues

3.1 Issues for Assessment

3.1.1 This section identifies the key environmental issues that are assessed within this ES with regard to the site and the proposed development.

3.1.2 Following initial baseline work to inform the preparation of the scheme and the scoping undertaken by the applicant, the key issues identified and assessed within this ES include:

- Landscape and visual;
- Ecology and nature Conservation;
- Traffic and transport
- Dust and air quality
- Noise and vibration
- Water resources, flood risk and drainage
- Cultural Heritage; and
- Socio economic.

3.1.3 Cumulative effects related to all of the above key issues are dealt with within each technical chapter as well as within a standalone chapter (Chapter 14), where further consideration is given any impacts arising from a combination of individual effects a single receptor.

3.1.4 In addition to the above key issues, matters related to sustainability and lighting are considered at a strategic level to ensure that the scheme responds appropriately to these matters at the detailed design stage to ensure no significant impacts will result. On this basis an overview of sustainability and lighting considerations and the applicants proposed approach the approach at the detailed design stage is provided within Chapter 4.
4.0 Proposed Development, Sustainability and Construction Methodology

4.1 Proposed Development

4.1.1 The proposed development is advanced as enabling development for the Stadium for Cornwall. Enabling development as a concept relates to a proposal that may not ordinarily be acceptable but which would have such associated public benefits that this would override this fact. The developer returns from this proposal will therefore be used to fund the construction of the stadium. Please refer to the Enabling Statement submitted as part of the application for further details.

4.1.2 The scheme proposed is a mixed use development that will form a fully integrated extension to the wider Langarth proposal. The scheme proposes the concept of a dual district centre for the wider Threemilestone DB area by combining the application proposals with that proposed as part of the local centre on the Langarth site. When combined with the local centre at Langarth together they will deliver everything required to meet the requirements of a district centre.

4.1.3 The description of the proposed development is:

"Outline mixed use proposal for retail (Use Class A1) with associated petrol filling station and car parking (providing space for mobile library), food and drink (Use Classes A3, A4 and A5) / day nursery (Use Class D1) and residential (Use Class C3) alongside the provision of a community and sports facility (Use Classes D1 and D2), public open space (including formal playing pitch provision), and other associated infrastructure (inclusive of linkage to consented Langarth/Stadium sites). [Means of access to be determined only]"

4.1.4 The proposed mixed use development therefore involves the provision of a broad range of uses that will provide prospective residents of both this scheme and the wider A390 Development brief area with access to a range of uses/services/facilities.
4.1.5 In terms of the quantum of development proposed the Parameters Plan submitted defines this (see Technical Appendix 4.1). The following bullets and table provide a complete overview of the scheme illustrated on the Parameter Plan:

- Up to 130 residential units (use class C3) ranging from two to four storeys (ridge heights between 9 and 15 metres).
- Provision of sports pitches (two adult and one junior) and other public open space/ landscaping.
- Pedestrianised areas and a public square.
- Vehicular and pedestrian links to Langarth.
- Car parking – capable of accommodating 650 spaces and a requirements for a mobile library.
- Petrol filling station with 12 pumps and extending to a maximum height of 8 metres (top of canopy).

<table>
<thead>
<tr>
<th>Use</th>
<th>Floorspace</th>
<th>Floorspace</th>
<th>Height details</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>GIA (sq. m)</td>
<td>GEA (sq. m)</td>
<td></td>
</tr>
<tr>
<td>Community and Sports Facility (D1, D2)</td>
<td>500</td>
<td>515</td>
<td>Maximum of 8 metres (1 storey)</td>
</tr>
<tr>
<td>Retail (A1)</td>
<td>10,219 sq. m</td>
<td>10,536</td>
<td>Maximum of 8 metres (1 storey)</td>
</tr>
<tr>
<td>Food store (primarily convenience provision)</td>
<td>5,574 sq. m</td>
<td>5,747</td>
<td></td>
</tr>
<tr>
<td>Open A1 (Comparison goods) Retail Units</td>
<td>4,645 sq. m</td>
<td>4,789</td>
<td></td>
</tr>
<tr>
<td>Food and Drink / Day Nursery (A3, A4, A5, D1)</td>
<td>929 sq. m</td>
<td>958</td>
<td>Maximum of 15 metres</td>
</tr>
<tr>
<td>Totals</td>
<td>11,648</td>
<td>12,009</td>
<td></td>
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</tbody>
</table>

4.1.6 The open space included in the scheme enables the provision of formal sports pitches, informal amenity open space and children’s play areas. In addition to this, due to the interrelationship/connectivity between the site and the adjacent Langarh scheme it will also be possible for residents of this scheme (and vice
versa) to benefit from/utilise the open space provision on that site (particularly the proposed public open space immediately adjacent to the eastern boundary of the site).

**Lighting**

4.1.7 The detail of lighting and position of lighting is currently unknown as this is an outline proposal with all matters except for access reserved. The detailed positioning and specification of lighting will therefore be determined at the detailed design/reserved matters stage. It is therefore not appropriate at this stage to assess lighting in detail but instead undertake detailed assessment at the detailed design stage. At the outline stage it is considered appropriate to highlight how the detailed design of lighting should be advanced to ensure no adverse impacts result.

4.1.8 In terms of sensitive receptors there are existing residential properties, proposed residential properties and ecology (specifically Bats) which need to be considered when devising a lighting strategy and deciding on the positioning and type of lighting used within the various parts of the site. In the context of these receptors and to reduce any associated impact, any lighting proposed on the site should use shrouded, LED and/or directional as per guidance provided by the Institute of Lighting Engineers\(^1\). These measures will serve to minimise light spill.

**4.2 Sustainability**

4.2.1 The proposed development responds in full to best practice national planning guidance for sustainability and exceeds the minimum standards required by 2013 Building Regulations. The development will be sustainable in the following ways:

- **Economy**: Local jobs will be created on site from fuelling the local economy through its construction and ensuring appropriate employment

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\(^1\) Institute of Lighting Engineers - Guidance Notes for the reduction of Obtrusive Light GN01 (2005)
facilities are provided close by to reduce the need for unnecessary travel for basic services and work.

- **Transport**: Sustainable transport modes such as cycling and walking are to be promoted through the provision of dedicated pathways connecting to established routes into and around Truro. The development will be linked to an established Park & Ride facility near the site, providing direct and cost effective transport into the City Centre. All dwellings will be provided with ‘home office’ facilities which will facilitate working from home and reduce unnecessary car journeys.

- **Environment**: A variety of green spaces and buffer zones will be provided and these will integrate with the existing wildlife habitats found on the site. Trees and Cornish hedges will be retained as illustrated in the landscape strategy with appropriate buffer zones, maximising the sustainable use of existing resources. Planting schemes should be in preference for native and / or wildlife attracting species. Wetlands and swales will be incorporated, promoting sustainable drainage, enhancing biodiversity, assisting in delivering local cooling in summer and reducing air pollution. A focus on energy efficiency and incorporating renewable technologies will reduce the carbon dioxide emissions from the site below a 2010 Building Regulations baseline.

- **Community**: A range of open green areas, play spaces, share surfaces and dedicated community spaces and a facility will help to encourage social interaction across the development.

**Energy Production and Conservation**

4.2.2 All residential dwellings will benefit from energy efficient techniques such as reduced U-values via an enhanced fabric specification, highly efficient gas boilers, enhanced heating controls and an air tight build. The focus on enhanced fabric energy efficiency is an economically prudent strategy that maintains the maximum carbon dioxide savings over the lifetime of the development.
Selection of Materials

4.2.3 The selection of construction materials for all of the new buildings will favour those with the lowest environmental impact over their life-cycle. Timber will be sourced from well-managed and licensed European sources to reduce transportation emissions. Efforts will be made to source locally available building materials wherever possible.

Solar Access and Daylighting

4.2.4 The majority of dwellings have main living rooms that face due south. This assists in the maximum use of passive solar gains for heating, reducing the demand for central heating and associated carbon dioxide emissions. Wherever practicable, windows will be sized to take maximum advantage of natural daylight. This will again reduce the heating demand but will also limit the energy demand for electric lighting.

Water Conservation

4.2.5 To reduce water consumption within all residential dwellings to a total of no more than 125 litres per person per day, water efficient sanitary devices will be installed. This will potentially include dual flush WCs, spray/aerated taps, and reduced flow showers. Water meters will be installed in all homes/buildings to encourage future occupants to make maximum water savings.

Sustainable Drainage

4.2.6 The proposed development will incorporate Sustainable Drainage Systems, into the surface water management train, to control and treat surface water runoff at source. To provide both habitat enhancement and maintain groundwater flows, similar to the existing drainage regime, it is proposed to utilise a combination of both infiltration and above ground storage techniques. This approach was supported by the Environment Agency within the adjacent
Langarth development and it is therefore logical that it should be replicated through adjacent developments.

4.2.7 It is proposed that the commercial area will drain to a system of swales and wet ponds which will integrate with the green infrastructure and provide amenity enhancement. Prior to entering the wet ponds, swales and permeable paving will be incorporated in the upstream system to improve water quality of surface water runoff. The downstream ponds will provide the storage element of the system with the intercepted surface water stored above the permanently retained water level. The outfall from the system will be restricted to the calculated 1 in 1 year Greenfield runoff rate, for the undeveloped site, and therefore represents betterment to the downstream catchment up to the 1 in 100 year plus 30% climate change rainfall event.

4.2.8 The infiltration aspect of the drainage proposal, that will re-charge groundwater levels, will be provided through private soakaways and permeable paving within the residential areas. Where feasible, parking courts or private drives will be constructed using permeable paving to treat surface water prior to infiltration.

Domestic Recycling

4.2.9 Residents of homes will be provided with bin stores, which will include sufficient space to accommodate the local authority refuse and recyclable waste collection service.

4.3 Construction

4.3.1 At this stage it is not possible to detail exactly how the proposed development will be constructed as this will become clearer once the detailed design of the proposed development is defined at the subsequent planning stage (reserved matters). This section therefore describes the anticipated construction phases and specific assumptions to assist in identifying and assessing the potential construction impacts.
4.3.2 The following provides an indication of the timing and phasing of the construction period:

- Enabling works (site clearance, surveys, demolition, ground works, access and spine road etc) – July 2015 to December 2015 (6 months)
- Construction (including fit out) of Retail/PFS/mixed use areas (Café & restaurants / residential [up to 40 units] etc) January 2016 to February 2017 (14 months)
- Construction of purely Residential areas (up to 90 units) – January 2016 to May 2017 (18 months)
- Construction of Community and Sports Building and sports pitches – July 2016 to March 2017 (9 months)
- Landscaping and open space works - March 2017 to June 2017 (4 months)
- Completion - July 2017

4.3.3 The above indicative construction programme has been defined to reflect the applicants commitment to deliver the scheme at the earliest opportunity but also to establish a ‘worst case’ for assessment purposes (i.e. would result in the highest level of construction associated impacts). In this regard the programme outlined is based on a scenario whereby all of the proposed development is brought forward quickly and simultaneously.

4.3.4 Prior to the start of construction there will be a need to undertake a range of enabling work, which is expected to include:

- Additional survey work related to utilities and the undertaking of any necessary works;
- Establishment of the construction grid and temporary benchmarks;
- Demolition of existing buildings
- Construction of site access and internal spine roads;
- General site preparation ready for foundation work, inclusive of ground works and cut and fill exercise that will be necessary to facilitate the delivery of the scheme;
• Investigations and surveys necessary to define ground conditions in advance of construction of foundations and structures;
• Archaeological investigations to fully define any features present within the site and to confirm any required mitigation

4.3.5 With regard to the cut and fill exercise that would be required to facilitate the development, it has been estimated that approximately 140,000 cubic metres of material will be moved. Of this in the order of 60,000 cubic metres would be removed from the site and 80,000 cubic metres will be retained. To ensure a ‘worst case’ is assessed it has been assumed that 100,000m³ would be removed from the site within the identified ‘enabling works’ phase (over a 6 month period). On this basis and assuming the use of a 4 axle tipper lorry (which has capacity for around 9m³), total HGV movements over the period would be 11,111 (22,222 two-way). This equates to a daily flow of 93 arrivals (186 two-way) per day (based on four weeks p/month and five day days). Allowing for minor fluctuations in arrival rates, the worst case hourly HGV rate is assumed to be 1/8th of the daily rate, and thus 12 arrivals (24 two-way) which equates to one arrival every 5 minutes (or one movement every 2.5 minutes).

4.3.6 In terms of construction staff on-site, it has been assumed that there would a maximum of 100 at any one point over the construction phase. This figure has been derived from the total number of construction jobs expected to be generated by the proposal which is 216. The figure of 100 is considered appropriate as not all 216 employees related to the project would be working on site (e.g. specialist and technical staff / back of house positions).

Controls to protect the local environment and receptors

4.3.7 It is important to ensure there are controls in place to protect the local environment and provide mitigation for identified construction impacts. It is anticipated that these control measures, which are either proposed as mitigation or assessed as embedded within technical chapters, will be secured by appropriate planning condition.
4.3.8 The preparation of a Construction Environmental Management Plan (CEMP) is an established method of managing environmental impacts resulting from construction works. The CEMP would be submitted to and agreed with Cornwall Council in advance of commencement of works. The obligations of the CEMP would be passed on to the contractors as “Employer Requirements’ within the contract for the works. The structure of the CEMP is expected to include:

- A table (logical framework) showing the objectives, expected results, activities (mitigation/optimisation measures), and responsibilities for the implementation of those activities;
- The broad plan of the phasing of the work and its context within the whole project;
- Inclusion of baseline levels for noise, vibration and dust and monitoring protocols;
- Setting of ‘Threshold’ and Action Levels‘ for noise, vibration and dust to warn of activities that may require particular care and control;
- Details of prohibited or restricted operations (location, hours etc.);
- Institutional arrangements for its implementation and for environmental monitoring: responsibilities, role of the environmental authorities, participation of stakeholders;
- Suggestions for contracts (environmental clauses and standards) and contracting modalities;
- A monitoring and supervision plan (including appropriate indicators, frequency of monitoring, means to gather and analyse the data, reporting system);
- A response plan in case of accidents or unexpected results from the environmental monitoring;
- Reference to ground conditions and remedial measures and/or mitigation associated with ground contamination if necessary;
- Contact during normal working hours and emergency details outside working hours;
- Provision for reporting, public liaison, and prior notification of particular construction related activities;
• The mechanism for the public to register complaints and the procedures for responding to such complaints;
• The details of proposed routes for heavy goods vehicles travelling to and from the Site; and
• Reference to management of material resources and waste.

4.3.9 Additionally, it is proposed that the site is registered with the “Considerate Contractors Scheme”. This will ensure that contractors undertake their work in a safe and considerate manner that has due regard to pedestrians, road users and neighbouring properties.

4.3.10 The disposal of all waste and other materials from the site is expected to be controlled through the implementation of a Site Waste Management Plan (SWMP) to reduce environmental impact and the potential for any adverse impacts. The SWMP should form part of the CEMP requirements.
5.0 Consideration of Alternatives and Scheme Evolution

5.1 Consideration of Alternatives

5.1.1 Schedule 4, Part 1(2) of the EIA Regulations requires that an outline of the main alternatives studied and an indication of the main reasons for selecting the proposed option, taking into account the environmental impacts, is included in the ES.

5.1.2 The main objective of the proposed development is to enable the delivery of the Stadium for Cornwall and to deliver a district centre alongside community and sports uses to support the consented and proposed development along the A390 corridor. The ‘Land North of A390/ Threemilestone’ development brief (2012) establishes the Council’s aspirations for large scale development within this locality and envisages the provision of the uses contained in the proposed development subject of this ES.

- A sustainable, safe, accessible, and human friendly extension to Truro/Threemilestone that complements and integrates with existing communities and accords with the emerging Cornwall Design Guide.
- A phased development with all key infrastructure delivered as early as possible and the release of individual areas of land so as to avoid overloading of existing infrastructure.
- The provision of sustainable transport infrastructure to serve the development whilst improving the accessibility of facilities, services and employment for the existing community.
- The provision of an appropriate variety of sizes, tenures, densities and styles of housing in accordance with local need.
- The provision of significant new: employment; retail; open spaces; leisure and community facilities that complement and enhance provision for existing residents in meeting the needs of the new community.
- The retention and enhancement of important ecological, landscape and archaeological features within and, where possible adjacent to the site.
- A Stadium for Cornwall in a landmark building.
5.1.3 In summary the development brief sets out how it is envisaged that there will be the provision of approximately 2,600 dwellings, circa 17,000 sq. m of employment floorspace, a stadium, hotels, retail (including a food store), food and beverage uses, leisure provision and community facilities.

5.1.4 Before the current proposed development was advanced to the application stage, consideration was given to an alternative mix of uses at the site. The initial proposal for the site (submitted to Cornwall Council in the Scoping and pre-application request) included the provision of a food store, up to 250 residential units and a Park and Ride transport hub (providing up to 600 spaces).

5.1.5 After further analysis and following feedback on the proposal from Cornwall Council, the decision was taken to remove the park and ride element of the proposal and to move towards a scheme that would provide sports facilities and formal playing pitch provision alongside food and drink, day nursery and community uses. The revised mix of development was selected because this would facilitate the creation of a District Centre for the wider Langarth development and would ensure that sports and community facilities, including formal playing pitch provision, would be provided for the prospective residents of Langarth and the wider local area. The selected option would therefore provide wider socio economic benefits. It would also avoid potential highway related issues highlighted by the Council in their scoping response.

5.1.6 As with any development, it is crucial that a thorough understanding of the site is obtained before devising an initial scheme. This understanding then has to be balanced with the proposed uses. Following the undertaking of these processes, the opportunities for the site and subsequent realisation of the overall vision is achieved.

5.1.7 By analysing the site information and reflecting on potential uses, the following items are considered as the primary constraints for the site:
1. **Topography**
   There are significant changes in level across the site from south to north, which mean that the introduction of any building accommodation can be challenging. This constraint means careful consideration must be given to the location of any building.

2. **Highways and Access**
   Any buildings must have a clear and logical access that relates well to the existing and consented highways infrastructure.

3. **Connectivity and adaptation of consented Langarth masterplan**

4. **Visual Impact and Relationship to Existing Landscape**
   The visual impact of any development should be considered. Due to the topography and relationship to the open countryside to the west, consideration needs to be given to these important views.

5. **High Pressure Gas Main**
   The high pressure gas main (HPGM) that runs through the site is a major constraint on development.

6. **Ecology**
   Careful consideration must be given to the existing environment and species on the site. Where possible, the existing biodiversity must be sustained and enhanced.

7. **Heritage**
   Appropriate consideration is to be given to known and potential heritage assets within the site and in close proximity to it, which were identified through the preparation of a desk-based assessment.

5.1.8 Based on the constraints of the site and content of development, the following design opportunities where identified:
1. District Centre
The creation of a district centre with a mixed used activity facing away from open countryside and towards the consented Langarth masterplan.

2. Mixed Uses with Strong Relationship to Housing and Wider Residential Community
A mix of uses that centre around a central hub with strong physical connections to the consented Langarth residential masterplan and new stadium.

3. Location of Larger Buildings
Larger buildings should be located on ‘flatter land’ towards the northern boundary. This will reduce the visual impact and improve the viability. Opportunities for ‘green roofs’ that minimise the visual impact of the larger buildings should be considered and roof pitches that follow the existing natural topography of site will help reduce visual impact further.

4. Screening of Food Store Service Yard
A secure service area that is covered and screened when viewed from west should be considered. This is an important aspect of the development and must be detailed appropriately. Light spill and acoustic issues will need to be addressed to overcome the environmental challenges in this location.

5. Public Open Space
The provision of a variety of public open spaces for different activities that relate well to the consented masterplan, additional residential accommodation and new district centre. Due to the proximity of the site to open country side, the provision of larger areas of public open space can be used as a buffer for the development.

6. Housing that Adopts the Language of the Consented Masterplan
As the landscape characteristics of the site are similar to the consented masterplan, well connected housing that has a consistent and established
language can be adopted. Due to the topography of the site this housing will provide interest to the wider landscape.

7. **Green and Routes and Corridors**

Strong urban design principles have been used for the wider consented masterplan. These principles and connectivity strategies can be adopted to help the connectivity of the site. These strategies include the new link road and pedestrian green routes that run east to west through the consented masterplan.

5.1.9 A number of different layout options for the site were considered before the preferred option was selected (for full details refer to Design and Access Statement submitted as part of the application). These included positioning the retail element and the residential elements within the western proportion of the site and locating the formal playing pitch provision within the central and eastern parts of the site. The preferred layout with the district centre and food store located at the centre of the application site with residential accommodation to the east and the majority of public open space (including sports pitches and associated facilities) located to the west has been selected for the following positive attributes and environmental reasons:

- There is a good physical and visual connection to the main highway. This is critical for the viability of the project and the attractiveness to retailers. A clear and simple connection will also ensure improved orientation for the community and visitors.
- The topography of the site is challenging and extreme in places. The severe changes in level restrict access, viability and appropriateness in many locations on the site. By working with the existing landscape and placing the buildings in the landscape that minimise the impact is necessary. Therefore the larger buildings are located on the flatter parts of the site and towards the lower levels.
- The visual impact from the open country side from the west is important. This impact is significantly minimised by placing the larger buildings on the lowest part of site. This issue is improved further by facing the main activities and frontages away from the western views.
• The orientation of the district centre facing away from the western views significantly improves the connectivity to the wider consented Langarth masterplan and stadium to the east. By extending the established vehicular and pedestrian routes of the consented Langarth masterplan towards the district centre also improves this relationship.

• By placing the larger public open space to west of the site, the relationship of the development to the landscape is improved. The public open space uses soften the edge of the development and aims to ensure the district centre connects well with the landscape. As the topography in the west of the site is less severe, a reduction in the changes in level will reduce cut and fill. This will ensure that the public open space is more viable, appropriate and attractive.

• Some public open space will be provided to replace the landscape strip to the western edge of the consented Langarth masterplan. Due to the topography it is suggested that this area will be a park with children’s play areas. The provision of these facilities will relate well to the housing either side. The houses will front onto the new public space producing an appropriate residential language.

• The established language of the consented housing will extend into the application site and the built form will terminate with the district centre. This will create an appropriate and ‘joined-up’ architectural approach.

• The frontage of the food store and comparison retail will help to animate the pedestrian route and district centre. The architectural detailing to these areas will be enhanced and add to the character and attractiveness of the area. By creating a central hub that has a focus of uses in one place ensures that the quality is maintained.

• The service yard will be more discrete at the north of the site and will be hidden from the long distant views with a landscape screen. By enclosing this area the noise and light spill will be minimised.
6.0 Landscape and Visual

6.1 Introduction

6.1.1 This chapter has been prepared by FPCR Environment & Design Ltd and is a Landscape and Visual Impact Assessment (LVIA) of the application, "Outline mixed use proposal for the provision of retail (shops and supermarket), restaurant and café and residential uses alongside the provision of public open space (including community sports facility and playing pitch provision), a petrol filling station and other associated infrastructure. (Means of access to be determined only)". The site location and its context are shown in Figure 6.1. For ease of description and for clarity, the LVIA refers to the application site as the site and the development proposals as stated above and indicated in Parameters Plan as the Proposed Development.

6.1.2 The purpose of the LVIA is to assess the landscape and visual effects of the Proposed Development on the receiving landscape and visual resource.

6.2 Legislative and Policy Framework

6.2.1 The overall planning policy context in relation to the application is explained in more detail within the accompanying Planning Statement. The following provides a summarised review and has been considered specifically in relation to urban design, green infrastructure, landscape and visual matters.

National Context

6.2.2 The National Planning Policy Framework (NPPF) sets a ‘presumption in favour of sustainable development’ and includes general policy guidance on Green Infrastructure, landscape character and good quality design.

6.2.3 Section 7 of the NPPF deals with “Requiring good design” and section 8 deals with “Promoting healthy communities”. In terms of design, the NPPF states that:
"The Government attaches great importance to the design of the built environment. Good design is a key aspect of sustainable development, is indivisible from good planning, and should contribute positively to making places better people" (para 56)

6.2.4 Section 11 is concerned with “Conserving and enhancing the natural environment”. The NPPF seeks to conserve and enhance the natural environment – protecting and enhancing valued landscapes, and affording great weight to the protection of areas of natural and scenic beauty.

"The planning system should contribute to and enhance the natural and local environment by: Protecting and enhancing valued landscapes...”

6.2.5 The landscape and green infrastructure proposals which form part of the proposed development stem from the landscape and visual appraisal undertaken and reflect the principles of Good Design which the NPPF advocates.

National Planning Practice Guidance (NPPG 2014)

6.2.6 The NPPG came into force on the 6th March 2014 and is part of the Governments reforms to make the planning system less complex and more accessible. It is an online planning resource and provides guidance on the NPPF. The NPPF continues to be the primary document for decision making.

Local Context

Carrick District Local Plan

6.2.7 The Carrick District Local Plan was adopted in April 1998, and a number of policies from this document were "saved" by the Secretary of State in September 2007.

6.2.8 Until a Local Plan for Cornwall is prepared, planning policy in use within the Carrick District area at the 31st March 2009 will continue to have some weight. The weight will vary with the degree to which the Policy is still relevant in terms of evidence and National Policy.
6.2.9 The Local Plan "saved" policies that are relevant to this development proposal are:

- 3A Protection of Countryside
- 3D Character and Setting of Settlements
- 3F Trees and hedgerows
- 3J Local Habitats
- 10B Open space and childrens play space in new development

**Cornwall Local Plan 2010-2030**

6.2.10 Cornwall Local Plan 2010-2030 is the developing local development plan for Cornwall. The relevant landscape policies are listed below.

**Policy 23 Natural Environment**

This policy seeks to limit preventable loss of trees, hedges, lakes/ponds or other important landscape or ecological features that could be successfully and appropriately incorporated into the design of a development.

Development proposals will need to sustain Cornwall’s local distinctiveness and character and protect and enhance Cornwall’s natural environment and assets according to their international, national and local significance through the following measures:

1. **Cornish Landscapes**

   "Development should be of an appropriate scale, mass and design which recognise and respect the distinctive and diverse, landscape character and coastline as being vital to Cornwall’s economy whilst having regard for the sensitivity and capacity of the landscape asset."

3. **Terrestrial and Marine Biodiversity and Geodiversity** Specifically ensuring that with direct and cumulative impact:
   a) "international, national and locally designated sites for nature conservation are safeguarded"
   b) conserves, protects and enhances features of biological or geological interest (including Biodiversity Action Plan habitats and species), and provide for their appropriate management.
   c) ensure no net loss of existing biodiversity and enable a net gain in biodiversity by designing in biodiversity, and ensuring any unavoidable impacts are appropriately mitigated and/or compensated for.
d) the importance of habitats identified in the South West Regional Nature Map and the creation of a local and regional biodiversity network of wildlife corridors and local wildlife sites, helping to deliver the actions set out in the Cornwall Biodiversity Action Plan are recognised.”

**Policy 25 Green Infrastructure**
The policy seeks to protect and enhance a diverse, connected and functional network of open spaces and waterscapes.

Development proposals should:

1. “Demonstrate that all the functional environmental infrastructure and connections have been taken into account including; ecosystem services; biodiversity; coastal processes; and recreation within and near to the application site and show how this understanding has positively influenced the proposal.
2. Retain and enhance the most important environmental infrastructure assets and connections which contribute to our Strategic Environmental Infrastructure network in their existing location.
3. Provide appropriate buffers to high value natural spaces.
4. Restore or enhance connectivity for nature and people through the site and linking to adjacent sites.
5. Provide good quality and accessible open and coastal space.
6. In exceptional circumstances where the need for the retention of the most important environmental infrastructure assets and connection is outweighed by the benefits arising from the development proposals, mitigation against the loss of such green infrastructure should be equal to or above its current value and quality.
7. Provide clear arrangements for the long-term maintenance and management that supports the green infrastructure and for transport routes.”

**Policy PP6 – Truro and Roseland CNA**
The policy seeks to demonstrate that the following landscape relevant priority for Truro can be satisfied:

“…Protection and enhancement of the landscape setting and green infrastructure of Truro.”

**Landscape Designations and Strategies**

6.2.11 This section considers only the relevant landscape designations and strategies in the context of the landscape and visual issues of the site and development.
Landscape Designations

6.2.12 No specific landscape designations have been identified within the proposed site. Figure 6.2 shows the designations with a relevance to landscape in the locality.

Gwennap Mining District - World Heritage Site

6.2.13 To the south of the site lies the Gwennap Mining District World Heritage Site. Designated in 2006 the World Heritage Site protects the Cornish and West Devon Industrial Mining landscape.

"Once the richest of all Cornwall’s mining districts, its fine houses, well-preserved industrial remains and dramatic, alien-looking mining landscapes. It is a large and varied area of fertile countryside, historic mining villages, pretty woods, tranquil river creeks and some of the most impressive industrial landscapes to be found anywhere in the site."

Landscape and Green Infrastructure Strategies

A Green Infrastructure Strategy for Cornwall 2012

6.2.14 Cornwall’s vision is for a strategically planned and delivered green network throughout the county, comprises of high quality green spaces, green corridors and other environmental features delivering a wide range of ecosystems services for the benefit of all.

6.2.15 The strategy provides a strategic framework to enable a focus on the two main areas which are best able to develop and deliver a well-planned and functioning green infrastructure resource. These areas are:

"Where new housing and employment growth is likely to be delivered through allocation of housing growth and distribution options, as set out in the Core Strategy.

On a catchment level to increase the ability of natural systems to function more effectively."
To be successful the strategy will need to have in-built flexibility to allow it to evolve over time and to reflect circumstances as they change and as projects are delivered.”

6.3 Methodology and Scope

6.3.1 The LVIA is based upon the guidance contained within the Guidelines for Landscape and Visual Impact Assessment (GLVIA3)²,

6.3.2 In summary, the GVLIA3 states:-

"LVIA, is a tool used to identify and assess the significance of, and the effects of, change resulting from development on both landscape as an environmental resource in its own right and on people's views and visual amenity."

6.3.3 There are two components of LVIA that are described separately within this report:-

- Assessment of landscape effects; assessing effects on the landscape as a resource in its own right; and
- Assessment of visual effects; assessing effects on specific views and on the general visual amenity experienced by people.

6.3.4 The GLVIA3 recognises that professional judgement is a very important part of LVIA, and states that whilst there is some scope for quantitative measurements of some relatively objective matters, much of the assessment must rely on qualitative judgements (para 2.23). It also states that in identifying significant effects

"the need for an approach that is in proportion to the scale of the project that is being assessed and the nature of the likely effects judgement needs to be exercised at all stages in terms of the scale of the investigation that is appropriate and proportional" (para 1.17).

6.3.5 In terms of baseline studies, the assessment provides an understanding of the landscape in the area to be affected, its constituent elements, character, condition and value. For the visual baseline this includes an understanding of the area in which the Proposed Development may be visible, the people who may experience views, and the nature of views.

6.3.6 The overall significance of effects is determined by making judgement about two components:-

- The nature of the receptor likely to be affected (known by the shorthand 'sensitivity') and;
- The nature of the effect likely to occur (known by the shorthand 'magnitude').

6.3.7 Judgements on sensitivity are made by considering:

- The susceptibility of the receptor to the type of change arising from the specific proposal; and
- The value attached to the receptor.

6.3.8 Judgements on magnitude are made by considering:

- The size and scale of the effect, for example whether there is a complete loss of a particular element of the landscape or a minor change;
- The geographical extent of the area that will be affected; and
- The duration of the effect and its reversibility.

6.3.9 Consideration of all of the above feeds into a comprehensive assessment of significance.

6.3.10 In terms of mitigation, primary measures to prevent/avoid, reduce and, where possible, offset or remedy any significant adverse effects are developed through the iterative design process of the Proposed Development. This is described by the LVIA and is included within the overall assessment of effects.
Assessment of Landscape Effects

6.3.11 GLVIA3 states that:

"An assessment of landscape effects deals with the effects of change and development on landscape as a resource".

6.3.12 The baseline landscape is described by reference to existing landscape character assessments, and by a description of the site and its immediate context.

6.3.13 A range of landscape effects can arise through development. These can include:-

- Change or loss of elements, features, aesthetic or perceptual aspects that contribute to the character and distinctiveness of the landscape;
- Addition of new elements that influence character and distinctiveness of the landscape; and
- Combined effects of these changes.

6.3.14 These are discussed within the assessment.

Susceptibility to Change and Value of the Landscape Receptor

6.3.15 The characteristics of the existing landscape resource are considered in respect of the susceptibility of the landscape resource to the change arising from the development.

6.3.16 The value of the existing landscape is also considered. The GLVIA3 indicates information that contributes to understanding landscape value. This information is set out in paragraph 5.20 of the GLVIA3 and includes:-

- Information about areas recognised by statute such as National Parks, Areas of Outstanding Natural Beauty;
- Information about Heritage Coasts, where relevant;
- Local planning documents, for local landscape designations;
- Information on individual or groups of features such as conservation areas, listed buildings, special historic or cultural sites;
- Art and literature, identifying value attached to particular areas or views; and
- Material on landscape of local or community interest.

6.3.17 Where there is no clear existing evidence on landscape value, an assessment is made based on the following factors, as outlined within the GLVIA3:-

- Landscape quality (condition);
- Scenic quality;
- Rarity;
- Representativeness;
- Conservation interest;
- Recreation value;
- Perceptual aspects; and
- Associations.

**Magnitude of Landscape Effects**

6.3.18 Each effect on landscape receptors is assessed in terms of size or scale, geographical extent of the area influenced and its duration and reversibility.

6.3.19 In terms of size or scale the judgement takes account of the extent of the existing landscape elements that will be lost or changed, and the degree to which the aesthetic or perceptual aspects or key characteristics of the landscape will be altered by removal or addition of new elements. This assessment describes scale and size by reference to the terms of 'High', 'Medium' and 'Low'.

6.3.20 The geographical extent of the effect is described by reference to the site, its immediate context and wider landscape character areas. The duration and reversibility of effects are also described.
Significance of Landscape Effects

6.3.21 The overall significance of landscape effects is determined by considering the sensitivity of the landscape receptors and the magnitude of effect on the landscape.

6.3.22 The landscape sensitivity is determined by considering the susceptibility to change and the value of the landscape receptor. Judgements about the susceptibility to change are recorded on a scale of 'High', 'Medium' and 'Low'. The value of the landscape is recorded on a scale of 'National', 'Regional' or 'Local'. The magnitude of landscape change is defined in terms of 'High', 'Medium', 'Low' or 'Negligible'.

6.3.23 The GLVIA3 notes, at paragraph 5.46, that there can be complex relationships between the value attached to landscape receptors, and their susceptibility to change. As an example, a nationally valued landscape does not automatically have a high susceptibility to all types of change.

6.3.24 Final conclusions regarding the overall significance of landscape effects are drawn from the assessment components. The GLVIA3 notes, at paragraph 5.56-5.57:

"There are no hard and fast rules about what makes a significant effect, and there cannot be a standard approach since circumstances vary with the location and landscape context and with the type of proposal. At the opposite ends of a spectrum it is reasonable to say that:

- Major loss or irreversible negative effects, over an extensive area, on elements and/or aesthetic and perceptual aspects that are key to the character of nationally valued landscapes are likely to be of the greatest significance;
- Reversible negative effects of short duration, over a restricted area, on elements and/or aesthetic and perceptual aspects that contribute to but are not key characteristics of the character of landscapes of community value are likely to be of least significance and may, depending on the circumstances, be judged as not significant; and
- Where assessments of significance place landscape effects between these extremes, judgements must be made about
whether or not they are significant, with full explanations of why these conclusions have been reached.

Where landscape effects are judged to be significant and adverse, proposals for preventing/avoiding, reducing, or offsetting or compensating for them (referred to as mitigation) should be described. The significant landscape effects remaining after mitigation should be summarised as the final step in the process”

Assessment of Visual Effects

6.3.25 An assessment of visual effects deals with the effects of change on the views available to people and their visual amenity.

6.3.26 Field evaluation has been used to establish a series of representative viewpoints. These have been used to represent a range of potential viewpoints.

6.3.27 The viewpoints include:-

- Views to aid description of the site itself (where considered appropriate);
- Public viewpoints, including rights of way and open access land;
- Public locations representing residential areas (where possible);
- Transport routes; and
- Places where people work.

6.3.28 The views also represent what can be seen from a variety of distances towards the Proposed Development, and thus provide different viewing experiences.

Sensitivity of Visual Receptors

6.3.29 For each affected viewpoint the assessment considers both susceptibility to change in views and the value attached to views.

6.3.30 The visual receptors most susceptible to change are generally likely to include:-

- Residents at home;
- People engaged in outdoor recreation, including users of public rights of way, whose attention or interest is likely to be focused on the landscape or particular views;
- Visitors to heritage assets or other attractions, where views of surroundings are an important contributor to the experience; and
- Communities where views contribute to the landscape setting enjoyed by residents within the area.
- Travellers on road, rail or other transport routes tend to fall into an intermediate or lower category of susceptibility to change. Where travel involves recognised scenic routes or recognised important viewing points, awareness of views is likely to be higher.

6.3.31 Visual receptors less likely to be sensitive to change include:-

- People engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape; and
- People at their place of work whose attention may be focused on their work or activity, not on their surroundings.

6.3.32 Judgements about susceptibility to change are recorded in this assessment on a scale of 'High', 'Medium' and 'Low'.

6.3.33 Judgements on the value attached to views experienced takes account of:-

- Recognition of the value attached to particular views, for example in relation to heritage assets or through planning designations; and
- Indicators of the value attached to views by visitors, for example through appearances in guidebooks or visitor maps.

6.3.34 Judgements on visual value within this assessment are assessed as 'High', 'Medium' and 'Low'.
**Magnitude of the Visual Effects**

6.3.35 Each of the visual effects is evaluated in terms of its size or scale, the geographical extent of the area influenced and its duration or reversibility.

6.3.36 In terms of size or scale, the magnitude of visual effects takes account of:

- The scale of the change in the view with respect to the loss or addition of features in the view and changes in its composition, including proportion of the view occupied by the Proposed Development;
- The degree of contrast or integration of any new features or changes in the landscape with the existing or remaining landscape elements and characteristics; and
- The nature of the view of the Proposed Development, in terms of the relative amount of time over which it will be experienced and whether views will be full, partial or glimpsed (minimal)

6.3.37 The geographical extent of the visual effect in each viewpoint is likely to reflect:

- The angle of view in relation to the main activity of the receptor;
- The distance of the viewpoint from the proposed development; and
- The extent of the area over which the changes will be visible.
- As with landscape effects, the duration of the effect could be short to long term or permanent and the same definitions apply.

**Significance of Visual Effects**

6.3.38 GLVIA paragraphs 6.44 and 6.45 state:

"There are no hard and fast rules about what makes a significant effect, and there cannot be a standard approach since circumstances vary with the location and landscape context and with the type of proposal. At the opposite ends of a spectrum it is reasonable to say that:"
• Effects on people who are particularly sensitive to changes in views and visual amenity are more likely to be significant
• Effects on people at recognised and important viewing points or from recognised scenic routes are more likely to be significant.
• Large-scale changes which introduce new, non-characteristic or discordant or intrusive elements into the view are more likely to be significant than small changes or changes involving features already present within the view.

Where visual effects are judged to be significant and adverse, proposals for preventing/avoiding, reducing, or offsetting or compensating for them (referred to as mitigation) should be described. The significant landscape effects remaining after mitigation should be summarised as the final step in the process”

**Overall Landscape and Visual Effects**

6.3.39 The final conclusions are drawn from the separate judgements on the sensitivity of the receptors and the magnitude of the effects, alongside reasoned professional judgement.

6.3.40 The GLVIA3 states at 3.32 that

“There are no hard and fast rules about what effect is likely to be ‘significant’ but LVIAs should always distinguish clearly between what are considered to be the significant and non-significant effects”.

6.3.41 The GLVIA3 Statement of Clarification\(^3\) states

“Concerning ‘significance’, it is for the assessor to define what the assessor considers significant. Depending on the means of judgement and terminology (which should be explicitly set out), effects of varying degrees of change (or levels of change), may be derived. The assessor should then establish (and it is for the assessor to decide and explain) the degree or level of change that is considered to be significant.”

6.3.42 For this assessment, the following descriptive thresholds have been used:-

- **Major**: an effect considered very important in the decision making process.

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\(^3\) GLVIA 3 Statement of Clarification 1/13, 10\(^{th}\) June 2013
• **Moderate**: an effect that is notable and one that is generally considered to be material in the decision making process.

• **Minor**: an effect that will be noticed, but is not considered to be an important factor in the decision making process; and

• **Negligible**: an effect that will be discernible, but of very limited consequences and one that not important or relevant to the decision process.

6.3.43 This LVIA considers that **Major** effects, whether they are adverse or beneficial, are significant, whilst **Moderate, Minor** and **Negligible** effects, whether adverse or beneficial are not judged to be significant.

6.4 **Baseline Conditions**

6.4.1 The site lies circa 6km to the west of the centre of Truro, and circa 3km west of Royal Cornwall Hospital and immediately north of the Threemilestone area and Truro Park and Ride. The A390 runs west to east to the south of the site forming a major transport corridor into Truro. The approach to Truro along this corridor is characterised by some private properties, a number of smaller industrial and business units and a retail park closer to Threemilestone. Its location and extent is identified on **Figure 6.1**. The site at the time of survey was in agricultural use.

*Landscape Character and Context*

6.4.2 Landscape Character Assessments have been prepared at National and Countywide scales covering the site and its context.

*National Character Assessments*

6.4.3 The site lies within Natural England’s National Character Area (NCA) profile 152 ‘Cornish Killas’. This is an extensive character area, with the site located approximately centrally within it.
6.4.4 Key Characteristics of the NCA 152 ‘Cornish Killas’ are described below:

- "Undulating slate plateau with little woodland and few hedgerow trees.
- Numerous broadleaved wooded valleys, varying greatly in size. Northern valleys generally narrow and densely wooded. In the south there are drowned valleys (rias) with wide estuaries.
- Rugged coastal scenery. Exposed and windswept cliffs in the north with limited access to the sea more sheltered and wooded in the south.
- Outstanding historic parks, mainly in the sheltered valleys in the south.
- Generally a dispersed settlement pattern of hamlets, farmsteads and small fishing villages.
- Variable field pattern dominated by stone-built Cornish hedges.
- Important archaeological and industrial-archaeological sites."

6.4.5 Given that the Natural England assessment covers a wide area, the description and details contained therein only describes the very broad landscape context for the site and wider landscape context. The local landscape is more influenced by local landscape features.

*Local Character Assessments*

6.4.6 The Cornwall and Isles of Scilly Landscape Character Assessment provides a further grain of landscape characterisation. Part of the site lies within the large character type CA11 – ‘Redruth, Camborne and Gwennap’. The rest of the site lies in the adjacent Landscape Character Area CA13 – ‘Fal Ria, Truro and Falmouth’. These character areas are shown within Figure 6.2.

6.4.7 CA 11 key characteristics are described below:

- "Rolling slate and siltstone landscape with small scale inland but more open on the north coast.
- Post-industrial mining landscape with many visible mining relics, including old engine houses and revegetating spoil heaps with remnant surviving or developing woodland, heath or wetland.
- Extensive Lowland Heathland with bracken and scrub along coastal strip
• Pastoral landscape of improved and rough grazing with extensive areas of rough land.
• Strong field pattern enclosing small-medium scale fields and narrow lanes.
• Trees, occurring in hedges, valleys, corner of fields and around farm buildings.
• Valleys which are shallow and narrow, containing small streams.
• A well populated landscape containing Cornwall’s largest built-up area.
• Many built structures giving the landscape a cluttered appearance.”

6.4.8 CA 13 key characteristics are described below:

• “An interlocking and winding ria (drowned river valley) system of small creeks and river valleys that drain into the River Fal that broadens to form the Fal Estuary.
• Muddy creeks with brackish open water and wet grassland, merging with Coastal Saltmarsh close to tidal limits.
• Semi-natural woodland and Ancient Woodland on steep slopes, with ornamental and conifer estate planting inland on the undulating plateau with Monterey Pines a feature. Where woodland does not dominate the slopes there are pasture fields usually with scrub vegetation down to the water's edge. Extensive forestry north of Ladock and west of Tresillian.
• Farmland is a mix of pasture and arable with some areas of upland rough ground with a small field pattern of anciently enclosed land with more regular larger fields indicating areas of more recent enclosure. Fields are bounded by Cornish Hedges with extensive tree cover on these boundaries, adding to the wooded feel.
• Creeks that are dominated by former ports in small villages, with an industrial, water-related character of small quays and landing stages.
• Harbours and defence fortifications at the mouth of the estuary. Quays and tide mills at the heads of creeks.
• A coastal zone of low rocky cliffs backed by farmland interspersed with discrete woodlands.
• Transition between coastal and tidal river waterscapes, with many boats and ships emphasizing the marine character.
• Medieval settlements at the heads of creeks with strong vernacular of slate with render, painted pink, cream or white with frequent medieval churches. Linear villages occur along main transport routes on the valley floors with some larger urban and industrial areas.
• Tree lines linking villages, farms and cottages and forming tunnels.
• A busy landscape with much movement of people between the urban centres and lots of river traffic.”

6.4.9 This description applies to the wider area, but the local landscape is more influenced by local landscape features.

**Local Landscape**

6.4.10 The landscape in which the site is located draws on the character of the character areas described above, but is also influenced by the local interaction of topography, vegetation and local landscape features. An assessment of the local landscape character has been carried out, using field evaluation and analysis of maps and other published data based on the guidance by Natural England and by the characterisation completed by Cornwall Council.

6.4.11 The site comprises of five fields of variable sizes. At the time of survey all of the fields were planted with arable crops apart from the smallest field which consists of pasture. The field boundaries comprised of hedgebanks with a hedgerow on top. The hedgerows surrounding the smaller fields are overgrown with many small trees providing a feeling of enclosure. In the larger fields and in particular in the upper parts of these fields the hedgerows only contain occasional small trees creating a more open character.

6.4.12 The surrounding local landscape to the north, east and west is predominantly farmland with scattered farmsteads and a field pattern consisting of medium sized fields. Trees are more abundant in the valleys and as one moves nearer to the top of ridges the vegetation becomes sparser with hedgerows containing relatively few trees. There are a number of wind turbines on the ridges to the north of the site. To the immediate south of the site there are a number of residential properties that run along the main transport route, the A390. Part of
the large Gwennap Mining District World Heritage Site lies to the south of the A390. The landscape of the World Heritage Site consists of a network of smaller, often tree-lined fields giving this area a feeling of enclosure with limited views out to areas beyond. The settlement of Threemilestone is circa 1.5km from the site, in addition there are a series of small light industrial buildings, a small retail park and the Park and Ride for Truro that border the A390.

**Landform**

6.4.13 In the wider context of the site the land is formed of gently rolling hills and river valleys, with land east of Threemilestone falling away to the Fal estuary. The site itself is located on sloping land between approximately 75m AOD and 105m AOD. Land falls away to the north towards a tributary for the River Kenwyn. A localised highpoint is located on the site’s southern boundary, with the A390 passing through a cutting in the hillside. A topography plan is shown in Figure 6.3.

**Hedgerows and Boundary Features**

6.4.14 The site comprises of fields bound by hedgerows and banks. The hedgerows in the lower part of the site contain many small/medium sized trees. The hedgerows in the higher parts of the site contain few trees and have become thin in places and overtaken by brambles.

**Woodland and Trees**

6.4.15 Young to mature singular and groups of trees are to be found in the stream valley that forms the northern boundary of the site.

**Urban Influences and Infrastructure**

6.4.16 The A390 runs adjacent to the southern edge of the site, providing a main link between Truro and the A30. The A390 has become a corridor for light industrial buildings which lie approximately 1km to the south and east of the site.
Public Rights of Way (PROW) and other Footpaths

6.4.17 A public right of way crosses a small part of the eastern part of the site.

Landscape Condition

6.4.18 The condition of the site landscape has been assessed as Moderate/Poor.

a. The site itself is not covered by a landscape quality designation;

b. There are no significant landscape features within the site that would severely preclude development.

c. Features of the landscape such as the hedgerows in the upper parts of the site would benefit from a combination of either improved or different management or maintenance.

d. The site comprises of 5 fields planted mostly with arable crops. Most of the biodiversity value is likely to be confined to the field boundaries.

e. It is a landscape that is influenced by the urbanising effects of the A390.

Visual Receptors and Existing Views

6.4.19 A visual appraisal has been undertaken for the proposed development. The baseline appraisal seeks to explore the nature of the existing visual amenity of the area and to establish the approximate visibility of the site from any surrounding receptors. This section provides a baseline analysis of the available views and amenity and is supported by a series of photo viewpoints (Figures 6.5 – 6.9). Figure 6.4 details the location of the photo viewpoints.

6.4.20 An assessment of the visual effects of the proposed development upon the receptors is detailed in the subsequent effects section. The viewpoints are described below.
**Photo viewpoint 1 – View south east from start of a public right of way on road to north of site**

6.4.21 This viewpoint is from the start of the public right of way to the north of the site. From this point only the upper parts of the site can be seen. Trees rise up beyond the site on the horizon. Just beyond the site some houses that lie on the A390 are visible amongst the trees. The lower parts of the site are obscured by the trees in the valley bottom.

**Photo viewpoint 2 – View east from a public right of way.**

6.4.22 This viewpoint is from the public right of way that runs to the west of the site. Only small parts of the eastern parts of the site are visible from this viewpoint because of intervening vegetation.

**Photo viewpoint 3 – View north east: users of the A390**

6.4.23 The viewpoint represents what can be seen by occupants of vehicles as they travel along the A390 towards Truro. Only glimpses are afforded of the site from this viewpoint because of a belt of trees between the road and the site.

**Photo viewpoint 4 – View south west from a public right of way**

6.4.24 This photograph shows the view looking south west from a nearby public right of way. Large parts of the eastern parts of the site are visible from this location. Scattered small trees that are on the southern part of the site run along the horizon. The western parts of the site are not visible because of the intervening landscape.
**Photo viewpoint 5 – View south from gateway on road to the north of the site.**

6.4.25 Viewpoint representing the view through a gateway on the road that runs to the north of the site. From this viewpoint only the eastern part of the site is visible. The rest of the site to the west is obscured by a tall, overgrown hedgerow.

**Photo viewpoint 6 – View north east from a public right of way.**

6.4.26 North east viewpoint from a public right of that lies to the south of the A390 in the World Heritage Site shows rising land screens the site from this point.

**Photo viewpoint 7 – View looking east from road to the south of Three Burrows**

6.4.27 Views of the site from this eastern viewpoint on a road to the south of Three Burrows within the World Heritage Site are screened because of the landform, with the site sloping away in the opposite direction.

**Photo viewpoint 8 – View north from road at Saveock**

6.4.28 This photograph was taken looking north from a road located to the south of the site. In the foreground are the houses that comprise Saveock. The site is not visible from here because the land rises up from this point.

**Photo viewpoint 9 – View north from public right of way**

6.4.29 This photograph was taken looking north from a public right of way in the World Heritage Site. The nature of the landform with the site sloping away in the opposite direction and also intervening trees means that the site is not visible from this location.
6.4.30 The photograph was taken from a road on the edge of the residential area of Three Burrows. From this elevated vantage point the eastern end of the site is visible in the middle distance. Beyond the site the land continues to fall and in the far distance the Park and Ride and the urban area of Truro is just visible.

6.4.31 This photograph was taken from a gateway on a road to the north east of the site. Trees in the intervening landscape block views to the site.

6.4.32 View point looking south west through a gateway on a road to the north east of the site represents the start of a public right of way. From this point the site is not visible because of the intervening landform and vegetation.

6.4.33 This photograph was taken looking south west from a gateway on the B3284. The site is not visible because of the intervening landform and topography.

6.4.34 This photograph was taken looking northwest from the A390. The land rises up in a ridge towards the site and the road lies below the cutting as it passes this point. The fact that the land rises up and the site slopes away in the opposite direction means that site is not visible from this viewpoint.
**Photo viewpoint 15- View southeast from road near Lands Farm**

6.4.35 This photograph was taken looking south east from the road near Lands Farm. A large part of the site is visible from this point although the view is a fairly distant one. The lower parts of the site and the smaller field that comprise the site are obscured from view by a combination of landform, an agricultural building and vegetation. The view of the site is in the context of an agricultural building and wind turbine in the foreground. Beyond the site and to the east are industrial/retail units that lie on the A390 and further beyond this the urban area of Truro is visible.

**Summary of Visual Receptors**

6.4.36 The interaction of topography and vegetation results in a restricted ‘visual envelope’ or visible extent of the site. The photographic viewpoints demonstrate how visually contained the site is from the south, west and east. The main views of the site are from the public rights of way to the north of the site and from the A390 for people travelling in the direction of Truro. The potential visual receptors that have been identified are indicated on Figure 6.4 are as follows:
Table 6.1 Receptors

<table>
<thead>
<tr>
<th>Sensitivity to Change</th>
<th>Value</th>
<th>Receptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium - High</td>
<td>High</td>
<td>1. Residents of Three Burrows</td>
</tr>
<tr>
<td>Medium</td>
<td>Medium</td>
<td>2. Users of public rights of way to the north of site</td>
</tr>
<tr>
<td>Low</td>
<td>Medium/Low</td>
<td>3. Users of the A390</td>
</tr>
<tr>
<td>Medium</td>
<td>High</td>
<td>4. Users of public rights of way in the World Heritage Site</td>
</tr>
<tr>
<td>Medium</td>
<td>Medium</td>
<td>5. Users of distant public rights of way to the north east of the site</td>
</tr>
<tr>
<td>Medium - High</td>
<td>High</td>
<td>6. Residents of properties adjacent to the site boundary</td>
</tr>
</tbody>
</table>

6.5 Identification and Evaluation of Key Likely Impacts

Construction

Landscape Effects

6.5.1 There is limited existing site vegetation away from the hedgerow and planted boundaries, so little vegetation will be removed as part of the works. The extent of the planting to be removed represents a small overall proportion and quantity. Where trees are to be conserved, protective fencing and measures in accordance with BS 5837 (Trees in relation to construction) would be implemented as required to protect the areas; trees and planting within the site. These would be implemented prior to the commencement of construction.
work within the vicinity of the specific areas or planting. The removal of any mature trees or vegetation would be undertaken outside the bird nesting season (or if unavoidable, would be inspected prior to removal by a suitably qualified ecologist and only removed following confirmation that there are no nesting birds present).

6.5.2 In landscape terms, the effects arising during construction would not be significant as the construction phase is transitory in nature and over the short term. It would generally reflect the overall change to the landscape character of the site and loss of landscape features and resources as outlined in the subsequent Operational Effects section. Overall and relative to the local landscape character and resources, there would be a **Minor Adverse** landscape effect during construction and effects would be localised to the site.

**Visual Effects**

6.5.3 Construction activities and plant movements within the site would be visible from a limited number of receptors. The clearest views towards the activities and plant movements etc would be experienced by users of the public rights of way to the north of the site and from the A390 for people travelling in the direction of Truro.

6.5.4 The significance of the visual effects for all of these receptors would vary during the course of construction and would generally increase at the peak of construction activity and with the structure of the built units (to their maximum heights) in place. At this time, the significance of the visual effects is likely to exceed those arising from the completed and operational development. However, these increased visual effects would only occur for a relatively short duration and for a limited number of receptors or locations. The sequencing and phasing of the development would also influence the nature and extent of the visual effects during the construction period.

6.5.5 Overall, the construction effects on the surrounding visual receptors are considered to be Moderate Adverse, with users of the A390 and users of the public rights of ways to the north of the site gaining the closest and clearest
views towards the construction activity experiencing the most significant visual
effects at the peak of construction activity.

6.5.6 At worst, the significance of the visual effects of construction upon each of the
identified receptors is considered to be generally comparable with the
significance assessments outlined in the Operational Section. In some cases,
the potential visual effects would be relatively worse or better for a period of
time, yet the significance of the effects during the construction period as a
whole are considered to be generally comparable.

Operational

6.5.7 This section details the landscape and visual effects arising from the proposed
development of the site. The operational effects consider those effects arising
upon completion of the proposed development. The impact on the landscape as
a result of the Proposed Development would be restricted to the site and the
immediate local landscape around it. There would be no major adverse effects
upon the wider landscape.

6.5.8 It is considered that the site’s landscape is one that could receive change of the
nature and type proposed, as presented by the masterplan, and that
development upon it would not lead to any unacceptable landscape effects.

Landscape Effects

6.5.9 The predicted effects are considered with reference to the published landscape
character assessments, local landscape character and site specific landscape
features and components.

Landscape Character Assessments

6.5.10 The proposed development would have very limited effects upon the National
Countryside Character Area 152 ‘Cornish Killas’. This generally reflects the
broader scale of these published assessments and the reduced influence that
the proposals would have over these more extensive landscape tracts. The proposed development would have a **Minor Adverse** landscape effect.

6.5.11 At a more detailed level, in the context of future development of the Langarth site the proposed development would occupy an urban edge location within the CA11 ‘Redruth, Camborne and Gwennap’ Landscape Character Type (LTC) and the CA13 – ‘Fal Ria, Truro and Falmouth’. The development would be an extension of the Langarth site and would be similar in character to this development. In this context the proposed development would result in a **Minor Adverse** landscape affect upon these LCTs. Beyond this, the proposed development would have a rapidly diminishing influence and no discernible landscape effect on the wider extents of these particular LCTs.

6.5.12 The Gwennap Mining District UNESCO World Heritage Site is located directly south of the A390. The nature of the topography of the area with the site sloping away from the area of the World Heritage Site means that the site is not visible from the World Heritage Site. The nature of the landscape in the World Heritage Site also reduces the potential for views of the site as the landscape in this area consists of a pattern of small field surrounded by high hedgerows. The susceptibility of the World Heritage Site to change is considered to be Low/Medium but the Value of this landscape is considered to be high. Considering the negligible scale of change it is considered that the significance of effects is **negligible**.

**Local Landscape**

6.5.13 The proposals would extend the built development north and west of Threemilestone and would extend the developed edge along the A390. However in the context of the future development of the Langarth site the proposed site would only represent an extension of the urban edge rather than a new separate area of development. The proposals would result in the direct loss of agricultural land (five fields).

6.5.14 The landscape sensitivity of this local landscape character area to the nature of the development proposed (residential) has been assessed as Medium/Low. The
considerations that have been taken into account to reach this conclusion are as follows: the landscape is of reasonably positive character; it contains strong hedgerow structure, however they have been left in disrepair and would be potentially tolerant of significant change; there is an absence of significant landscape features within the site of interest; in the context of the future development of the Langarth site the proposed site would constitute an extension of an urban edge rather than a new separate settlement; development of the site would be in the context of the current influences of the A390 road corridor with its existing residential, light industrial and retail development. All of these factors make the local landscape character area more tolerant of change.

6.5.15 The vast majority of the existing vegetation, tree belts and hedgerows would be conserved, together with the inclusion of significant new planting and areas of open space that would form part of the proposed scheme. Therefore the nature of the change would include some beneficial as well as adverse effects. The overall magnitude of this change has been assessed as Medium.

6.5.16 Overall, in the long term the resultant significance of landscape effect upon the local landscape character of the site and its immediate context would be Minor Adverse.

Landscape Features

6.5.17 Landform: The existing topography gently slopes away from the A390 northwards towards a watercourse. The proposed development has sought to assimilate the necessary landform changes as appropriately as possible with minimal disruption to the existing topographic character of the site. However a significant amount of cut and fill would still be required and therefore the significance of the landscape effect upon the local landform has been assessed as Major Adverse.

6.5.18 Hedgerows: Although some sections of hedgerow would need to be removed to facilitate access to the site the layout and design of the proposed development seeks to conserve the existing hedgerows and to utilise these to
support the establishment of landscape corridors throughout the proposed development where possible. New hedgerows would be planted and connected to the existing pattern of hedgerows and existing hedgerows would be reinforced where necessary by new infill planting (where any hedgerows are fragmented or include gaps) and appropriate management.

6.5.19 The pattern of existing and new hedgerows would run around the edge of the proposed development and would provide an appropriate and distinctive landscape setting to the built proposals. Although there would be a loss of sections of hedgerow the proposed development would result in an extension of the overall lengths and management improvements. The significance of the landscape effect upon hedgerows has been assessed as **Minor Beneficial** in the long term once the green infrastructure is established and maturing.

6.5.20 **Woodland and Trees**: The proposed development would seek to retain many of the singular mature trees on the boundary of the site, with a few trees potentially requiring removal to allow access. Where possible, there would not be a loss of any other trees or woodland as part of the scheme.

6.5.21 The proposals would include a corridor of green space running along the northern side of the site. This would increase the overall number of plants and related habitats across the site and assist in establishing a robust landscape framework for the built development proposals. In combination with the conserved planting, it assimilates the built development proposals. The significance of the landscape effect upon woodland and trees has been assessed as **Minor Beneficial**.

**Visual Effects**

6.5.22 A comprehensive visual appraisal of the development has been undertaken to determine the potential effects upon surrounding receptors. Using the methodology outlined at the beginning of this chapter, receptors with potential views to the proposed development have been assessed in terms of sensitivity, the nature and extent of the changes to view and resulting overall significance of the visual effect.
Effects upon Visual Receptors

Settlement and Properties – Summary

6.5.23 Residents of Three Burrows (Receptor 1). Partial distant views from these properties will be obtained of the proposed development. The landform and the existing intervening vegetation currently helps screen the site. The significance of visual effects on this receptor would be Minor/Negligible Adverse.

6.5.24 Users of public rights of way to the north of site (Receptor 2). At certain points users of the public rights of way to the north would obtain extensive views of the site. The impact is lessened because of the intervening topography and vegetation. Green roofs are proposed for the retail and supermarket buildings which will assist to lessen the impact of the development on these receptors. New tree planting is proposed along the northern boundary and as part of a network of green infrastructure. This planting would reduce the impact of the development in the medium/long term. The significance of the visual effects on the receptor are judged as Moderate Adverse.

6.5.25 Users of the A390 (Receptor 3). There are potentially for partial and glimpsed views of the site for users of the A390 as they travel toward Truro. This could be mitigated in the medium/long term by new planting along the southern boundary of the site (see Landscape and Opens Space Framework Plan that forms part of this application). Because the A390 is set down in a cutting there would be limited views of the site from vehicles travelling away from Truro on the A390. The significance of visual effects on this receptor is judged as Negligible in the long term.

6.5.26 Users of public rights of way in the World Heritage Site (Receptor 4). Because the site slopes away from the area of the World Heritage Site and there is a high point between the World Heritage Site and the site. As a result the site is not visible from areas to the south of the A390.
6.1.1 **Users of distant public rights of way to the north east of the site (Receptor 5).** Because of the topography of the area and the presence of intervening ridges and vegetation between the receptors and the site no views or only glimpsed views can be obtained of the site. The significance of visual effects on these receptors is judged to **Negligible Adverse** in the short term but there are considered to be no significant effects in the long term.

6.5.27 **Residents of properties adjacent to site boundary (Receptor 6).** Partial rear views from properties adjacent to the A390 on the south western site boundary will be possible. These properties consist of West Langarth Farm and buildings, a bungalow and detached dwellings. Views to the site depend on rear garden boundary treatments and orientation of the building, restricting views to first floor rear windows. The due to the proximity of the partial views significance of visual effects on this receptor would be **Moderate Adverse**.

**Summary of Impacts**

6.5.28 See appendix 6A for the Landscape Effects Table and 6B for the Visual Effects table and summaries.

6.6 **Mitigation Measures**

**Construction Phase**

6.6.1 The location and design of temporary site compounds, lighting, signage and perimeter screen fencing, combined with effective project management would seek to ensure that the potential landscape and visual effects are minimised during the construction phase. It is anticipated that the construction working methods would adopt best practices and be agreed with the Local Planning Authorities and Statutory Bodies where necessary.

**Operational Phase**

6.6.2 Although close to urban areas and adjacent to an approved future development scheme the existing illumination of the local area is still largely unlit. The
project will follow the latest best practice guidance on lighting installations to minimize lighting emissions and pollution on the surrounding landscape and on the night time skies. Given the appropriate mitigating lighting strategy and the broadly well contained site the lighting effects on the night-time skies are considered to result in moderate-slight adverse effect.

6.6.3 Landscape mitigation for the scheme typically considers and addresses;

- The positioning of the proposed built development within proposed green infrastructure, to include retained landscape features and new landscape planting where needed to assist in providing screening and containment.
- Appropriate choices of building form, height, massing and materials to relate to the existing built form.
- The introduction of habitat creation as part of a green infrastructure framework that will provide biodiversity and recreational benefits.

6.6.4 The proposal is to include the following uses: Residential, Retail development, Food and Drink, Day Nursery and Community and Sports Facilities together with new footpaths and a play area (LEAP) and public open space within a network of Green Infrastructure.

6.6.5 A perimeter Green Infrastructure framework (see the Landscape and Open Space Framework Plan), which includes strengthening the existing boundary vegetation along the A390 and the existing areas of woodland along the northern and western boundaries would minimise the impact of the development upon the landscape. The planting of native woodland species would be appropriate given the rural surroundings of the site.

6.6.6 A wide corridor of public open space is proposed for the development along the northern boundary of the site. This would include new native woodland, scrub, orchard, meadow planting, balancing ponds and equipped play facilities. As well as this larger area of public open space, smaller areas of public open space create would link into this creating a network of green spaces throughout the site and create links to existing green corridors. The location and setting of existing established trees and hedgerows on the site will be respected and
incorporated into the proposals. Retained trees and hedgerows would be fully protected during the construction stages using best practice methods.

6.6.7 Approximately 10 hectares (60%) of the site is proposed as Green Infrastructure, retaining existing trees and hedgerows.

6.6.8 It is proposed that properties will be generally two storeys, with the potential for some 2.5 storey in height and a range of semi and detached properties. The built form of the development would take reference from local character and vernacular to ensure that the development is well related to its context. The choice of materials will reflect the colours of local brick and roof-tiles so that the built development blends visually with the existing settlement characteristics. High quality well-planned residential development would not be intrinsically harmful within this context.

6.7 Residual Impacts

Construction Phase

6.7.1 It is not envisaged that there will be any significant residual construction phase impacts.

Operational Phase

6.7.2 The development aims to establish a strong and robust landscape that is appropriate in landscape character terms and maximises its contribution to the landscape resources of the site. The landscape proposals would seek to reflect both the scale of the built development envisaged and the character of the surrounding landscape.

6.7.3 New trees, shrubs and hedgerow plants would be planted as part of the development. These would be principally native, indigenous and appropriate to the landscape character of the wider area and would offer valuable localised landscape and ecological benefits. The Green Infrastructure itself (excluding on plot landscape proposals to the building surrounds) occupies approximately 10
hectares (60% of the total site) and would include the following areas that are identified in the Parameters Plan that forms part of this application. Tree Screening and Landscape buffers; Landscaping (no public access); Public Open Space and Landscaping and Sports Pitches.

6.7.4 Although initially the overall significance of landscape changes to the site have been assessed as Moderate Adverse most of the adverse effects would reduce in the longer term due to the maturing of the landscape framework and the application of a comprehensive Landscape Management Plan. As a result the overall significance of change after a 15 year period has been assessed as Minor Adverse.

6.8 Cumulative Effects

Construction Phase

6.8.1 Careful consideration regarding the location and design of temporary site compounds, lighting, signage and perimeter screen fencing, combined with effective project management to minimise effects on residents within the consented Langarth development during the construction phase. It is anticipated that the construction working methods would adopt best practices and be agreed with the Local Planning Authorities and Statutory Bodies where necessary.

Operational Phase

6.8.2 The proposed development would add to the impact of the already consented Langarth development for the following receptors: Residents of Three Burrows (Receptor Group 1) and users of the PROW to the north of the site (Receptor Group 2) along with the future residents within the eastern edge of the proposed Langarth scheme. The proposed development however, would be viewed in the context of the urban edge, representing an extension of the already consented Langarth scheme thereby resulting in a lessened cumulative visual impact than if a physically separate area of development had been proposed.
6.9 Summary and Conclusions

6.9.1 This report has been prepared by FPCR Environment and Design Ltd. It comprises a Landscape and Visual Impact Appraisal (LVA) that has been undertaken by Chartered Members of the Landscape Institute. The proposal comprises residential development with associated green infrastructure, located to the northwest of Threemilestone, Cornwall. The proposed location of the site is shown in Figure 6.1. The LVIA considered the potential effects of the development upon:

- Individual landscape features and elements
- Landscape character
- Visual amenity and the people who view the landscape.

6.9.2 At a national level, the site lies within the National Countryside Character Area "Cornish Killas" described in Natural England’s National Character Area. This is a large character area and the site is located in the middle. The proposed development would have a Negligible landscape effect at this scale.

6.9.3 At a local scale the site lies within two character areas: the CA11 ‘Redruth, Camborne and Gwennap’ Landscape Character Type (LTC) and the CA13 – ‘Fal Ria, Truro and Falmouth’. These areas are shown in Figure 6.2. The development would be an extension of the Langarth site and would be similar in character to this development. In this context the proposed development would result in a Minor Adverse landscape effect upon these LCTs.

6.9.4 The landscape in which the site is located draws on the character of the CA11 ‘Redruth, Camborne and Gwennap’, character area and the CA13 – ‘Fal Ria, Truro and Falmouth’, but is also influenced by local characteristics, shaped by the local interaction of topography, vegetation and local landscape features.

6.9.5 The local landscape is medium in scale, with a range of fields under arable and pasture. The fields are mostly regular in shape and enclosed by hedgerows,
which are mostly in poor condition. Trees are located along the northern boundary.

6.9.6 The local topography gently undulates and is shown on Figure 6.3. The site lies approximately between 75m to 105m above Ordnance Datum (AOD) with the land falling gradually away to the north.

6.9.7 The landscape effects of the development would vary over time. Most of the adverse effects would reduce in the longer term due to the maturing of the landscape framework and the application of a comprehensive Landscape Management Plan. The overall landscape effects after a 15yr period have been judged to be Minor Adverse.

6.9.8 The visual influence of the development varies across the study area due to the limiting effects of both topography and vegetation.

6.9.9 Overall, the landscape and visual effects are considered to be predominantly localised and contained. The most notable landscape effects arise from the changes to the landscape character of the site and for the visual effects upon users of the public rights of way to the north of the site (the significance of effects is considered at Year 0 to be Major/Moderate Adverse for these receptors) and people travelling in vehicles on the A390 in the Truro direction (the significance of effects is considered Year 0 to be Minor Adverse for these receptors). However the scheme includes an extensive and robust landscape framework that has been carefully devised to provide a suitable green structure to the site and to conserve and extend those existing features and habitats of value. These mitigation measures will reduce the significance of impact over time (see appendix 6A and 6B) with the maturing of the proposals and the application of a Landscape Management Plan.

6.9.10 The proposed development would not give rise to any effects that should preclude it on landscape and visual grounds. Subsequent care and attention to the detailed design of the development will however, be important. In particular, careful regard to the rooflines, elevation treatments and overall detailed design of the buildings would be required to ensure that the potential
adverse visual effects are further mitigated and minimised. Similarly, careful attention will be required to the detailed design and management of the landscape framework to maximise the long term environmental benefits of this local resource.

6.9.11 Whilst there would be some adverse landscape and visual effects at the outset (Year 0) on account of the permanent loss of the fields and the change from agriculture to urban development, it is judged that these adverse effects would be localised, being limited to the site and the immediate local landscape around.

6.9.12 Effects would reduce in the longer term (Year 15 and beyond) on account of the maturing GI framework, which would provide a net gain in habitats, such as tree cover, as well as accessible green space for play and recreation. The overall landscape and visual effects at Year 15 are judged to minor adverse. It is considered that the site’s landscape character has the ability in which to absorb urban development of the scale and type proposed without causing any unacceptable landscape and visual harm.
# APPENDIX 6A - LANDSCAPE EFFECTS TABLE (LET)

<table>
<thead>
<tr>
<th>Landscape Type and Reference</th>
<th>Sensitivity of Landscape Effects</th>
<th>Magnitude of Landscape Effects</th>
<th>Notes</th>
<th>Overall Significance of Effect at Construction Phase</th>
<th>Overall Significance of Effect at Year 0</th>
<th>Overall Significance of Effect at Year 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susceptibility to Change</td>
<td>Value</td>
<td>Scale or Size of the Degree of Change including degree of contrast/integration) at Stages of Project</td>
<td>Are the Effects Reversible?</td>
<td>Major</td>
<td>Moderate</td>
<td>Minor</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Yes</td>
<td>Major</td>
<td>Moderate</td>
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</tr>
<tr>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>No</td>
<td>Moderate</td>
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</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>Negligible</td>
<td></td>
<td>Minor</td>
<td>None</td>
<td>No</td>
</tr>
</tbody>
</table>

**Landscape Designations:**

| Nil                          | n/a                             | n/a                           | No    | Moderate | Minor | None | None | Moderate | Minor | None | None |

**Landscape Character: National**

| National Countryside Character Area 152 'Cornish Killas'. | Medium/Low | Medium | Medium/Low | No | The site displays some of the key characteristics of the relevant NCA, however the proposals include the retention and reinforcement of key landscape features. There are no significant areas of designated character that would be affected by the proposals. | Moderate/Minor Adverse | Moderate/Minor Adverse | Minor Adverse |

**Landscape Character: Regional/Local**

| CA11 – ‘Redruth, Camborne and Gwennap’. | Medium/Low | Medium | Medium | No | The landscape displays some of the local character features. Some of the features of the Character area such as trees, occurring in hedges, valleys, corner of fields make development easier to assimilate into the landscape. The current influences would lessen the sensitivity of the site. This includes the influence of the road corridor and industrial estate and the absence of any well maintained significant landscape features or characteristic within the site of interest. | Moderate Adverse | Moderate Adverse | Minor Adverse |

| CA13 – ‘Fal Ria, Truro and Falmouth’ | Medium/Low | Medium | Medium | No | The landscape displays some of the local character features such as fields… bounded by Cornish Hedges with extensive tree cover on these boundaries. The current influences would lessen the sensitivity of the site. This includes the influence of the road corridor and industrial estate and the absence of any well maintained significant landscape features or characteristic within the site of interest. | Moderate Adverse | Moderate Adverse | Minor Adverse |

<p>| Gwennap Mining District UNESCO World Heritage | Low/Medium | High | Negligible | No | The nature of the topography of the area with the site sloping away from the area of the World Heritage Site means that the site is not visible from the World Heritage Site. The nature of the landscape in the World Heritage Site also reduces the potential for views of the site as the landscape in this area consists of a pattern of small field surrounded by high hedgerows. | Negligible | Negligible | Negligible |</p>
<table>
<thead>
<tr>
<th>Landscape Type and Reference</th>
<th>Sensitivity of Landscape Effects</th>
<th>Magnitude of Landscape Effects</th>
<th>Notes</th>
<th>Overall Significance of Effect at Construction Phase</th>
<th>Overall Significance of Effect at Year 0</th>
<th>Overall Significance of Effect at Year 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susceptibility to Change</td>
<td>Value</td>
<td>Scale or Size of the Degree of Change including degree of contrast/integration at Stages of Project</td>
<td>Are the Effects Reversible?</td>
<td>Major Moderate Minor Negligible None</td>
<td>Major Moderate Minor Negligible None</td>
<td>Major Moderate Minor Negligible None</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>No</td>
<td>No</td>
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</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>Negligible</td>
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**Site and Immediate Context:**

<table>
<thead>
<tr>
<th>Site and Immediate Context</th>
<th>Medium/Low</th>
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<th>Moderate Adverse</th>
<th>Moderate Adverse</th>
<th>Minor Adverse</th>
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<tr>
<td></td>
<td>Medium/Low</td>
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# APPENDIX 6B: VISUAL EFFECTS TABLE (VET)

<table>
<thead>
<tr>
<th>Ref</th>
<th>Receptor Type</th>
<th>Sensitivity of Visual Receptor</th>
<th>Magnitude of Visual Effects</th>
<th>Notes</th>
<th>Judged Effects at Construction Phase</th>
<th>Judged Effects at Year 0</th>
<th>Judged Effects at Year 15</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Susceptibility to Change</td>
<td>Value</td>
<td>Distance from Application Boundary (approx. m/km)</td>
<td>Nature of View</td>
<td>Is the View Permanent or Transient?</td>
<td>Size/Scale of Visual Effect (including degree of contrast/integration) at Stages of Project</td>
</tr>
<tr>
<td>1</td>
<td>Residents of Three Burrows</td>
<td>High</td>
<td>Medium Low</td>
<td>High</td>
<td>Medium Low</td>
<td>Full Partial Glimpse None</td>
<td>High Medium Low</td>
</tr>
<tr>
<td>2</td>
<td>Users of public rights of way to the immediate north of site</td>
<td>Moderate</td>
<td>Moderate</td>
<td>0.5km</td>
<td>Full to partial</td>
<td>Permanent</td>
<td>High / medium</td>
</tr>
<tr>
<td>3</td>
<td>Users of the A390</td>
<td>Low</td>
<td>Medium/ Low</td>
<td>Along southern boundary</td>
<td>Full to partial</td>
<td>Transient</td>
<td>High / medium</td>
</tr>
<tr>
<td>4</td>
<td>Users of public rights of way in the World Heritage Site</td>
<td>Medium</td>
<td>High</td>
<td>0.5-2km</td>
<td>None</td>
<td>Permanent</td>
<td>Low</td>
</tr>
<tr>
<td>5</td>
<td>Users of distant public rights of way to the north east of the site</td>
<td>Medium</td>
<td>Medium</td>
<td>1.5-2km</td>
<td>Glimpse/ None</td>
<td>Permanent</td>
<td>Low</td>
</tr>
<tr>
<td>6</td>
<td>Residents of properties adjacent to the site boundary</td>
<td>Moderate</td>
<td>High</td>
<td>0 km</td>
<td>Full to partial</td>
<td>Permanent</td>
<td>High</td>
</tr>
<tr>
<td>Ref</td>
<td>Receptor Type</td>
<td>Sensitivity of Visual Receptor</td>
<td>Magnitude of Visual Effects</td>
<td>Notes</td>
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<tr>
<td></td>
<td></td>
<td>Susceptibility to Change</td>
<td>Value</td>
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<tr>
<td></td>
<td></td>
<td>Value</td>
<td>Distance from Application Boundary (approx. m/km)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Value</td>
<td>Nature of View</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Value</td>
<td>Is the View Permanent or Transient?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Value</td>
<td>Size/Scale of Visual Effect (including degree of contrast/integration) at Stages of Project</td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>Ref</th>
<th>Receptor Type</th>
<th>Sensitivity of Visual Receptor</th>
<th>Magnitude of Visual Effects</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Judged Effects at Construction Phase</td>
<td>Judged Effects at Year 0</td>
<td>Judged Effects at Year 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Major</td>
<td>Moderate</td>
<td>Minor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minor</td>
<td>Negligible</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adverse</td>
<td>Beneficial</td>
<td>Adverse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Major</td>
<td>Moderate</td>
<td>Minor</td>
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<tr>
<td></td>
<td></td>
<td>Minor</td>
<td>Negligible</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adverse</td>
<td>Beneficial</td>
<td>Adverse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Major</td>
<td>Moderate</td>
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<td>Adverse</td>
<td>Beneficial</td>
<td>Adverse</td>
</tr>
</tbody>
</table>
7.0 Ecology and Nature Conservation

7.1 Introduction

7.1.1 The following chapter assesses the likely significant impacts of the Proposed Development upon ‘resources’ or ‘receptors’ of biodiversity and nature conservation value. The assessment is based upon the initial extended phase 1 habitat survey and subsequent surveys of specific protected, rare or notable species/groups details of which are provided in Volume 3 at appendix 7.1.

7.2 Legislative and Policy Framework

7.2.1 The policy and guidance framework for biodiversity and nature conservation is provided by various national, regional and local planning policies as outlined in the following section. In addition to these policies and the remit of the relevant legislative framework relating to biodiversity and nature conservation, supplementary guidance documents including Local Biodiversity Action Plans (LBAP) have also been assessed for their relevance to the Proposed Development.

Legislation

7.2.2 The relevant Legislative framework is summarised as follows:

- The Habitats Directive 1992⁴;
- The Conservation of Habitats and Species Regulations 2012⁵;
- The Wildlife and Countryside Act (WCA) 1981 (as amended)⁶;
- The Countryside and Rights of Way (CRoW) Act 1981 (as amended)⁷;
- The Natural Environment and Rural Communities (NERC) Act 2006⁸;

---
The Protection of Badgers Act 1992\(^9\); and
The Hedgerow Regulations (REGS) 1997 (as amended)\(^{10}\)

7.2.3 This assessment also takes into account the requirements of, and the advice provided in:

- Chartered Institute of Ecology and Environmental Management (CIEEM) (formerly IEEM) Guidelines on Ecological Impact Assessment (EcIA) 2006\(^{12}\).

**National context**

**National Planning Policy Framework (NPPF) 2012**

7.2.4 The National Planning Policy Framework (NPPF) 2012\(^{13}\) provides relevant information relating to the approach to be taken within the planning system to the various issues and disciplines encompassed by ‘sustainable development’, including in the production of local development plans and the determination of planning permissions for local councils. Planning applications should seek to conform to the principles set out within this framework, which should be reflected at a local level in local development frameworks and other planning policy documents for that area.

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\(^10\) DEFRA (1997) *The Hedgerow Regulations* DEFRA


7.2.5 Of relevance to this particular assessment is Section 11: Conserving and Enhancing the Natural Environment (paragraphs 109 – 125) of the NPPF. The following provides the overarching approach that should be taken with respect to the natural environment:

"...The planning system should contribute and enhance the natural and local environment by:

- Protecting and enhancing valued landscapes, geological conservation interests and soils;
- Recognising the wider benefits of ecosystem services;
- Minimising the effects upon biodiversity and providing net gains in biodiversity wherever possible, contributing to the government’s commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressure; and
- Preventing both new and existing development from contributing to or being put at an unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability."

7.2.6 In addition, the following paragraphs of Section 11 are of particular relevance to ecology and nature conservation:

"118. When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles:

- If significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or as a last resort compensated for, then planning permission should be refused;
- Proposed development on land within or outside a SSSI [Site of Special Scientific Interest] likely to have an adverse impact on an SSSI (either alone or in combination with other local developments) should not normally be permitted. Where an adverse impact upon the Site’s notified special interest is likely, an exception should only be made where the benefits of the development at this site, clearly outweigh both the impacts that it is likely to have on features of the Site that make it of special scientific interest and any broader impacts on the national network of SSSI’s;
- Development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;
- Opportunities to incorporate biodiversity in and around developments should be encouraged; Planning permission should
be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged, or veteran trees found outside ancient woodland unless the need for and benefits of the development in that location clearly outweigh the loss; and

- The following wildlife sites should be given the same protections as European sites:
  - Potential Special Protection Areas and possible (or candidate) Special Areas of Conservation;
  - Listed or proposed Ramsar sites; and
  - Sites identified or required ad compensatory measures for adverse impacts on European sites.

...125 By encouraging good design, planning policies and decisions should aim to limit the impact of light pollution on local amenity, intrinsically dark landscapes and Nature Conservation.”

7.2.7 The Government Circular ODPM 06/2005; Planning for Biodiversity and Geological Conservation – a guide to good practice to accompany the NPPF states also that the presence of a protected species is:

"...A material consideration when a planning authority is considering a development proposal which, if carried out, would be likely to result in harm to the species or its habitat.”

Local context

Cornwall Local Plan 2010 - 2030

7.2.8 Cornwall Local Plan 2010-2030 is the current local development plan for Cornwall. Those retained policies relevant to biodiversity and nature conservation have been included below.

Policy 23 Natural Environment

3. Terrestrial and Marine Biodiversity and Geodiversity Specifically ensuring that with direct and cumulative impact:

  a. "international, national and locally designated sites for nature conservation are safeguarded


ODPM
b. conserves, protects and enhances features of biological or geological interest (including Biodiversity Action Plan habitats and species), and provide for their appropriate management.

c. ensure no net loss of existing biodiversity and enable a net gain in biodiversity by designing in biodiversity, and ensuring any unavoidable impacts are appropriately mitigated and/or compensated for.

d. the importance of habitats identified in the South West Regional Nature Map and the creation of a local and regional biodiversity network of wildlife corridors and local wildlife sites, helping to deliver the actions set out in the Cornwall Biodiversity Action Plan are recognised.”

7.3 Methodology and Scope

7.3.1 An extended Phase 1 Habitat Survey (JNCC, 1993) was undertaken in July 2014 in order to identify protected rare or otherwise notable habitats, or habitats with the potential to support protected, rare or otherwise notable species or species groups. Habitats suitable for the support of the following species/groups were identified and further survey work recommended; badger, birds, bats & reptiles.

7.3.2 Methodology for each survey is detailed within the respective technical appendix (7.1). The ecological baseline and the assessment of the effects of the site relate to ecological resources or receptors present within the site unless the Zone of Influence (ZoI) is considered to extend to a wider area.

7.3.3 Formal request for scoping opinion was submitted to Cornwall Council as Local Planning Authority in February 2014. Response to this request was provided by Cornwall County Council and highlighted areas for consideration within this assessment that have been covered fully by this chapter and supporting information.

Desk study and consultation

7.3.4 Statutory and non-statutory organisations and local interest groups, including the Environmental Records Centre for Cornwall and the Isles of Scilly (ERCCIS) were consulted for any existing data relating to the site and immediate
surrounds. The search area for local biodiversity information was related to the importance of the respective site or species and the potential Zones of Influence (ZoI) of the Proposed Development upon each. Therefore, information was sought for sites of international importance (Special Protection Areas (SPA’s), Special Areas of Conservation (SAC’s) and Ramsar sites) within 5km of the site, sites of national or regional importance (Sites of Special Scientific Interest (SSSI) and Local Nature Reserves (LNR’s)) within 2km of the site and sites of County, District or Local importance (Sites of Importance for Nature Conservation (SINC’s) and Local Wildlife Sites (LWS)); and protected, Local Biodiversity Action Plan (BAP) priority, NERC S41, Red Data Book (RDB) or otherwise notable species within 1km of the site.

7.3.5 The following potentially significant effects on the ecology and nature conservation resources within the Ecological ZoI have been assessed in accordance with the Chartered Institute of Ecology and Environment Management (CIEEM) guidelines 2006. Based on the value or potential value of the ecological receptor/resource within a defined geographic context using the criteria detailed in Table 5.1. A minimum threshold of local/parish level value has been set to take forward through the assessment.

**Assessment of likely potential impacts**

7.3.6 The following paragraphs provide a brief, generic overview of the potential impacts that may influence Valued Ecological Resources (VER’s) during both the construction and operation phases of the Proposed Development.

**Construction Phase**

**Loss of habitat**

- The potential direct loss of habitat during the initial site clearance or land take activities;
- Changes in land use on scarce, protected or otherwise notable species;
- Disturbance
• Through accidental damage or degradation of retained habitats resulting from construction operations (includes noise and lighting);
• Through damage resulting from pollution incidents, chemical spills, improper storage of materials, construction vehicle maintenance etc. upon retained habitats; and
• Through harm or injury to scarce, protected or otherwise notable species resulting from the above (including habitat fragmentation).

**Operational Phase**

**Disturbance**

• Through intentional/unintentional damage and degradation of retained and newly created habitats through increased recreational use (compaction, changes in soil composition etc.);
• Through pollution incidents, chemical contamination resulting from runoff from urban paved surfaces, roads etc.;
• Through the introduction of alien, invasive or otherwise undesirable species;
• Through artificial lighting, noise, vehicular traffic etc.; and
• Changes in land use on scarce, protected or otherwise notable species.

7.3.7 Table 7.1 below provides the geographic frame of reference used for this assessment and is based on that provided in the Chartered Institute of Ecology and Environment Management (CIEEM) guidelines (2006). Former United Kingdom Biodiversity Action Plan (UKBAP) priority species and habitats still regarded as conservation priorities within the UK Post-2010 Biodiversity Framework are now listed on Section 41 of the Natural Environment and Rural Communities Act, 2006 (NERC S41). Table 7.1 below has been amended to reflect this.
### Table 7.1 Geographic frame of reference

<table>
<thead>
<tr>
<th>Level of value</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>International</strong></td>
<td>An internationally designated site or candidate site (Specially Protected Area (SPA), potential SPA (pSPA), Special Area of Conservation (SAC) or candidate SAC (cSAC)), Ramsar site, Biogenetic Reserve or an area which meets the published selection criteria for such designation, irrespective of whether or not it has yet been notified; A viable area of a habitat type listed in Annex I of the Habitats Directive or smaller areas of such habitat which are essential to maintain the viability of a larger whole; Any regularly occurring population of an internationally important species, which is threatened or rare in the UK (i.e. it is a UK Red Data Book (RDB) species or listed as occurring in 15 or fewer 10km squares in the UK or of uncertain conservation status or of global conservation concern; and A regularly occurring, nationally significant population/number of any internationally important species.</td>
</tr>
<tr>
<td><strong>National</strong></td>
<td>A nationally designated site (Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Marine Nature Reserve (MNR)) or a discrete area, which meets the published selection criteria for national designation (e.g. SSSI selection guidelines) irrespective of whether or not it has yet been notified; A viable area of a habitat listed on Schedule 41 of the Natural Environment and Rural Communities Act (NERC S41) or smaller areas of such habitat which are essential to maintain the viability of a larger whole; Any regularly occurring, regionally or county significant population/number of any nationally important species; and A feature identified as of critical importance also listed as NERC S41 habitats of principal importance.</td>
</tr>
<tr>
<td><strong>Regional</strong></td>
<td>Viable areas of key habitat identified in the Regional Biodiversity Action Plan (BAP) or smaller areas of such habitat which are essential to maintain the viability of a larger whole; Viable areas of key habitat identified as being of Regional value in the appropriate Natural Area profile; Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant Natural Area on account of its regional rarity or localisation; A regularly occurring, locally significant number of a regionally important species; and Sites which exceed the County-level designations but fall short of SSSI selection guidelines, where these occur.</td>
</tr>
<tr>
<td><strong>County</strong></td>
<td>Semi-natural ancient woodland greater than 0.25ha; County/Metropolitan sites and other sites which the designating authority has determined to meet the published ecological selection criteria for designation, including Local Nature Reserves (LNR) selected on County/Metropolitan ecological criteria (County/Metropolitan sites will often have been identified in local plans); A viable area of habitat identified in the County BAP; Any regularly occurring, locally significant population of a species which is listed in a County/Metropolitan “red data book” or BAP on account of its regional rarity or localisation; and A regularly occurring, locally significant number of a County/Metropolitan important species.</td>
</tr>
<tr>
<td><strong>District</strong></td>
<td>Semi-natural ancient woodland smaller than 0.25 ha;</td>
</tr>
</tbody>
</table>
Areas of habitat identified in a sub-county (District/Borough) BAP or in the relevant Natural Area profile;  
District sites that meet the published ecological selection criteria for designation, including LNR selected on District/Borough ecological criteria (District sites, where they exist, will often have been identified in local plans);  
Sites/features that are scarce within the District/Borough or which appreciably enrich the District/Borough habitat resource;  
A diverse and/or ecologically valuable hedgerow network;  
A population of a species that is listed in a District/Borough BAP because of its rarity in the locality or in the relevant Natural Area profile because of its regional rarity or localisation; and  
A regularly occurring, locally significant number of a District/Borough important species during a critical phase of its life cycle.

Local Areas of habitat considered to appreciably enrich the habitat resource within the context of the parish or neighbourhood (e.g. species-rich hedgerows); and LNRs selected on parish ecological criteria.

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Receptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>e.g. A feature of international biodiversity and nature conservation importance.</td>
</tr>
<tr>
<td>High</td>
<td>e.g. A feature of national biodiversity and nature conservation importance or one that has little ability to absorb change without fundamentally altering its present character.</td>
</tr>
<tr>
<td>Medium</td>
<td>e.g. A feature of regional or county biodiversity and nature conservation importance or one that has moderate capacity to absorb change without significantly altering its present character.</td>
</tr>
<tr>
<td>Low</td>
<td>e.g. A feature of district or local biodiversity and nature conservation importance or one that is tolerant to change without detriment to its present character.</td>
</tr>
</tbody>
</table>

7.3.8 In order to standardize the methodology for the assessment of likely potential impacts with that used in the other chapters of this Environmental Statement, the term ‘biodiversity value’ has been substituted by the term ‘sensitivity’. The relationship between the ‘sensitivity’ of any resource/receptor and its ‘value’ (measured on a geographic scale as per Table 7.1 above) is illustrated in Table 7.2 below.

### Table 7.2 Sensitivity of valued ecological receptors

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Receptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>e.g. A feature of international biodiversity and nature conservation importance.</td>
</tr>
<tr>
<td>High</td>
<td>e.g. A feature of national biodiversity and nature conservation importance or one that has little ability to absorb change without fundamentally altering its present character.</td>
</tr>
<tr>
<td>Medium</td>
<td>e.g. A feature of regional or county biodiversity and nature conservation importance or one that has moderate capacity to absorb change without significantly altering its present character.</td>
</tr>
<tr>
<td>Low</td>
<td>e.g. A feature of district or local biodiversity and nature conservation importance or one that is tolerant to change without detriment to its present character.</td>
</tr>
</tbody>
</table>

7.3.9 The likelihood that a change/activity will occur as predicted has a degree of confidence assigned. The categories used within this assessment are shown in table 7.3 below.
### Table 7.3 Probability of change

<table>
<thead>
<tr>
<th>Level of confidence</th>
<th>Estimated probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certain / Near Certain</td>
<td>Probability estimated at 95% chance or greater.</td>
</tr>
<tr>
<td>Probable</td>
<td>Probability estimated at below 95% but greater than 50%.</td>
</tr>
<tr>
<td>Unlikely</td>
<td>Probability estimated at below 50% but greater than 5%.</td>
</tr>
<tr>
<td>Extremely Unlikely</td>
<td>Probability estimated at lesser than 5%.</td>
</tr>
</tbody>
</table>

7.3.10 Reference may also be made to the parameters detailed in Table 7.4 when describing the likely potential impacts upon a valued receptor, ecosystem structure or function.

### Table 7.4 Parameters for describing likely potential impacts

<table>
<thead>
<tr>
<th>Parameters used in describing likely potential impacts</th>
<th>Definition of respective parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beneficial or adverse</td>
<td>Whether the likely potential impact is a positive or negative one.</td>
</tr>
<tr>
<td>Extent</td>
<td>The area over which the likely potential impact will occur.</td>
</tr>
<tr>
<td>Magnitude</td>
<td>The size/scale of the likely impact, in this instance whether the likely potential impact is substantial, moderate, slight or negligible.</td>
</tr>
<tr>
<td>Duration</td>
<td>The period of time over which the likely potential impact is predicted to last prior to mitigation, enhancement, compensation.</td>
</tr>
<tr>
<td>Reversibility</td>
<td>Whether the likely potential impact is permanent (irreversible) or temporary (reversible).</td>
</tr>
<tr>
<td>Timing and frequency</td>
<td>How often the likely potential impact will occur (e.g. disturbance from repeated noise and vibration associated with piling work) and when (e.g. vegetation clearance undertaken outside of the main bird breeding season).</td>
</tr>
</tbody>
</table>

7.3.11 As part of the Ecological Impact Assessment (EcIA) it is important to assess whether or not an impact is significant or not. Significance is defined as:
"An impact (adverse or beneficial) on the integrity of a defined site or ecosystem or the conservation status of a habitat or species within a given geographic area”.

7.3.12 As part of the process of determining whether there is likely to be an effect on the integrity of a site or ecosystem, the following questions were considered:

- Will any site/ecosystem process be removed or change?;
- What will be the effect on the nature, extent and function of the component habitats? and
- What will be the effect on the average population size and viability of the component species?

7.3.13 Terms used to define the magnitude of likely potential impacts upon VER’s are shown within the following table.

Table 7.5 Parameters for describing the magnitude of likely potential impacts

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substantial</td>
<td>Total loss or major/substantial alteration to key elements of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Loss of or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed.</td>
</tr>
<tr>
<td>Slight</td>
<td>A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition attributes of the baseline condition will be similar to the pre-development circumstances/situation.</td>
</tr>
<tr>
<td>Negligible</td>
<td>Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.</td>
</tr>
</tbody>
</table>
7.3.14 The significance of likely potential impacts upon valued ecological receptors is assessed in accordance with the Impact Significance Matrix summarized in table 7.6 below.

**Table 7.6 Impact Significance Matrix**

<table>
<thead>
<tr>
<th>Sensitivity of receptor</th>
<th>Magnitude of impact</th>
<th>Substantial</th>
<th>Moderate</th>
<th>Slight</th>
<th>Negligible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high</td>
<td>Major</td>
<td>Major – Intermediate</td>
<td>Intermediate</td>
<td>Minor</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>Major – Intermediate</td>
<td>Intermediate</td>
<td>Intermediate - Minor</td>
<td>Neutral</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>Intermediate</td>
<td>Intermediate - Minor</td>
<td>Minor</td>
<td>Neutral</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Intermediate - Minor</td>
<td>Minor</td>
<td>Minor - Neutral</td>
<td>Neutral</td>
<td></td>
</tr>
</tbody>
</table>

**Mitigation Measures**

7.3.15 For the purpose of this Ecological Impact Assessment (EcIA), impacts upon valued resources of biodiversity and nature conservation value are assessed in the absence of mitigation.

7.3.16 Mitigation or compensation is given for significant impacts upon valued resources of nature conservation interest and in line with current CIEEM guidelines, the mitigation for the effects of the Proposed Development aim to:

- Prevent any significant adverse ecological impacts:
- Reduce any significant adverse impacts that cannot be avoided; and
- Offset any residual impacts.

7.3.17 Priority is given in all instances to the avoidance of impacts, where possible through the design and through regulation i.e. timing, storage of materials etc., where this is not possible, opportunities are sought to reduce the impacts as much as is feasible. If significant impacts cannot be avoided through mitigation
then compensation considered appropriate to offset the significant adverse impacts of the Proposed Development are outlined.

**Cumulative Effects**

7.3.18 A review of the potential likely significant impacts of cumulative schemes has been undertaken and used to inform this assessment. Proposed or permitted developments that have the potential to have significant cumulative effects upon valued resources of biodiversity and nature conservation value are identified and summarized within Chapter 2 of this ES in addition to later in this chapter.

### 7.4 Baseline Conditions

**Existing baseline information**

7.4.1 The following section provides the results of desk surveys and searches for sites of nature conservation interest and records of protected, rare or otherwise notable species and the results of comprehensive field survey for habitats or protected, rare or otherwise notable species where such surveys were considered appropriate to inform this ES.

**Statutory and non – statutory sites of nature conservation interest**

7.4.2 Three internationally (European) designated sites have been identified within 10km of the application site, the closest of which is Carrine Common Special Area of Conservation (SAC) located c.3.14 southeast. This site is designated as it comprises Annex I habitats including Temperate Wet Atlantic Heath (with both Dorset heath *Erica ciliaris* and cross-leaved heath *Erica tetralix*) and European Dry Heath.

7.4.3 The second internationally designated site, Godrevy Head to St Agnes SAC, also designated for the presence of the Annex I habitats Temperate Wet Atlantic Heath and European Dry Heath is located c.7km northeast.
7.4.4 The third internationally designated site is the Fal and Helford SAC, a large estuarine site designated for wetland and saltwater habitats including sandbanks, mudflats, shallow inlets/bays and Atlantic Salt Meadows (all Annex I habitats) and additionally for the presence of populations of shore dock *Rumex rupestris*, an Annex I species.

7.4.5 A single nationally designated site (two sub-sites) is located c.0.86km and 1.42km west of the application area. The Carrick Heaths Site of Special Scientific Interest (SSSI) is designated as Southern Atlantic Wet Heath with additional nationally scarce plant, invertebrate and Schedule 1 bird species.

7.4.6 None of the above sites are considered likely to be affected by the proposed development, primarily owing to the relative degree of geographic isolation. The application area is remotely connected to the Fal and Helford SAC via the Langarth Stream in the north of the application area and the River Truro. Given the distance, it is considered highly unlikely that the proposed development would have any significant impact upon the integrity of the site.

*Protected and notable species*

7.4.7 Full details of recent local records of protected, rare or otherwise notable species are provided within Volume 3, appendix 7.1.

*Habitats and flora*

7.4.8 The application area consisted of three large arable field compartments bounded by indigenous hedgerows with narrow field margins. In addition was a smaller field of marsh grassland in the northwest of the application area. The northern boundary of the application area is a mosaic of wet grassland/rush pasture, riparian habitat and wet broadleaved woodland/willow carr alongside running water (Langarth Stream), referred to throughout the following chapter as the Langarth Stream corridor.
7.4.9 The botanical diversity of marsh grassland, hedgerow bases and field margins across the application area was considered reasonably diverse although no protected, rare or notable species were noted at the time of the initial survey.

Arable

7.4.10 The majority of land to be affected by the proposed development is under intensive arable tenure. Characteristically these large open arable fields are botanically species poor and of little or no floristic interest having been subject to historic repeated applications of nitrogen based fertilizers and herbicides. Such habitat is considered of negligible nature conservation value.

Tall Ruderal

7.4.11 Tall herbaceous and ruderal vegetation was present in small areas throughout the site, mostly in located on disturbed ground or high nitrogen substrate around agricultural buildings and little used field gate ways. No notable weeds were recorded in association with this habitat type across the site and such habitat can be thought of as largely ephemeral, common and widespread and easily replicable; therefore, tall herbaceous ruderal habitat is considered of negligible nature conservation value.

Rush pasture/wet grassland

7.4.12 Comprising a small field in the northwest of the site and a mosaic in association with wet woodland/willow carr and riparian habitats of the Langarth Stream corridor across the north of the site. Whilst many of the species recorded in this habitat are those frequently found within the scarce purple moor grass rush pasture (PMGRP) this habitat is distinguished from true PMGRP owing to the absence of purple moor grass and one or more creeping rushes (sharp-flowered rush, jointed-rush or blunt-flowered rush for example) and is therefore not a NERC S41 Habitat of Principal Importance. The habitat does support a diverse range of flora including nationally scarce wavy St John’s wort; and fauna including otter, bats and birds of conservation concern and therefore is
considered of **local/parish – district/borough** level nature conservation value.

**Hedges**

7.4.13 A total of eight hedges were assessed within the site, of which none were considered ‘important’ when assessed under the ecological criteria of the Hedgerow Regulations, 1997 (REGS). Four of the hedgerows (H1, H2, H3, H4) were however classified as of moderate to high nature conservation value against the Hedgerow Evaluation and Grading System (HEGS). A further hedge (H9) was considered defunct with only the bank and occasional scattered scrub present.

7.4.14 All indigenous hedgerows can be considered NERC S41 habitats of principal importance and are considered LBAP priority habitats in Cornwall. Providing connectivity throughout the site and between habitats within the wider local environment; and providing valuable resources to local wildlife, these hedgerows are considered of **local / parish level** nature conservation value.

**Wet woodland/willow carr**

7.4.15 Found as part of a mosaic of habitats that form the Langarth Stream corridor along the northern boundary of the site. Wet woodland/willow carr is considered an important stage in ecological succession between habitats of open water and deciduous broadleaved woodland and is recognized as a NERC S41 habitat of principal importance. Whilst relatively common throughout Cornwall and the southwest peninsula habitat is frequently lost through poor management and is therefore considered of **local / parish** level nature conservation value.

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**Langarth Stream (running water)**

7.4.16 Flows through the mosaic of habitats present within the Langarth Stream corridor, is a NERC S41 habitat of principal importance and LBAP priority habitat (rivers and streams) and considered of district / borough level nature conservation value.

**Notable plant species**

7.4.17 Two notable plant species were recorded from the site during the initial extended Phase 1 Habitat Survey and subsequent visits to site throughout 2014 and there is potential, given the number of local records for notable species returned following consultation with ERCCIS for the site to support other plant species of conservation concern. The habitats associated with the Langarth Stream corridor are of particular note with the site, overall considered of local / parish level nature conservation importance for higher plants.

**Invasive plant species**

7.4.18 The WCA Schedule 9 invasive ‘Japanese Knotweed’ is present within the site, limited to the southern site boundary. Given the potential detrimental effects of the spread of this invasive plant species upon other habitats of value it can be considered of negative nature conservation value of at least local / parish level.

**Fauna**

**Badger**

7.4.19 Following an extensive search of habitats within the application area for evidence of badger occupation or presence carried out during the initial Extended Phase 1 Habitat Survey (in June 2014) only a single disused sett comprising three holes was located just off site to the northeast. No further
signs of foraging were recorded from within the application area and therefore the habitats are considered of **negligible** value to local badger populations.

**Bats**

7.4.20 Static and manual bat activity transect surveys have been undertaken on a monthly basis in line with the Bat Conservation Trust (BCT) Guidelines 2012\(^\text{16}\) Although surveys have not been fully completed, given the range of common bat species (common and soprano pipistrelle, noctule, brown long – eared and Myotis species) recorded to date and the habitats available for foraging bats within the site, it is considered probable that these species, considered common and widespread within the wider local environment utilise habitats within the site (hedgerows, marsh grassland and the Langarth Stream corridor) for foraging and commuting. Such an assemblage of common bat species (and given the habitat present assumed unremarkable numbers) is considered to be of **local / parish** level value.

7.4.21 To date, in terms of Annex II species, only unremarkable numbers of greater horseshoe, lesser horseshoe and barbastelle bats have been recorded utilizing habitats within the application area for casual foraging and commuting. Whilst all three species are Annex II and NERC S41 priority species, all are considered to be widely distributed throughout the counties of the south west peninsula. Given the unremarkable numbers of each species recorded and that in each case, more optimum foraging habitat is present within the wider local area, the foraging resource provided by habitats within the application area is considered of **local / parish** level value to Annex II bat species. Details of bat survey results together with discussions can be found at Volume 3, technical appendix 7.1 of the ES.

**Breeding birds**

7.4.22 The main areas of interest in terms of breeding birds are confined to field compartment boundaries, specifically where well established Cornish hedges

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and banks of semi improved grassland and scattered scrub are present. Such habitat on site has the potential to support small populations of typical and widespread NERC S41/BoCC red or amber listed species including dunnock, song thrush, house sparrow, bullfinch, starling, whitethroat and mistle thrush.

7.4.23 Overall, based upon the species recorded during July 2014 and the range of habitats present across the site, habitats within the site are considered to be of Local/parish value to breeding birds.

**Wintering Birds**

7.4.24 A full winter bird survey has not been undertaken to date in association with this application owing to seasonal constraints however, an assessment of the potential for habitats’ present to support wintering birds was made during the initial Extended Phase 1 Habitat Survey (July 2014) and on subsequent visits during summer 2014.

7.4.25 A relatively wide range of habitats are present within the site including arable fields, hedgerows, wet woodland and riparian habitats that are likely to support a diverse range of wintering birds. Such an assemblage of wintering birds is likely also to include birds of conservation concern including dunnock, linnet, bullfinch, song thrush, starling, fieldfare and redwing.

7.4.26 Given that the site has the capability of supporting unremarkable populations of common and widespread wintering bird species, including those of conservation concern listed above during winter months, the site is considered to be of local/parish level value to wintering birds.

7.4.27 Wood lark have been recorded locally using fields of of arable stubble for overwintering but none were recorded during the Extended Phase 1 Habitat Survey, breeding bird habitat assessment survey or on subsequent visits to site. Arable fields are however considered suitable habitat for this species, in particular where stubble is left over the winter months. In the absence of survey evidence the presence of wood lark cannot be discounted however, the species is known to show high affinity to particular arable fields, or small areas
within arable fields and therefore the existence of local records does not necessarily indicate higher potential for presence on this site. Wood lark are a Schedule 1 WCA species and considered rare in Cornwall and the south west peninsula. Given this, the site is considered at most of **district/borough** level value to wintering wood lark.

**Amphibians**

7.4.28 No dedicated amphibian survey was undertaken in association with this application and no recent (<10 years) local records were returned following consultation with ERCCIS from within 2km of the site.

7.4.29 Wet grassland and riparian habitats of the Langarth Stream corridor along the northern boundary of the site provide suitable habitat for common amphibian species such as common toad and common frog, both species protected from sale in the UK under Schedule 5 of the WCA and the former being a NERC S41 species of principal importance.

7.4.30 The Langarth Stream corridor is to be retained and buffered by additional habitat creation under proposals and therefore, suitable habitats are unlikely to be adversely affected. The biodiversity value of the Langarth Stream corridor will be significantly increased through the proposed creation of additional aquatic and riparian habitats associated with the implementation of sustainable drainage.

7.4.31 Habitats within the site are considered of **local/parish** level nature conservation importance to amphibians.

**Reptiles**

7.4.32 Strategic presence/absence surveys for reptiles have been undertaken across the site during July and August 2014. No recent (<10 years) local records were returned following consultation with ERCCIS.
7.4.33 Suitable habitats within the site are limited to restricted semi improved grassland margins, Cornish hedges and wet grassland/riparian habitats associated with Langarth Stream along the northern boundary. A ‘low’ population of grass snake has been confirmed as using the habitats of the Langarth Stream corridor but no other reptile species were confirmed from the site. Whilst the habitats of the Langarth Stream corridor are considered the most suitable for grass snake, there is potential for hedgerow bases to be used by hibernating individuals. All common reptile species receive protection through the WCA and are considered NERC S41 species of principal importance. All three species mentioned are common throughout Cornwall and the UK. Given this, habitat on site is considered to be of local/parish level value to reptiles.

**Otter**

7.4.34 Otter signs have been observed from Langarth Stream that in association with marsh grassland and scrub (willow carr) forms the northern boundary of the application area.

7.4.35 Otter are protected under the Conservation of Habitats and Species Regulations 2010 and the WCA. They are listed on NERC S41 as a species of principle importance, a priority species in England and a LBAP priority species. Nationally, otter populations have undergone recovery since the first national survey (1977 – 1979)\(^{17}\) previous to which the national population had suffered serious decline. The most recent national survey confirmed the trend of population recovery (58%) and acknowledged that the recovery has been driven by re-colonisation from strongholds in the southwest (as well as northern England and Wales)\(^ {18}\). The otter population therefore is considered of district / borough level value.

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## Table 7.7 Valued Ecological Receptors

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Value</th>
<th>Receptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>N/A</td>
<td>No receptors were considered of very high sensitivity.</td>
</tr>
<tr>
<td>High</td>
<td>N/A</td>
<td>No receptors were considered of very high sensitivity.</td>
</tr>
<tr>
<td>Medium</td>
<td>Must be considered in conjunction with associated riparian habitat, rush pasture/wet grassland and wet woodland/willow carr. Distantly connected to the Fal and Helford SAC via the River Truro. <strong>District / borough.</strong></td>
<td>Langarth Stream corridor (running water and associated habitats)</td>
</tr>
<tr>
<td></td>
<td>In the absence of full survey data and with some limited potential for woodlark – if the site was confirmed as supporting wintering populations of this species then the nature conservation value of the site for wintering birds would be raised to <strong>District / borough</strong> level.</td>
<td>Wintering birds (wood lark)</td>
</tr>
<tr>
<td>Medium</td>
<td>Limited field evidence in the northwest of the site in habitat associated/adjacent to Langarth Stream. Local records and mobile local populations. <strong>District / borough.</strong></td>
<td>Otter</td>
</tr>
<tr>
<td>Low</td>
<td>No notable arable weeds, restricted margins. Provides foraging for wintering birds. <strong>Local /parish.</strong></td>
<td>Arable</td>
</tr>
<tr>
<td>Low</td>
<td>Common, widespread and easily replicable. Provides foraging for seed eating birds and nectar source for invertebrates. <strong>Local /parish.</strong></td>
<td>Tall Ruderal</td>
</tr>
<tr>
<td>Low</td>
<td>NERC S41. LBAP. Associated with Langarth Stream (Running water). <strong>Local /parish.</strong></td>
<td>Rush pasture/wet grassland</td>
</tr>
<tr>
<td>Low</td>
<td>None ‘important’ (REGS). Four mod – high conservation value (HEGS). All indigenous hedgerows NERC S41. <strong>Local /parish.</strong></td>
<td>Hedgerows</td>
</tr>
<tr>
<td>Low</td>
<td>NERC S41. LBAP. Associated with Langarth Stream (Running water). <strong>Local /parish.</strong></td>
<td>Wet woodland/willow carr</td>
</tr>
<tr>
<td>Low</td>
<td>Site supports two notable plant species (Wavy St John’s Wort &amp; balm-leaved figwort). <strong>Local /parish.</strong></td>
<td>Higher plants</td>
</tr>
<tr>
<td>Low</td>
<td>Two or three small stands of Japanese knotweed on the southern site boundary. <strong>Local /parish</strong> (negative).</td>
<td>Invasive plant species</td>
</tr>
<tr>
<td>Low</td>
<td>No signs of use, or occupation of the site by badgers. Local populations nearby so potential for</td>
<td>Badger</td>
</tr>
<tr>
<td>Level</td>
<td>Description</td>
<td>Biodiversity Category</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>Site used by unremarkable numbers of common and widespread bat species for foraging. Langarth Stream corridor in north of site likely to provide high quality navigational corridor. <strong>Local / parish.</strong></td>
<td>Bats (common species)</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>Site used by unremarkable numbers of Annex II bat species for foraging. Annex II species recorded both locally common and widespread throughout the southwest peninsula (including Cornwall), mostly associated with habitats of the Langarth Stream corridor in north of site. <strong>Local / parish.</strong></td>
<td>Annex II bat species</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>Supports a wide range of bird species including BoCC red and amber list species in addition to NERC S41 species of principal importance all of which can be considered common and widespread both locally and nationally. <strong>Local / parish.</strong></td>
<td>Breeding birds</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>Likely to support a wide range of bird species including BoCC red and amber list species in addition to NERC S41 species of principal importance all of which can be considered common and widespread both locally and nationally. <strong>Local / parish.</strong> N.B nature conservation of the site could be raised to <strong>District / borough</strong> level if breeding woodlark are confirmed on site (See wintering birds ‘Wood lark’ above).</td>
<td>Wintering birds</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>High potential for Langarth Stream corridor including riparian and rush pasture/wet grassland to support populations of common toad (NERC S41, LBAP) and common frog. <strong>Local / parish.</strong></td>
<td>Amphibians</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>Site supports ‘low’ population of grass snake (WCA Schedule 5, NERC S41). Recorded from the most suitable habitat on site associated with the Langarth Stream corridor. <strong>Local / parish.</strong></td>
<td>Reptiles</td>
</tr>
</tbody>
</table>
7.5 Identification and Evaluation of Key Likely Impacts

**Inherent mitigation through design**

7.5.1 This brief section describes how the proposed development and its design have responded to the emerging baseline ecology of the site in order to minimize the potential environmental impacts of, and maximize the biodiversity benefits delivered by the proposed development. Key principles of the development design were to take into account the valued ecological receptors identifies, retain all key features as far as is feasible and provide mitigation and enhancement through incorporation within a wider landscape framework with the aim of providing significant net biodiversity gains.

7.5.2 Substantial proportions of the landscape framework have been designed around the key habitats and features of the site as well as seeking to incorporate the features of value, primarily the Langarth Stream corridor and many of the site boundary hedgerows, wet grassland/rush pasture and wet woodland/willow carr.

7.5.3 This has resulted in a strong structural setting around which the proposed development has been designed, with the majority of remaining area to be developed, of significantly lower ecological value (arable fields with restricted margins). By retaining the Langarth Stream corridor (running water, wet woodland/willow carr, wet grassland/rush pasture and riparian habitat) and site boundary hedgerows the development proposals have acknowledged the significance of these features and their value to local wildlife and local communities.

7.5.4 As these features cross the site, their careful integration within the proposed development is expected to make the site more permeable to wildlife and should ensure that wildlife is present form the outset. By the retention and enhancement of existing habitat, taken out of intensive agricultural management, it is possible to say that the proposed development has the potential to make an important contribution to reducing and possibly reversing
some of the decline in nature conservation value experienced at the site. In particular, this can be said of the retention and enhancement of the Langarth Stream corridor that directly connects to the Landscape framework of the consented outline Langarth scheme to the east.

7.5.5 Having broadly explained the rationale of project design in terms of minimizing the potential impact of the proposed development in terms of ecology and nature conservation, the likely impacts of the scheme will be assessed in the following section in the absence of mitigation.

Construction

Habitat loss

7.5.6 Current development proposals for the scheme at West Langarth will result in the permanent, direct and total loss of arable land and the permanent, direct and total loss of tall herbaceous ruderal habitats. Some sections of Cornish hedge will be removed to facilitate the implementation of access as will H5 in its entirety to the footprint of the foodstore, retail and mixed use portion of the proposed development; in each case these losses will be permanent and direct.

7.5.7 The loss of habitat detailed in the paragraphs above, and those below is not considered to represent a potential effect upon the integrity of any of the statutory or non–statutory designated sites of nature conservation interest identified in earlier sections of this chapter given the relative degree of geographic separation between these and the proposed development.

Arable

7.5.8 Fields under arable tenure on site were considered of low nature conservation value however they do provide foraging and loafing habitat for wintering bird species if retained as stubble during winter months however, anecdotal evidence reports that these fields are regularly sown in autumn with ‘winter wheat’ in which case they would provide sub-optimum forage for wintering birds. The total loss of this habitat (covering c.>75% of the total site) does
represent a loss of moderate magnitude however, the low sensitivity of this receptor means that the significance of the impact is considered to be minor.

**Tall herbaceous ruderal**

7.5.9 Small patches of this habitat type considered of at most, local/parish nature conservation value are not only common and widespread but also ephemeral and easily replicable. Such habitat follows seasonal cycles of removal and regeneration from seed so the total loss of this habitat from site can only be considered temporary prior to establishment in other locations throughout the construction phase and therefore the magnitude of this impact can only be considered slight, and the receptor being of low sensitivity, the significance of the impact is considered to be neutral.

**Hedgerows (Cornish hedges)**

7.5.10 In general, the hedges on site (c.2,000 linear metres), although most taking the characteristic Cornish hedge form and therefore being structurally diverse through association with an earth bank of some description were either lacking in woody canopy diversity or the woody canopy had been unmanaged and shaded out the ground flora thus reducing floral diversity. These hedges however do provide foraging and nesting resources to a range of local wildlife and connectivity across the site. The proposed loss of c.500lm of such habitat from site is of moderate magnitude and this impact on a receptor of low sensitivity considered of minor significance.

**Habitat disturbance**

7.5.11 Prior to the implementation of mitigation measures there is potential for retained habitats to be adversely affected by the impact of disturbance. The potential impacts upon each of the valued ecological receptors (habitats) are discussed further below.
**Hedgerows**

7.5.12 All retained hedges have the potential to be at risk from adverse effects resulting from disturbance through construction activities. Such disturbance, of moderate magnitude to receptors of local/parish nature conservation value and low sensitivity is likely to result in a negative impact of minor significance.

**Wet grassland/rush pasture**

7.5.13 Wet grassland/rush pasture has historically been adversely impacted by modern farming practices, drainage and nitrogen enrichment and remains at risk of disturbance during the construction phase of the development. In addition to these pressures from ‘agricultural improvement’ both wet grassland/rush pasture and wet woodland/willow carr form part of an intricate ecological succession (hydrosere) and this habitat is susceptible to the encroachment of scrub, in this instance, the unchecked establishment of willow carr. Disturbance would be a potential moderate impact upon a receptor of local/parish level value and low sensitivity and therefore a negative impact of minor significance.

**Wet woodland/willow carr**

7.5.14 Similarly to the habitat discussed in the above paragraph, wet woodland/willow carr is susceptible to the establishment of pioneer tree species such as birch and ash if not properly managed in addition to the normal pressures from agricultural improvement, drainage etc. All areas of wet woodland/willow carr can be considered at risk of disturbance during the construction phase of the development. Disturbance represents a potentially moderate adverse impact upon this receptor of local/parish level value and low sensitivity and therefore a negative impact of minor significance.

**Langarth Stream (running water)**

7.5.15 Central to the corridor of habitats running along the northern boundary of the site, Langarth Stream is at particular risk of disturbance as the site topography
is such that it lies at the lowest elevation and therefore is susceptible to receipt of runoff during the construction phase of the development subsequently causing nitrogen enrichment, sedimentation and contamination by water borne pollutants.

7.5.16 Disturbance during the construction phase may represent as much as a substantial adverse impact upon this receptor of district/borough level nature conservation value and medium sensitivity that results in a negative impact of intermediate significance.

**Operational**

7.5.17 During the operational phase of the proposed development the potential for disturbance is usually less significant than during the construction phase, largely as a result of mitigation measures inherent to the project design. The majority of disturbance during the operational phase results from increased public access to semi natural environments and includes intentional/unintentional damage to habitats, erosion and compaction, littering/’fly-tipping’, nutrient enrichment and intentional/unintentional release of invasive or non-native species into the semi-natural environment; all of which are relatively insignificant if only occurring in the short term.

**Hedges**

7.5.18 All retained and newly created hedges have the potential to be at risk from adverse effects resulting from disturbance during the operational phase of the development. Such disturbance, of slight magnitude to receptors of local/parish nature conservation value and low sensitivity is likely to result in a negative impact of minor - neutral significance.

**Wet grassland/rush pasture**

7.5.19 All areas of wet grassland/rush pasture can be considered at risk of disturbance during the occupational phase of the development. Disturbance would be a
potential slight impact upon a receptor of local/parish level value and low sensitivity and therefore a negative impact of minor to neutral significance.

**Wet woodland/willow carr**

7.5.20 All areas of wet woodland/willow carr can be considered at risk of disturbance during the occupational phase of the development. Disturbance represents a potentially slight adverse impact upon this receptor of local/parish level value and low sensitivity and therefore a negative impact of minor to neutral significance.

**Langarth Stream (running water)**

7.5.21 Although during the operational phase, SuDS will be fully implemented and will provide a buffer to Langarth Stream reducing the potential for disturbance through site runoff, nitrification, sedimentation or water borne pollution incidents, Langarth Stream remains at risk of disturbance during the occupational phase of the development. Disturbance during the occupational phase may represent as much as a moderate adverse impact upon this receptor of district/borough level nature conservation value and medium sensitivity that results in a negative impact of intermediate to negative minor significance.

**Impact of habitat loss and disturbance to species**

7.5.22 The potential impacts of habitat loss and habitat disturbance upon specific species and floral/faunal groups associated with habitats are considered below.

**Higher plants**

7.5.23 The loss of short sections of hedge H7 & H8 to facilitate the instatement of access into the proposed development seeks to avoid the total loss of populations of the Nationally Scarce balm-leaved figwort but there remains a risk that populations could be adversely affected as a result of disturbance. Such negligible impact upon a receptor of local/parish value and low sensitivity would result in an impact of neutral significance. Similarly populations of the
Nationally Scarce wavy St John’s wort associated with riparian and wet grassland/rush pasture habitat along Langarth Stream will not be affected by habitat loss; however, this receptor being present in a habitat feature of medium sensitivity have the potential to be adversely affected as a result of disturbance. Disturbance in both the construction and operational phases upon a receptor of local/parish value and low sensitivity is considered slight however, given the receptor is one component of a wider habitat feature of medium sensitivity, the impact is considered to be minor negative, rather than neutral significance.

**Schedule 9 invasive plants**

7.5.24 The spread of the Schedule 9 invasive Japanese knotweed through the site poses a potential substantial adverse impact upon a receptor of low sensitivity and therefore a negative impact of minor to intermediate significance.

**Badger**

7.5.25 No signs of the use or occupation of the site by badgers was confirmed but there is potential for habitats on site to provide some limited seasonal foraging resources to local badger populations given the transient and dynamic nature of the species. The impacts of habitat loss and disturbance at this scale on receptors of low sensitivity during both the construction and operation phases are considered negligible and therefore of neutral significance.

**Bats**

7.5.26 The loss of hedges H5, H9 and sections of H1, H2, H6, H7 & H8 and increased disturbance to retained hedges and linear vegetation features both in the construction and operational phases will result in a direct loss of foraging resource to local bat populations in addition to fragmentation of commuting corridors and subsequent indirect losses of foraging through disruption to these corridors. During the operational phase, there is also potential for disturbance through the illumination of foraging and commuting areas indirectly causing losses of foraging owing to changes in behavior of bat species (in particular
Annex II bat species). The loss of and disturbance to habitat presents a potential substantial adverse impact upon a receptor of low sensitivity and local/parish level value resulting in a negative impact of intermediate to minor significance.

**Breeding birds**

7.5.27 The loss of all areas of arable land and hedges on site will lead to a reduction in foraging and nesting opportunities for breeding birds. The potential disturbance to retained hedges during construction and operational phases (including illumination of habitats, construction noise etc.) and nesting habitat for breeding birds. Construction operations have the potential to disturb bird species of nature conservation interest that use habitats within the application area for foraging, breeding, roosting and loafing. Whilst the impacts are likely to be temporary and short term, repeated disturbance in particular during the breeding season can lead to nest desertion and failure of breeding attempts. Whilst most breeding species recorded within the application area are not considered to show particular sensitivity to the disturbance associated with construction works, initial vegetation clearance and earthworks are most likely to cause temporary disturbance. Whilst effects of such construction operations upon the breeding bird population are unlikely to significantly affect the conservation status of bird populations within the application area, they have the potential to lead to an infringement of legislation. The loss of and disturbance to habitats ranges from a potential slight adverse, to moderate adverse impact upon a receptor of low sensitivity and local/parish level value therefore resulting in a negative impact of between minor-neutral, and minor significance.

**Winter birds**

7.5.28 The loss of all areas of arable land and some hedges (c.25%) on site will lead to a significant reduction in foraging and loafing opportunities for wintering bird species. The site was considered unlikely to support significant flocks of overwintering migratory waterfowl or wildfowl and although there will be a significant, permanent loss of arable land from site, species most likely to utilize
the site will be associated with boundary or marginal features (in particular if ‘winter wheat’ as the alternative to remaining as stubble during the winter months) the majority of which are retained within development proposals. The loss of and disturbance to habitats ranges from a potential slight adverse, to moderate adverse impact upon a receptor of low sensitivity and local/parish level value therefore resulting in an impact of negative minor, to minor - neutral significance.

7.5.29 Were wood lark to be confirmed as using the site, the loss of and disturbance to habitats would pose a potentially substantial adverse impact upon a receptor of medium sensitivity and district/borough value therefore resulting in a negative impact of intermediate significance.

**Amphibians**

7.5.30 The majority of habitats suitable for use by amphibians are to be retained within the landscape framework of the proposed development but there is potential for disturbance during the construction and operational phases of the development. Potential disturbance to retained habitat utilized by amphibians represents a potential slight adverse impact upon a receptor of low sensitivity and local/parish level value and therefore a negative impact of minor significance.

**Reptiles**

7.5.31 Whilst the majority of habitats identified as being as optimal for reptiles (grass snake) and from where reptiles were recorded are being retained within the landscape framework of the proposed development, there is potential for disturbance during the construction and operational phases of the development in addition to the potential loss of hibernation habitat in the northern extent of hedgerows adjacent to the Langarth Stream corridor. Potential disturbance to retained habitat utilized by reptiles (grass snake) ranges from a potentially moderate adverse impact at the construction phase, to a slight adverse impact at the operational phase upon a receptor of low sensitivity and local/parish level
value and therefore negative impacts of minor and negative minor – neutral significance respectively.

**Otter**

7.5.32 All habitats associated with Langarth Stream are to be retained within the landscape framework of the proposed development however; otter display particular sensitivity to disturbance of the type that will be experienced both in the construction and operational phases of the proposed development. In particular otter will be sensitive to disturbance resulting from increased public access during the operational phase that can indirectly lead to abandonment of laying up areas and holt sites (no holt sites were identified on site) Disturbance of habitats poses a potentially substantial adverse impact upon a receptor of medium sensitivity and district/borough level nature conservation value therefore resulting in a negative impact of intermediate significance.

7.6 **Mitigation Measures**

*Mitigation through project design*

7.6.1 The following section describes how the proposed development and its design has responded to the baseline ecological assessment and potential impacts in order to minimize the adverse environmental impacts and maximize the environmental benefits. This section provides an overview of the proposals with species specific details provided within technical appendices where necessary. One of the key principles of the proposed development is to consider any valued ecological receptors identified and provide mitigation and enhancement through a landscape framework with the aim of residual net biodiversity gains.

7.6.2 Habitats present on site range from local/parish to district / borough level nature conservation value, largely owing to the majority of the site being under intensively managed arable tenure with habitats of higher conservation value being associated with field boundary features or the Langarth Stream corridor. Mitigation for any impacts associated with land-take includes the creation of new habitats during, and on completion of, the construction of the proposed
development and the enhancement of retained habitats within the site. The proposed development has been designed to mitigate the potential impacts upon wildlife identified within and surrounding the site and to ensure populations are maintained at a favourable conservation status.

7.6.3 In order to mitigate for the potential for disturbance to be caused through construction activities, good practice guidelines will be implemented, in particular this relates to reducing the potential for pollution incidents (pollution prevention guidelines PPG1: General Guide to the Prevention of pollution, PPG5 Works in, Near or Liable to Affect Watercourses and PPG6: Working at Construction and Demolition Sites. Information will also be provided regarding the correct siting of compounds, construction transport routes, away from sensitive retained habitat to reduce the effects of accidental damage, harm, injury or disturbance. In addition, construction working hours will be limited to that of the normal daily working hours for the construction industry (i.e. between 0800 and 1800) in order to reduce the potential for disturbance to crepuscular/nocturnal wildlife and nesting birds.

**Mitigation for loss of or disturbance to habitats**

7.6.4 The following provides proposed mitigation for the loss of and disturbance to retained habitats within the landscape framework of the proposed development during the construction phase and the disturbance to retained and newly created habitats in the operational phase of development.

7.6.5 All retained habitat will be appropriately fenced and designated construction traffic routes will be chosen away from retained habitat. Fencing should be consistent with that proposed in the *Arboricultural Impact Assessment* and where possible will incorporate buffer areas of species rich semi improved grassland.

7.6.6 Whilst no direct compensation for hedges lost is proposed, the retained hedges will be enhanced through ‘gapping-up’ with indigenous woody species and significant areas of structural woodland planting will be implemented along the western boundary.
7.6.7 A significant habitat buffer will be provided on the southern edge of the existing Langarth Stream corridor that will include structural woodland planting, species rich meadow grassland and SUDS/wetland features with aquatic and riparian planting.

7.6.8 The SuDS drainage strategy for the proposed development will inevitably be designed with Natural England’s ‘Ecosystems Approach’ in mind, providing an example of integrated management of water and living resources in line with the NPPF’s vision of green infrastructure as a ‘multifunctional resource’ and will aid in the project’s delivery of significant biodiversity benefits. The SuDS features will incorporate specific features (such as silt traps) to minimize the risk of water borne contaminants both in the construction and operational phase.

7.6.9 All areas of Japanese knotweed will be marked and dealt with appropriately under a method statement prior to the commencement of construction to reduce the potential for construction working activities to facilitate the spread of the species throughout the site.

7.6.10 Although the mitigation measures described herein are considered sufficient for the purpose of this outline application, it is anticipated that further works may be required following development of detailed plans and method statements relating to further minimizing the potential for disturbance on habitats and species will be devised as necessary.

**Mitigation for impacts of loss of habitat on or the disturbance to species**

**Badger**

7.6.11 Whilst the use of the site by badger populations has not been confirmed following extensive survey of the habitats within the site owing to the transient and dynamic nature of badger social groups and the presence of a known social group of badgers in occupation of arable land to the east of the site precautionary measures will be taken in order to reduce the potential for
disturbance. As a precautionary measure during construction, all holes, trenches and ditches will be covered at night or where not practicable a means of escape will be installed to allow badgers or other mammals to exit.

7.6.12 Significant new areas of potential foraging habitat will be provided within the landscape framework of the proposed development that could be exploited by local badger population in future including large areas of species rich meadow grassland and structural woodland planting. The integrity of existing corridors of movement will be strengthened through ‘gapping-up’ or reinforcement with additional indigenous woody species and preference will be given to the selection of fruiting and flowering species that provide and autumn foraging resource to local wildlife.

**Bats**

7.6.13 The Langarth Stream corridor has been identified as the most important resource within the site for foraging / commuting bat species including small numbers of Annex II bat species and the proposed development has sought to retain this in its entirety and as many linear habitats within the landscape framework as is feasible.

7.6.14 To minimise the potential effects upon foraging and commuting routes through fragmentation, the retained hedgerow either side of new pedestrian or vehicular linkage will be reinforced though ‘gapping-up’ using indigenous woody species. Appropriate management of retained hedges either side of new pedestrian or vehicular access will create ‘hop – overs’ to facilitate the continued, unhindered movement of bat species along linear habitat features, ensuring there is no echolocation break. Simply, ‘hop-overs’ consist of a progression of increased canopy heights leading up to new pedestrian or vehicular access that causes bats (and birds) to naturally increase their flight altitude. Management of mature trees either side of new access should raise the crown height by regular pruning of lower branches back to the trunk in order to promote the most suitable flight line above the maximum vehicle height. Such measures will also serve to reduce the potential for road traffic mortalities.
7.6.15 No features requiring high intensity lighting or that would create large volumes of light spillage are proposed within close proximity of the Langarth Stream corridor and design measures (including the use of shrouded, LED and or directional lighting as per guidance provided by the Institute of Lighting Engineers, 2005)\(^{19}\) will be implemented to avoid light spillage in these areas – primarily the service yard to the north of the foodstore. Such measures will serve to minimise the light spill onto foraging routes and minimise the potential disturbance through illumination of corridors and potential roosting sites.

7.6.16 Additional enhancements will include the increase in potential roost sites by the implementation of structural woodland planting and high quality foraging habitats south of the Langarth Stream corridor.

7.6.17 A program of bat monitoring will be devised to monitor the levels of bat activity and species using habitats present within the site during the construction and operational phases of the proposed development. Ideally monitoring surveys would concentrate on the Langarth Stream corridor that provides a significant navigational corridor with the site but also within the wider local environment, strengthening the integrity of the Langarth Stream corridor connecting through the consented outline Langarth scheme to the east.

**Breeding birds**

7.6.18 Although the loss of habitat suitable for nesting birds is minimal, generally limited to the loss of hedges and sections thereof, mitigation for such losses is be provided by habitat creation throughout the landscape framework of the proposed development including structural woodland planting, mature trees, . Additional enhancements will be provided by the inclusion of nest boxes within suitable areas throughout the Proposed Development.

7.6.19 To avoid unnecessary disturbance to birds, all construction activities (removal of hedge sections) should occur outside of the bird-breeding season (March –

September inclusive) or at a minimum distances of 15m from species nesting in cover (hedges/trees). This would also be a statutory requirement owing to the protection of all birds on the nests under the Wildlife and Countryside Act 1981 (as amended). Where any site preparation works are proposed within the bird-breeding season, the area will first be checked for nesting birds by a suitably qualified ecologist and detailed advice will be provided at the time depending on the bird species and type/level of activity.

**Wintering birds**

7.6.20 Full winter bird surveys will be undertaken to confirm the use of the site by wintering populations of birds. Generally the retained hedges and habitats associated with the Langarth Stream corridor will continue to provide a foraging resource to wintering birds. Additional habitat provided through the creation of SuDS and structural woodland planting will provide further resources for wintering bird species. The use of autumn fruiting and seed bearing species will be considered for inclusion within the planting schedules for newly created habitats and areas of tall herbaceous ruderal habitat will be allowed to established in suitable locations throughout the landscape framework to provide additional winter seed resources although these areas will not be allowed to become dominant at the expense of other habitats such as species rich meadow grassland.

7.6.21 Should woodlark be confirmed on site following surveys in winter 2014 then mitigation will include the survey of arable land within the wider local area in order to find suitable alternative habitat and secure long term management and future safeguarding of the population.

**Amphibians**

7.6.22 All habitats identified as optimum for the support of amphibian species are to be retained within the landscape framework of the development proposals and buffered from the potential impacts of construction operations through the creation of a wide buffer zone of newly created semi-natural habitats to the south of the Langarth Stream corridor. As a precaution, to avoid the potential
impact of habitat loss or disturbance during the initial vegetation clearance phase, where possible, vegetation should be removed following the emergence of common toad from hibernation in late February when they will migrate from terrestrial to aquatic and riparian breeding grounds.

7.6.23 The creation of additional riparian and aquatic habitat within a wide corridor of species rich grassland meadow adjacent to the Langarth Stream corridor will significantly increase the breeding, foraging and refuge opportunities for common species of amphibian an increase in abundance of which will significantly increase the prey/foraging resource to grass snake, the mitigation for which is considered in more detail in the below paragraphs.

Reptiles

7.6.24 In order to avoid the potential impact of habitat loss or disturbance during the construction phase to hibernating grass snake, the removal of Cornish hedges, or at least the northern most extents adjacent to the Langarth Stream corridor should be completed under the supervision of an ecologist within the active season for reptiles when temperatures are consistently above 10°C to when individuals are sufficiently able to move away into adjacent retained habitats.

7.6.25 Extensive areas of species rich meadow grassland, riparian and aquatic habitat provisioned within the wide landscape buffer south of the Langarth Stream corridor will significantly increase the available habitat for foraging, refuge and basking and increase the suitability to invertebrates and amphibians that are known to provide a substantial proportion of the diet of grass snake.

Otter

7.6.26 In addition to the the Langarth Stream corridor’s value as a foraging resource and commuting corridor for bat species, the corridor and associated habitats have also been identified as valuable resources for riparian mammal species, specifically otter (although no holt sites were confirmed within the site). These habitats are retained in their entirety within the landscape framework of the proposed development that is buffered from the potential effects of disturbance
by a wide corridor of newly created habitats within which any ‘construction’ is limited to implementation of structural landscaping and SuDS, both of which are some distance from Langarth Stream itself. The design has also sought to minimise the potential effects of disturbance during the operational phase (through increased recreational use) by proposing no ‘formal’ streamside path or crossing points over Langarth Stream. It is the intention for the greenspace to be accessible through informal routes such as short mown paths through longer vegetation that will serve to direct footfall away from more sensitive habitats. The SuDS, where engineering constraints permit areas of permanent open water, will provide an increase in riparian habitat suitable for use by otter.

7.6.27 During the construction phase, appropriate fencing will be erected along the southern extent of the retained Langarth Stream corridor on order to reduce the potential for disturbance to otters ‘laying-up’ in these habitats.

7.6.28 The implementation of appropriate working methods (following Environment Agency guidelines for working near watercourses and relevant pollution prevention guidance) will reduce the potential impact of disturbance during the construction phase.

7.6.29 Although given the width of the buffer habitats incorporated into the landscape framework, disturbance to areas used by otters for ‘laying up’ is considered highly unlikely, should any works within 30m of Langarth Stream be proposed then the affected area will be resurveyed for evidence of otter prior to the commencement of works.

7.7 Residual Impacts

7.8.1 Please refer to Table 7.8 for a full summary of residual impacts.
Table 7.8: Summary of Biodiversity and Nature Conservation Impacts

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Sensitivity of receptor</th>
<th>Impact magnitude</th>
<th>Nature of impact</th>
<th>Significance</th>
<th>Summary of Mitigation/ Enhancement</th>
<th>Residual Impact magnitude</th>
<th>Residual Impact significance</th>
<th>Confidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arable</td>
<td>Low</td>
<td>moderate</td>
<td>Total loss of all intensively managed arable land (&gt;75% of the total site).</td>
<td>Negative, minor</td>
<td>No direct mitigation for habitat loss.</td>
<td>Moderate</td>
<td>Negative, minor</td>
<td>Probable</td>
</tr>
<tr>
<td>Tall herbaceous ruderal</td>
<td>Low</td>
<td>slight</td>
<td>Total loss of all small areas of this habitat from the site although likely to persist as temporary habitat throughout construction and operation phases.</td>
<td>Neutral</td>
<td>No direct mitigation for habitat loss. This habitat type is ephemeral and seasonal and highly likely to colonise small areas of disturbed ground throughout the construction phase and form ruderal components to newly created habitats throughout the development during the operational phase.</td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
</tr>
<tr>
<td>Wet grassland / rush pasture</td>
<td>Low</td>
<td>Moderate</td>
<td>Habitat gain – see summary of mitigation/enhancement.</td>
<td>Positive, minor-intermediate</td>
<td>Creation of areas of wet grassland associated with SuDS in the north of the proposed development</td>
<td>Moderate</td>
<td>Positive minor-intermediate</td>
<td>Probable</td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td></td>
<td>Disturbance during construction phase from encroachment, soil compaction, pollution incidents etc.</td>
<td>Negative, minor</td>
<td>Implementation of appropriate protective fencing. Good working practice and good practice guidelines such as relevant pollution prevention guidance. Designated, fenced routes for construction site traffic away from sensitive wet grassland/rush pasture.</td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
</tr>
<tr>
<td>Slight</td>
<td></td>
<td></td>
<td>Disturbance during operational phase from accidental/intentional damage, nitrogen</td>
<td>Negative, minor-neutral</td>
<td>Informal public access to newly created species rich meadows, provision of Locally Equipped Area of Play and sports facilities to provide designated areas for recreation</td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
</tr>
<tr>
<td>Hedges</td>
<td>Low</td>
<td>Moderate</td>
<td>Total loss of c.25% of the total hedge resource on site.</td>
<td>Negative, minor</td>
<td>No direct like for like mitigation for habitat loss. Compensation through significant areas of structural woodland planting north of the foodstore service yard (c.20m wide area of woodland planting) and on the western boundary.</td>
<td>Slight</td>
<td>Positive, minor - neutral</td>
<td>Probable</td>
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</tr>
<tr>
<td>Moderate</td>
<td>Disturbance during construction phase from encroachment, root compaction, pollution incidents etc.</td>
<td>Negative, minor</td>
<td>Implementation of appropriate protective fencing (consistent with root protection zones and fencing specification recommended in the Arboricultural Impact Assessment. Creation of new habitats adjacent to retained hedges that will provide buffers to disturbance.</td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slight</td>
<td>Disturbance during operational phase from accidental/intentional damage &amp; pollution incidents etc.</td>
<td>Negative, Minor - neutral</td>
<td>Creation and maturation of new habitat adjacent to pre-existing retained hedges. Significant proportions of newly provided semi-natural open space, Locally Equipped Area of Play and sports facilities to provide designated areas for recreation and reduce pressure upon sensitive</td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
<td></td>
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</tbody>
</table>
Wet woodland / willow carr  | Low  | Slight | Habitat gain – see summary of mitigation/enhancement. | Positive, minor - neutral | Willow carr will inevitably establish in the long term in association with newly created SuDS features south of the Langarth Stream corridor and increase the resource on site. | Slight | Positive, Minor - neutral | Probable |

Moderate | Disturbance during construction phase from encroachment, soil compaction, pollution incidents etc. | Negative, minor | Implementation of appropriate protective fencing (consistent with recommendations of Arboricultural Impact Assessment). Good working practice and good practice guidelines such as relevant pollution prevention guidance. Designated, fenced routes for construction site traffic away from sensitive wet woodland/willow carr. | Negligible | Neutral | Probable |

Slight | Disturbance during operational phase from accidental/intentional damage, nitrogen enrichment, littering etc. | Negative, minor - neutral | Creation and maturation of new habitat south of the Langarth Stream corridor. Significant proportions of newly provided semi-natural open space, Locally Equipped Area of Play and sports facilities to provide designated areas for recreation and reduce pressure upon sensitive features such as wet woodland/willow carr (including designated dog waste and litter bins). Long term management of wet woodland/willow carr to prevent dominance of successional woodland communities (ash and birch). | Negligible | Neutral | Probable |

Langarth Stream  | Medium  | Slight | Habitat gain – see summary of mitigation/enhancement. | Positive, minor - neutral | Increase in aquatic and riparian habitat throughout the development through | Negligible | Neutral | Probable |


<table>
<thead>
<tr>
<th>(running water)</th>
<th>Substantial</th>
<th>Disturbance during construction phase through pollution incidents, sedimentation, nitrogen enrichment etc. originating from construction site runoff.</th>
<th>Negative, intermediate</th>
<th>Creation and implementation of SuDS with aquatic/marginal species planting.</th>
<th>Negligible</th>
<th>Neutral</th>
<th>Probable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate</td>
<td>Disturbance during operational phase through pollution incidents, sedimentation from roads, footpaths etc.</td>
<td>Negative, intermediate to minor</td>
<td>Creation and maturation of new habitat south of the Langarth Stream. Incorporation of engineering methods to buffer potential adverse impacts of urban runoff (such as sediment traps) into SuDS.</td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
<td></td>
</tr>
<tr>
<td>Flora (Higher plants)</td>
<td>Low</td>
<td>Neutral</td>
<td>No populations of either notable plant species directly impacted through habitat loss.</td>
<td>Neutral</td>
<td>Location of primary access located in areas where these populations will not be impacted.</td>
<td>Negligible</td>
<td>Neutral</td>
</tr>
<tr>
<td>Slight</td>
<td>Disturbance during construction phase through pollution incidents, sedimentation, nitrogen enrichment etc.</td>
<td>Neutral</td>
<td>Implementation of appropriate protective fencing. Good working practice and good practice guidelines such as relevant pollution prevention guidance. Designated, fenced routes for construction site traffic away from sensitive Langarth Stream (and Langarth Stream corridor generally) and retained hedges.</td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
<td></td>
</tr>
<tr>
<td>Slight</td>
<td>Disturbance during operational phase through pollution incidents, sedimentation, trampling,</td>
<td>Neutral</td>
<td>Informal public access to newly created habitats, provision of Locally Equipped Areas of Play and sports facilities will provide designated areas for recreation</td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
<td></td>
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</tbody>
</table>
nitrogen enrichment etc. and reduce pressure upon on habitats and therefore notable plant species (including designated dog waste and litter bins) throughout the proposed development. Monitoring of populations of notable plant species post construction.

<table>
<thead>
<tr>
<th>Flora (WCA Schedule 9 invasive plants)</th>
<th>Low</th>
<th>Substantial</th>
<th>Disturbance during construction phase and spread to other parts of the site.</th>
<th>Negative, minor to intermediate</th>
<th>All areas of Japanese knotweed will be marked and treated prior to the commencement of construction. Presence of the species throughout the site should be monitored for the duration of works during the construction phase and throughout the operational phase of the proposed development.</th>
<th>Substantial</th>
<th>Positive, minor to intermediate</th>
<th>Probable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Badgers</td>
<td>Low</td>
<td>Negligible</td>
<td>No badgers confirmed on site. Habitat gain (see summary of mitigation/enhancement).</td>
<td>Neutral</td>
<td>Substantial areas of new species rich grassland associated with habitat creation south of the Langarth Stream corridor will provide foraging resources and a wide corridor for movement within the wider local environment.</td>
<td>Slight</td>
<td>Positive, minor</td>
<td>Probable</td>
</tr>
<tr>
<td>Negligible</td>
<td>Limited potential for disturbance (unlikely given current absence from site)</td>
<td>Neutral</td>
<td>Construction works completed under a precautionary good practice method statement with all excavations covered at night or a means of escape installed. Construction activities restricted to normal working hours for construction industry to reduce potential for disturbance through light and noise.</td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slight</td>
<td>Habitat creation (see summary of mitigation and enhancement measures)</td>
<td>Positive, minor - neutral</td>
<td>Extensive new habitat creation including species rich meadow grassland and structural woodland will provide potential future foraging ground for local badger</td>
<td>Slight</td>
<td>Positive, minor - neutral</td>
<td>Probable</td>
<td></td>
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</tbody>
</table>
populations. Selection of autumn fruiting species for ‘gapping up’ hedges and in planting schedules for structural woodland will ensure potential year-round foraging resources are available for future exploitation by local badger populations.

<table>
<thead>
<tr>
<th>Bats (common and widespread species)</th>
<th>Low</th>
<th>Substantial</th>
<th>Habitat loss (H5, H6, sections of H1, H2, H6, H7 &amp; H8), potential fragmentation and loss of foraging habitat.</th>
<th>Negative intermediate - minor</th>
<th>Retention of the main feature of significance to foraging and commuting bats (the Langarth Stream corridor). Creation of significant areas of structural woodland planting (preference for night scented, flowering and fruiting species), SuDS and species rich grassland. Enhancement to retained hedges through ‘gapping up’.</th>
<th>Slight</th>
<th>Positive, minor - neutral</th>
<th>Probable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substantial</td>
<td></td>
<td>Disturbance during construction phase</td>
<td>Negative intermediate - minor</td>
<td>Protection of sensitive retained bat foraging and commuting routes by installation of appropriate fencing (see earlier sections). Construction activities restricted to normal working hours for construction industry to reduce potential for disturbance through light and noise.</td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
<td></td>
</tr>
<tr>
<td>Substantial</td>
<td></td>
<td>Disturbance during the operational phase</td>
<td>Negative intermediate - minor</td>
<td>Implementation and management of bisected linear habitat features to create ‘hop overs’ allowing continued unhindered movement throughout the site. Low intensity, LED, directional or shrouded lighting along edges of sensitive habitats to reduce illumination as per the guidance provided by the Institute of Lighting Engineers, 2005. Implementation of a monitoring program</td>
<td>Slight</td>
<td>Positive, minor - neutral</td>
<td>Probable</td>
<td></td>
</tr>
<tr>
<td><strong>Bats (Annex II species)</strong></td>
<td><strong>Low</strong></td>
<td><strong>Substantial</strong></td>
<td><strong>Habitat loss (H5, H6, sections of H1, H2, H6, H7 &amp; H8), potential fragmentation and loss of foraging habitat.</strong></td>
<td><strong>Negative intermediate - minor</strong></td>
<td><strong>The retention of the main feature of significance to foraging and commuting bats (the Langarth Stream corridor). Creation of significant areas of structural woodland planting (preference for night scented, flowering and fruiting species), SuDS and species rich grassland. Enhancement to retained hedges through ‘gapping up’.</strong></td>
<td><strong>Slight</strong></td>
<td><strong>Positive, minor - neutral</strong></td>
<td><strong>Probable</strong></td>
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<tr>
<td><strong>Disturbance during construction phase</strong></td>
<td><strong>Negative intermediate - minor</strong></td>
<td><strong>Protection of sensitive retained bat foraging and commuting routes by installation of appropriate fencing (see earlier sections). Construction activities restricted to normal working hours for construction industry to reduce potential for disturbance through light and noise.</strong></td>
<td><strong>Negligible</strong></td>
<td><strong>Neutral</strong></td>
<td><strong>Probable</strong></td>
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<tr>
<td><strong>Disturbance during the operational phase</strong></td>
<td><strong>Negative intermediate - minor</strong></td>
<td><strong>Implementation and management of bisected linear habitat features to create ‘hop overs’ allowing continued unhindered movement throughout the site. Low intensity, LED, directional or shrouded lighting along edges of sensitive habitats to reduce illumination as per the guidance provided by the Institute of Lighting Engineers, 2005. Of particular importance on the northern edge of the foodstore service yard where structural woodland planting will also aid in preventing illumination of the Langarth Stream corridor.</strong></td>
<td><strong>Slight</strong></td>
<td><strong>Negative, minor - neutral</strong></td>
<td><strong>Probable</strong></td>
<td></td>
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<tr>
<td>Breeding bird assemblage</td>
<td>Low</td>
<td>Moderate</td>
<td>Negative, minor</td>
<td>Clearance of all habitat shall be undertaken outside of the bird breeding season (March to September inclusive) or at a minimum distance of 15m from any nest. Retention of much of the existing habitat suitable for nesting birds. The creation of extensive areas of new habitat including structural woodland planting, species rich meadow grasslands, aquatic and riparian habitat that will increase the range and number of nesting opportunities to a wider range of breeding bird species.</td>
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<tr>
<td>Slight</td>
<td>Disturbance during construction phase. In particular along hedges and to retained habitats.</td>
<td>Negative minor neutral</td>
<td>Protection of sensitive retained breeding habitats by installation of appropriate fencing (see earlier sections). Construction activities restricted to normal working hours for construction industry to reduce potential for disturbance through light and noise.</td>
<td>Negligible Neutral Probable</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Slight</td>
<td>Disturbance during operational phase. In particular along hedges and to retained or newly created habitats.</td>
<td>Negative minor neutral</td>
<td>Long term management of the retained and newly created habitats within the proposed development to maximise the resources available to breeding birds. Detailed landscape planting and the maturation of residential gardens in the operational phase will provide increased opportunities to a wider range of breeding bird species. Enhancements including nest</td>
<td>Negligible Positive minor neutral Probable</td>
<td></td>
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<tr>
<td>Wintering bird assemblage</td>
<td>Low</td>
<td>Moderate</td>
<td>Habitat loss, all arable, loss hedges H5, H6, sections of H1, H2, H6, H7 &amp; H8, loss of foraging, loafing and wintering habitat for a range of bird species including NERC S41 &amp; BoCC listed species considered common and widespread.</td>
<td>Negative, minor</td>
<td>Retention of significant proportion of existing non-arable winter bird foraging resources and enhancement through ‘gapping up’ and through preference of seed bearing and autumn fruiting species. Creation of new habitats that will increase the foraging resource for wintering bird species (such as riparian habitats and species rich meadow grassland).</td>
<td>Slight</td>
<td>Positive, minor to neutral</td>
<td>Probable</td>
</tr>
<tr>
<td>Wintering bird assemblage</td>
<td>Slight</td>
<td>Disturbance during construction phase to retained foraging resources for wintering birds (hedges, margins etc.)</td>
<td>Negative, minor neutral</td>
<td>Protection of sensitive retained habitats by installation of appropriate fencing (see earlier sections). Construction activities restricted to normal working hours for construction industry to reduce potential for disturbance through light and noise.</td>
<td>Slight</td>
<td>Negative, minor neutral</td>
<td>Probable</td>
<td></td>
</tr>
<tr>
<td>Wintering bird assemblage</td>
<td>Slight</td>
<td>Disturbance during the operational phase to retained and newly created foraging resources for wintering birds.</td>
<td>Negative, minor neutral</td>
<td>Long term management of the retained and newly created habitats within the proposed development to maximise the resources available to wintering birds. Detailed landscape planting and the maturation of residential gardens in the operational phase will provide increased opportunities to a wider range of wintering bird species.</td>
<td>Slight</td>
<td>Negative, minor neutral</td>
<td>Probable</td>
<td></td>
</tr>
<tr>
<td>Wintering bird assemblage (including wood lark)</td>
<td>Medium</td>
<td>Substantial</td>
<td>Habitat loss, all arable, loss hedges H5, H6, sections of H1, H2, H6, H7 &amp; H8, loss of foraging, loafing and wintering habitat for a range</td>
<td>Negative, Intermediate</td>
<td>Implement surveys of wider landscape in order to find and secure off site mitigation for the loss of arable habitat potentially utilised by wood lark (if wood lark are confirmed using habitats within the site).</td>
<td>Negligible to substantial</td>
<td>Neutral to negative</td>
<td>Uncertain</td>
</tr>
<tr>
<td></td>
<td>Substantial</td>
<td>Disturbance to arable habitat during land clearance stage of construction phase.</td>
<td>Negative, intermediate</td>
<td>General mitigation for wintering birds included within above sections.</td>
<td>Substantial</td>
<td>Negative</td>
<td>Uncertain</td>
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<tr>
<td>Substantial</td>
<td>Habitat gain see summary of mitigation and enhancement measures.</td>
<td>Negative, intermediate</td>
<td>Secure the long term management of off-site habitat suitable for use by wood lark populations (if they are found to be utilising arable habitat on site).</td>
<td>Negative to substantial</td>
<td>Neutral to negative intermediate</td>
<td>Uncertain</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Amphibians</strong></td>
<td>Low</td>
<td>Negligible</td>
<td>Neutral</td>
<td>Clearance of suitable habitat (northern extends of hedges where necessary) from end of March when common frogs are likely to be in water and common toads will have moved from hibernation locations to water for breeding. Creation of large areas of suitable habitat including riparian/aquatic habitats associated with SuDS and terrestrial habitats (grassland and structural woodland) adjacent to the Langarth Stream corridor.</td>
<td>Negligible</td>
<td>Positive, minor to neutral</td>
<td>Probable</td>
<td></td>
</tr>
<tr>
<td><strong>(common toad, common frog)</strong></td>
<td>Slight</td>
<td>Disturbance to retained hedges (in particular the northern extents) adjacent to the Langarth Stream corridor during the</td>
<td>Negative, minor neutral</td>
<td>Protection of retained habitats by installation of appropriate fencing (see earlier sections). Construction working area maintained as unsuitable for amphibians i.e. no places of shelter or</td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
<td></td>
</tr>
<tr>
<td>Wildlife Group</td>
<td>Impact</td>
<td>Risk</td>
<td>Description</td>
<td></td>
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<td></td>
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<td></td>
<td>Construction phase. Rest created by incorrect storage of building materials adjacent to semi natural habitats.</td>
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</tr>
<tr>
<td>Slight</td>
<td>Negative, minor - neutral</td>
<td>Long term management of the retained and newly created habitats within the proposed development to promote their value to amphibian species.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Negligible</td>
<td>Positive, minor to neutral</td>
<td>Probable</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reptiles (grass snake)</strong></td>
<td>low</td>
<td>Negligible</td>
<td>Habitat gain see summary of mitigation and enhancement measures.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Neutral</td>
<td>Clearance of habitat (northern extent of hedgerows where necessary) during the active season for reptiles. Creation of large areas of suitable habitat including riparian and aquatic habitats associated with SuDS adjacent to the Langarth Stream corridor.</td>
<td></td>
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<tr>
<td></td>
<td>Negligible</td>
<td>Positive, minor - neutral</td>
<td>Probable</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Negative, minor</td>
<td>Protection of retained habitats by installation of appropriate fencing (see earlier sections). Construction working area maintained as unsuitable for reptiles.</td>
<td></td>
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<tr>
<td></td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
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<td></td>
</tr>
<tr>
<td>Slight</td>
<td>Negative, minor - neutral</td>
<td>Long term management of the retained and newly created habitats within the proposed development to promote their value to reptile species.</td>
<td></td>
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<tr>
<td></td>
<td>Negligible</td>
<td>Positive, minor to neutral</td>
<td>Probable</td>
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<td></td>
</tr>
<tr>
<td><strong>Otter</strong></td>
<td>Medium</td>
<td>Negligible</td>
<td>All suitable habitats retained. Habitat gains – see summary of mitigation/enhancement measures.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Neutral</td>
<td>Retention of all suitable habitats. Creation of new habitat (SuDS) suitable for future use by otter populations that will also serve to buffer the Langarth Stream corridor.</td>
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<tr>
<td></td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Substantial</td>
<td>Negative, intermediate</td>
<td>Protection of the sensitive Langarth Stream corridor by installation of</td>
<td></td>
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<tr>
<td></td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Substantial</td>
<td>Disturbance to retained habitats of the Langarth Stream corridor during the operational phase, most likely through increased recreational use of adjacent habitats.</td>
<td>Negative, intermediate</td>
<td>Maturation of new habitat south of the Langarth Stream corridor. Significant proportions of newly provided semi-natural open space, Locally Equipped Areas of Play and sports facilities to provide designated areas for recreation and reduce pressure upon sensitive features such as the Langarth Stream corridor and move recreational use away from potential areas used for ‘laying up’ by otter. Monitoring of otter activity along Langarth Stream post construction.</td>
<td>Negligible</td>
<td>Neutral</td>
<td>Probable</td>
<td></td>
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</tbody>
</table>
7.8 Cumulative Impacts

7.7.1 At the time of compiling this chapter, a total of seven schemes either consented or currently live in-application were identified as having potential to have cumulative or in-combination impacts with the proposed development on West Langarth. These schemes are identified in further detail in Chapter 2 of this ES.

7.7.2 Of the seven schemes identified it is considered highly unlikely that any of the schemes identified in Chapter 2, Table 2.1 will have the potential to impact upon valued ecological receptors within the site directly through the loss of habitat with the exception of the cumulative impact of habitat loss on populations of wintering birds. Assuming that the identified schemes have been compliant with the National Planning Policy Framework and provided comprehensive mitigation aimed at enhancing ecology and nature conservation interest and providing net biodiversity increase then the residual cumulative impacts will likely be reduced to neutral if not positive minor significance. The potential for in combination impacts between the proposed development of this West Langarth scheme and the Langarth Farm (PA11/06/06124), Langarth Farm Stadium (PA11/06125 & PA12/09036), Maiden Green (PA12/00703), Willow Green (PA13/10454), Land between A390, park & ride and Willow Green Farm (PA12/11527) and Pollards (PA14/03065) schemes is discussed further below.

7.7.3 In terms of cumulative impacts or in combination impacts of the proposed development and the above schemes, there is inevitably a greater potential for significant adverse impacts upon receptors of ecology and nature conservation value owing to the scale of the three schemes in accumulation. Whilst the potential for adverse impacts for the majority of receptors of ecology and nature conservation value can be reduced to neutral or positive minor residual impacts in most cases through mitigation inherent within the scheme designs, the cumulative impacts of the proposed development and the listed schemes upon wintering birds may be substantial adverse given that arable land will be directly lost to the majority of these proposed developments and retention of such habitat within schemes is not feasible. Following the successful
implementation of mitigation for the loss of wintering bird habitat both for the proposed development and these additional schemes (that relies on the successful securing and long term management of local arable land) the magnitude of the cumulative impact of these schemes will be reduced but the confidence remains uncertain. Such cumulative impacts are likely to be of neutral to negative intermediate level significance.

7.7.4 The Langarth Stream corridor is central to the mitigation strategy proposed for this proposed development and the adjacent consented Langarth Farm Scheme in addition also to the cumulative; Maiden Green (PA12/00703), Willow Green (PA13/10454) and Land between the A390, Willow Green Farm and the Park & Ride schemes (PA12/11527) (albeit the latter scheme only to a lesser extent) in terms of securing a strong linear navigational corridor and high quality foraging habitat to local bat and otter populations. The inclusion of the Langarth Stream corridor within the landscape framework of this proposed development raises the integrity of this corridor within the wider local landscape. The additional areas of structural woodland planting, SuDS and species rich meadow grassland adjacent to the Langarth Stream corridor and on the western boundary of the proposed development will serve to buffer the corridor from the potential impact of disturbance (particularly through artificial illumination); and the long term management of these habitats with the aim of providing maximum biodiversity benefits will ensure that the residual cumulative impact upon local bat and otter populations utilizing the Langarth Stream corridor is reduced to neutral or positive minor significance.
8.0 Traffic and Transport

8.1 Introduction

8.1.1 This Chapter of the Environmental Statement (ES) has been prepared by Curtins Consulting Ltd as part of their evaluation process to determine the magnitude and significance of the environmental effects associated with the transportation requirements of the proposed development. The detailed description of the site and of the proposed development are provided in chapters 1.0 and 2.0 of the ES.

8.1.2 The context of this Chapter has been informed by the Transport Assessment and Framework Travel Plan prepared by Curtins Consulting Ltd, which have been prepared in support of the outline planning application. The Transport Assessment and Framework Travel Plan are contained at Volume 3, Appendix 8.1 of this ES for reference.

8.2 Legislative and Policy Framework

8.2.1 The EIA process has been undertaken with due regard to current best practice and current policy, particularly in respect to the National Planning Policy Framework (NPPF) such that the assessment focusses on the following two principle areas of policy;

1. Sustainability

The stated purpose of the NPPF is "to help to achieve sustainable development" (Ministerial Foreword) and NPPF is therefore underpinned by a presumption in favour of sustainable development. In this regard, the economic, social and environmental credentials of the development proposals will be considered throughout this report, so far as is relevant to transport matters.
2. Cumulative Impact

Paragraph 32 of NPPF states that "development should only prevented or refused on transport grounds where the residual cumulative impacts of a development are severe" and the report therefore seeks to quantify the magnitude of any transport effects (including highway capacity and safety) in order to inform measures of likely severity.

8.3 Methodology and Scope

8.3.1 This Chapter of the ES has been prepared with reference to the requirements and best practice methods advocated by the following documents:-

- Planning Practice Guidance (Department for Communities and Local Government, March 2014);
- Guidance on Transport Assessment (Department for Transport, March 2007);
- Guidelines for the Environmental Assessment of Road Traffic (IEA, 1993); and

8.3.2 In this respect, the scope and methods used within the Environmental Impact Assessment (EIA) process are defined below.

Consultation Process

8.3.3 In accordance with the requirements of EIA, the assessment of impacts has been undertaken following appropriate consultation with the Local Planning and Highway Authorities. In this way, a Regulation 13 Request for a Scoping Opinion was submitted to the Local Planning Authority undercover of a letter prepared by PCL Planning Limited, dated 5\textsuperscript{th} February 2014. The request related to a similar development comprising a foodstore and residential elements, but also including a new Park & Ride site.
8.3.4 Cornwall Council, as the Local Planning Authority, provided their Scoping Opinion in a report received by PCL Planning Ltd on 3rd March 2014, by email. The transport-related issues relevant to the proposed development are summarised as follows:-

- The EIA Chapter should be based on a Transport Assessment prepared in accordance with the Department for Transport best practice, and recommended early discussion with the Local Highway Authority to agree the scope of the assessment.
- Further details on the access proposals for the A390 would be required, together with consideration of linkages for pedestrians, cyclists and public transport users.
- A site-wide Travel Plan would be required as part of the mitigation strategy.

8.3.5 On 20th March 2014, PCL Planning Ltd wrote to Cornwall Council requesting pre-application advice relating to the development of the site, and this was supported by a letter (and enclosures) dated 24th March 2014.

8.3.6 Cornwall Council replied undercover of a letter dated 25th April 2014 with their formal pre-application advice and provided the following points relevant to the current proposals.

- A Stage 1 Road Safety Audit of any access proposal would be required.
- A Transport Assessment would be required and this should be prepared in accordance with the Department for Transport’s best practice guidance.
- The scope of the Transport Assessment should be agreed with both the Local Highway Authority and the Highways Agency, although use of the Council’s micro-simulation model of the A390 corridor would be used to inform the design and the impacts on the local highway network.
- Facilities for non-car modes must be taken into account fully.
- A contribution to the Truro Transport Strategy would be required, based on the current peak hour tariff of £3,739 per trip. 20% of this
A contribution would be held in bond to incentivise the Travel Plan modal shift commitment, with repayment to the developer upon success demonstrated through post-scheme monitoring.

8.3.7 Curtins supplemented the above with separate pre-application meetings with the Highways Agency (11th July 2014) and the Local Highway Authority (18th July 2014). Minutes of the meetings were prepared by Curtins and jointly distributed undercover of an email dated 24th July 2014 to the Local Highway Authority (LHA) and the Highways Agency (HA), in the interests of coordination.

8.3.8 The content of the meetings broadly reflected comments provided earlier in the consultation process, with further refined detail provided. A copy of the minutes can be viewed at Volume 3, Appendix 8.1 of the ES (see Appendix A of Transport Assessment).

Assessment of the Site’s Travel Credentials

8.3.9 The accessibility credentials of the application site have been considered by way of GIS-based modelling, using centralised travel networks and public transport data to identify the catchment of each mode. New travel infrastructure has been created within the model to make allowance for the associated travel networks that are envisaged as part as part of adjoining developments and, in this respect, the masterplans for each of the developments incorporated within the A390 Development Brief area have informed the placement of new infrastructure.

8.3.10 In building the accessibility model, account has also been taken of the negative correlation that exists between travel speeds and gradient in respect of journeys by foot and cycle. In this way, the model output provides an accurate reflection of non-car accessibility that takes into account the site specific nuances.
Assessment of the Likely Traffic Effects

Study Area

8.3.11 The potential effects of development traffic have been considered in terms of the potential change in the current operation of the highway network and the following study area has thus been determined in agreement with the Local Highway Authority and Highways Agency.

- Chiverton Cross Roundabout;
- A390 / Unnamed Road towards Chacewater Hill; and the
- A390 / Chyvelah Road Roundabout.

8.3.12 The geometric characteristics and general maintenance of the network are considered with a view to establishing the suitability of the network in the context of accommodating the types of vehicles anticipated to be visiting the proposed development.

Ascertaining Traffic Conditions

8.3.13 The EIA has sought to take account of existing permitted and future proposed development that may have an effect on baseline traffic demand on the study area highway network.

8.3.14 In this respect, baseline traffic flows have been provided by the Local Highway Authority for a 2031-Baseline and 2031-Do Something scenario, which can be summarised as follows.
Table 8.1 Baseline Traffic Flow Composition

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Matrix</th>
<th>Network</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>As 2012 Base +</strong></td>
<td><strong>As 2012 Base Model +</strong></td>
</tr>
<tr>
<td></td>
<td>- INOX (Langarth)</td>
<td>- INOX (Langarth) access junction and NAR section</td>
</tr>
<tr>
<td>2031 Committed</td>
<td>- Oak Tree</td>
<td>- Langarth Park &amp; Ride extension and rear access from the NAR</td>
</tr>
<tr>
<td>Development</td>
<td>- Hendra (housing)</td>
<td>- Oak Tree access junction</td>
</tr>
<tr>
<td></td>
<td>- Tolgarrick</td>
<td>- Hendra (housing) access junction</td>
</tr>
<tr>
<td></td>
<td>- Former Richard Lander (FRL)</td>
<td>- TMS roundabout, Chyvelah Road mini-roundabout and TMS Industrial Estate junction all signalised</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Signalised pedestrian crossings added on A390 west and east of TMS roundabout</td>
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<tr>
<td></td>
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<td>- TMS roundabout, Chyvelah Road mini-roundabout and TMS Industrial Estate junction all signalised</td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td>- Hendra (housing) access junction</td>
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<td>- TMS roundabout, Chyvelah Road mini-roundabout and TMS Industrial Estate junction all signalised</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Signalised pedestrian crossings added on A390 west and east of TMS roundabout</td>
</tr>
<tr>
<td>2031 Do Something 6</td>
<td><strong>As 2031 Committed Dev. +</strong></td>
<td><strong>As 2031 Committed Dev +</strong></td>
</tr>
<tr>
<td></td>
<td>- Willow Green (WG)</td>
<td>- Willow Green access junction</td>
</tr>
<tr>
<td></td>
<td>- Maiden Green (MG)</td>
<td>- Maiden Green access junction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- NAR open (with Dynamic Feedback)</td>
</tr>
</tbody>
</table>

8.3.15 A forecast of likely traffic flows has been derived with the use of data previously accepted by the Local Highway Authority and supplemented by new data derived from interrogation of the TRICS (v.7.1.1) database, and supplemented with industry relevant research.

8.3.16 The magnitude and significance of the forecasted development traffic flows have then been considered in the context of the cumulative baseline identified above.

*Ascertaining Changes in Highway Capacity*

8.3.17 In agreement with the Local Highway Authority and the Highways Agency, the capacity performance of the study area highway network has been assessed for
proposed site access, with a commitment that the effects of the development would be modelled using the Local Highway Authority’s S-PARAMICS micro-simulation model of the A390 corridor during the consultation period of the planning application.

8.3.18 The EIA has considered that a junction is nearing its capacity when the Practical Reserve Capacity (PRC) is at 0.0% and that the threshold of capacity exists as -10%.

**Consideration of the Likely Safety Effects**

8.3.19 The potential highway safety effects of the calculated development traffic flows has been undertaken with regard to the existing pattern of accidents and with reference to the Institute of Highways and Transportation (IHT) Risk Assessment Matrix.

8.3.20 Within this, the severity of a collision is determined by impact speed, the type of vehicles involved in the collision and the protection afforded to victims. The resultant risks are categorised within the standard matrix below as 'low', 'medium', 'high', or 'very high'.

8.3.21 It is typically accepted that a 'low risk' is immaterial and consideration of mitigation would not be required. Where 'medium risk' ratings are indicated, mitigation is not a pre-requisite but practical solutions should be considered where possible. 'High risk' ratings indicate that mitigation would be desirable whereas a 'very high risk' would require immediate intervention.

8.3.22 Based on the above, an evaluation has been undertaken to establish if the calculated development traffic flows, when considered cumulatively, would lead to an abnormal or unacceptable safety risk. Where any adverse safety impacts are considered likely, appropriate mitigation measures have been identified.
Consideration of the Likely Environmental Effects

8.3.23 The need to consider environmental impacts beyond the highway capacity and safety effects has been determined by reference to the guidance for the Environmental Assessment of Road Traffic (IEA, 1993), which suggests two broad rules to define the need to undertake full environmental impact analysis. These are as follows:-

- Highway links where traffic flows will increase by more than +30% (or where the number of HGVs will increase by more than +30%); or
- Sensitive areas where traffic flows will increase by +10% or more.

8.3.24 In the event that the EIA process identifies the resultant traffic increases exceed either of the above criteria, the significance of and exposure to the environmental effects of traffic is considered. The environmental effects of traffic include:

- Pedestrian amenity (including severance, fear and intimidation, and delay)
- Driver delay
- Accidents and Safety.

8.3.25 Consideration of the magnitude of the effects is undertaken in compliance with the IEA guidance, as outlined below.

8.3.26 In the context of 'accidents and safety' the guidance suggests that professional judgment would be needed to assess the significance of the impact in the context of existing accident patterns. This Chapter refers the IHT Risk Assessment (mentioned above) to provide an informative to underpin the professional judgment.

8.3.27 In the context of driver delay, it has been agreed with the Local Highway Authority and Highways Agency that the traffic effects of the proposed development shall be tested within their micro-simulation traffic model of the
A390 corridor. This shall provide a more comprehensive analysis, taking into account route choice and driver behavior, as well as providing detailed output relating to driver delay. In the absence of such data, it is considered reasonable to assume for simplicity that the magnitude of driver delay effects will correspond with the changes in traffic flow.

8.3.28 Categorisation of the magnitude of the effects is summarised below.

**Table 8.2 Magnitude of Effect based upon Traffic Flow**

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Magnitude of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substantial</td>
<td>Consideration deterioration / improvement in local conditions or circumstances (+/- 90% change in traffic demand).</td>
</tr>
<tr>
<td>Moderate</td>
<td>Readily apparent change in conditions (+/- 60-90% change in traffic demand).</td>
</tr>
<tr>
<td>Slight</td>
<td>Perceptible change in conditions or circumstances (+/- 30-60% change in traffic demand).</td>
</tr>
<tr>
<td>Negligible</td>
<td>Very small perceptible change in conditions or circumstances (+/- 10 – 30% change in traffic demand).</td>
</tr>
<tr>
<td>No Impact</td>
<td>No discernible change in conditions (+/- 0 – 10% change in traffic demand).</td>
</tr>
</tbody>
</table>

8.3.29 Receptors are defined in Volume 11 of the DMRB and the levels for the environmental sensitivity of a receptor are specified therein. A similar approach is adopted herein with four levels of receptor sensitivity assessed: Low, Medium, High and Very High, as shown in Table 8.3. In this respect, the land-use of the receptors have been used to determine each receptor’s sensitivity, based upon the typical level of pedestrian activity for that land use.
Table 8.3 Receptor Sensitivity based upon Traffic Flow

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Receptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>Nationally or internally important site with special sensitivity to increases in road traffic.</td>
</tr>
<tr>
<td>High</td>
<td>Regionally important site with special sensitivity to increases in road traffic.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Residential (with frontage onto road under consideration), educational, healthcare, leisure public open space or town centre/local centre land-use.</td>
</tr>
<tr>
<td>Low</td>
<td>Employment or out of town retail land use, such as a retail park.</td>
</tr>
</tbody>
</table>

8.3.30 In the context of the proposed development, receptors within the study area include the retail park at Threemilestone (Receptor 1) and a number of residential properties set back from but fronting the A390, west of the application site (Receptor 2). In this regard, the sensitivity of the retail park is considered to be ‘low’ whereas the sensitivity of residential dwellings is categorised as ‘moderate’.

8.3.31 The significance of the impacts have been considered with a matrix-based approach, similar to that contained within DMRB Chapter 11, such that the impacts are derived from the receptor’s environmental sensitivity value in combination with the magnitude of the effect at that receptor. The matrix criteria is set out below.

Table 8.4 Significance Matrix

<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>Magnitude of Impact (Degree of Change)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negligible</td>
</tr>
<tr>
<td>Very High</td>
<td>Slight Adverse</td>
</tr>
<tr>
<td>High</td>
<td>Slight Adverse</td>
</tr>
<tr>
<td>Moderate</td>
<td>Negligible</td>
</tr>
<tr>
<td>Low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
8.4 Baseline Conditions

Access by Foot

8.4.1 The opportunities to travel to the site by foot have been considered at Section 3.2 of the submitted Transport Assessment (Volume 3, Appendix 8.1) wherein the baseline footway infrastructure has been replicated within an accessibility model, with adjustments made to the walk-speed to reflect the gradient of each link that will be constructed as part of the A390 Development Brief area, including new pedestrian crossings over the A390 at Threemilestone.

8.4.2 Developments comprising the A390 Development Brief area are either subject to outline planning permission or are, at the time of writing, pending a decision on current outline planning applications. Thus, the detailed design of infrastructure has not been established. However, current policy dictates that high quality walkable environments are created and thus the model assumes a maximum 8% (1:12) gradient in line with current guidance given within the IHT document entitled ‘Planning for Journeys on Foot’.

8.4.3 Adjustments to walk speed have been made in line with academic research undertaken by Nitzburg et al (1996)\(^2\) whose research identified that there is no quantifiable effect on walking speeds where gradients were below 3%, although a gradual linear decline in speed existed for steeper grades. Allied to this, Wigan (1995)\(^2\) found that the average walking speeds decreased by up to 11.5% with positive gradients from 5 to 10%, and by 25% for a positive slope of up to 20%. Further details are provided at Section 3.2 of the submitted Transport Assessment (Volume 3, Appendix 8.1).

8.4.4 The graphical output of the model is replicated as Figure 8.2.

\(^2\) Nitzburg, M., Knoblauch, R. & Pietrucha, M. (1996) Field Studies of Pedestrian Walking Speed and Start-up Time, Transportation Research Record 1538, Transportation Research Board, USA

\(^2\) Wigan, M. (1995) Treatment of Walking as a Mode of Transportation, Transportation Research Record 1487, Transportation Research Board, USA
8.4.5 The results of the analysis confirms that the over-whelming majority of the permitted Langarth development would be within the walk catchment of the application site and this would ensure that residents of Langarth, and those visiting the Stadium or Local Centre would be able to access the proposed leisure and retail land-uses by foot.

8.4.6 Indeed, the propensity to undertake the interconnecting journey by foot would be increased by the high quality green infrastructure that would be provided within the Langarth development and which would be extended into the application site, as discussed in this Chapter.

8.4.7 In a similar way, residents of the proposed development would be able to access a range of local amenities and employment opportunities afforded to them from within the proposed development, and within the wider Langarth development including at the Stadium for Cornwall.

8.4.8 On this basis the proposed development is considered to be well placed to encourage and provide for trips to be made by foot, in line with current planning policy.

Access by Cycle

8.4.9 The opportunities to travel to the site by cycle have been considered at Section 3.3 of the submitted Transport Assessment (Volume 3, Appendix 8.1) wherein the baseline infrastructure has been replicated within an accessibility model, with adjustments made to the cycle-speed to reflect the gradient of each link.

8.4.10 In this context, academic research undertaken by Parkin and Rotheram\textsuperscript{22} was incorporated within the model parameters. The findings of the research identified that the 85\textsuperscript{th} percentile speed for cyclists on the flat was 22.0kph and that for every additional 1\% of uphill gradient, the mean speed was reduced by

1.44kph. Links beyond the site and A390 Development Brief area have not been adjusted for topography, and therefore maintain an average cycle speed of 14.4kph (4.0 m/s) in line with IHT guidance.

8.4.11 The graphical output of the model is replicated in Figure 8.3.

8.4.12 The output identifies that a significant geographical area lies within a 30 minute commute of the site. Indeed, this area includes the whole of the A390 Development Brief area, Threemilestone, Chacewater, the majority of Truro and the fringe of Redruth.

8.4.13 Within this geographical area are a number of key local amenities, such as jobs, shops, and education facilities. On this basis, the location of the application site ensures that cycling is a reasonable alternative to car borne travel, in line with the thrust of NPPF

**Access by Bus**

8.4.14 The opportunities to travel to the site by bus have been considered at Section 3.3 of the submitted Transport Assessment (Volume 3, Appendix 8.1) using an accessibility model supported by bus timetable information that has been adjusted to reflect the proposal to diversion of the existing Number 88 bus service via the site, to connect onto the NAR within the Langarth Development. The proposed diversion is shown in the Figure 8.4.

8.4.15 The analysis considered a reasonable catchment to comprise a threshold inter-mode journey time of 60 minutes, with a maximum of one interchange. This therefore includes the time taken to travel to the bus stop, the time spent on the bus, and the time then to undertake the final part of the journey away from the bus stop from which the passenger alights.

8.4.16 The results are replicated in the Figure 8.5.

8.4.17 It is evident from the model output that the application site would afford access to a significant geographical catchment by bus, subject to diversion of the
existing Number 88 bus service. Indeed, the geographical catchment provides access to Truro City Centre, Falmouth, Redruth and St. Agnes are all within a 60 minute travel time of the application site by bus.

8.4.18 The Number 88 bus service would be rerouted to the application site under the development proposals, maintain its current 30 minute frequency throughout the day. This provides connectivity between the application site, Truro Railway Station and the City Centre.

8.4.19 In view of this, the application site is considered to be well located in respect of bus services that afford adequate opportunity to access a range of amenities and job opportunities. The same bus services also enable a significant population catchment to travel to the site by bus.

Rail Accessibility

8.4.20 The application site is accessible to the Truro Railway Station within a short taxi, cycle or bus journey. Indeed, bus services operate between the application site and railway station every 30 minutes throughout the day. Similarly, the accessibility model described previously demonstrates that the railway station is a 15-20 minute cycle ride from the application site, and secure, covered cycle storage is available at the Station to facilitate such journeys.

8.4.21 Rail services from Truro Railway Station provides regular services to Penzance, Falmouth, Newton Abbot, St.Austell, Plymouth, Exeter and London.

8.4.22 Consequently, the application site facilitates those journeys that may require travel by rail.

Linkage to the City Centre

8.4.23 The location of the application site is commensurate with the principle of a twin Centre approach, linking the proposed District Centre functions with the Local Centre and Stadium hub located within the Langarth development.
8.4.24 However, the location of the application site, towards the western extents of Truro, will also enable the interception of vehicular trips prior to reaching the more sensitive parts of the road network. These trips will comprise an element of trade that would have otherwise visited existing retail centres, but will also comprise an element of trip chaining whereby the application site becomes a waypoint for existing journeys to other retail centres, and particularly the City Centre.

8.4.25 However, the scale of the proposed land-uses will help to ensure that the application site is seen as a destination in its own right, helping to serve as a natural break in the journey to the City Centre and encouraging people to stay for longer. In this context, the application site would be more than a waypoint (or stopover) to another destination. Indeed, this effect will be increased by the site’s connectivity with the Local Centre and Stadium Hub. It is also worth noting that such connectivity would be expected to magnify the viability of the Local Centre and Stadium hub land-uses.

8.4.26 Allied to this, the Local Centre and Stadium hub uses are located adjoining the Park & Ride, and given this relationship, it is considered that the propensity to complete the last leg of the journey to the City Centre by Park & Ride bus service would be increased. Indeed, the ability to enter the Park & Ride from a rear access from the Northern Access Road, as foreseen within the Langarth development, would further increase this potential. In this respect, the application site would reinforce linkage with the City Centre by sustainable non-car travel modes.

Access by Car

8.4.27 The study area highway network was considered at Section 4.2 of the submitted Transport Assessment (Volume 3, Appendix 8.1), wherein a review of the geometric layout of the network was undertaken in the context of the Design Manual for Roads and Bridges (DMRB).
8.4.28 The submitted Transport Assessment noted the relatively recent (2011) upgrade of the Chiverton Cross Roundabout that was implemented to cater for capacity for the immediate future, and address existing queuing problems. Notwithstanding the upgrade, the Transport Assessment noted the concerns expressed by the Highways Agency during the pre-application meeting of 11th July 2014 that the junction would be unable to accommodate additional demand created by both the Maiden Green and Willow Green planning applications.

8.4.29 Notwithstanding concerns relating to other development, the assessment concluded that the application site is located where it would be able to access a high quality network of roads that provide connectivity to the regional city of Truro and to other significant destinations around the region, and made easier by the proximity of the trunk road network. These roads were determined to be geometrically suitable for use by the types of vehicles anticipated to be associated with the proposed development, as evidenced by their current use.

Highway Safety

8.4.30 The safety risks of the existing study area network are considered within Section 4.5 of the submitted Transport Assessment (Volume 3, Appendix 8.1) wherein existing accident records provided on behalf of the Local Highway Authority were provided for the most recent five-year period available.

8.4.31 The data were evaluated in order to establish if there were obvious clusters or patterns of accidents that might be suggestive of a deficiency in the geometry of the highway that might be contributing to an unacceptable safety risk. In this respect, the Transport Assessment review identified that the majority of accidents occurred at the Chiverton Cross Roundabout or away from junctions as isolated incidents on the network. A small number (3) of accidents occurred at the Chyvelah Road Roundabout and no accidents were recorded at the A390 junction with the unnamed road to Chacewater Hill.

8.4.32 Relating the data to the IHT Safety Risk Matrix, the Transport Assessment identified that there is a high risk of slight injury accidents at the Chiverton
Cross Roundabout, particularly on the A30 and A390 approaches to the junction. There is also a medium risk of serious injury at the junction. On this basis, the IHT guidance suggests that mitigation would be desirable.

8.4.33 The results of the review also indicated that there is a low risk of injury at the junction between the A390 and the unnamed road to Chacewater Hill. For clarification, despite no recorded accidents at the junction, accident theory suggests that there is always a risk at junctions. The results also indicate a medium risk of slight injury at the Chyvelah Road Roundabout, which guidance suggests that mitigation is not a pre-requisite.

8.4.34 In view that risk increases with exposure the above results should be considered in the context of traffic demand and in this respect, it is to be expected that accidents occur more frequently at those locations that accommodate greater levels of demand. Consequently, in consideration of the heavily trafficked nature of the Chiverton Cross Roundabout, it is considered that the junction currently operates within acceptable highway safety risks.

8.4.35 The submitted Transport Assessment also noted that the volume of traffic using the A390 corridor is expected to increase as a result of committed and planned development in the area. However, notwithstanding this, the Transport Assessment considers that the Local Highway and Planning Authorities will satisfy themselves that the respective developments will not give rise to any unacceptable worsening of the safety risks and, as a consequence, the salient issue for will be to consider whether the development effects are sufficient to create a material worsening in the risk of accidents occurring.

Baseline Traffic Demand & Highway Capacity

8.4.36 In agreement with the Local Highway Authority and following discussion with the Highways Agency, the submitted Transport Assessment (Volume 3, Appendix 8.1) considers two horizon year development scenarios that include the currently consented development at 2031, and a ‘do-something’ scenario that incorporates all committed and future development (including highway infrastructure) envisaged under the A390 Development Brief.
8.4.37 Traffic data for these scenarios has been determined from the S-PARAMICS micro-simulation model that is maintained on behalf of the Local Highway Authority, which has been provided as independent input to the Transport Assessment. It is understood to reflect the data on which the assessments for nearby development proposals have been undertaken.

8.4.38 The data provided on behalf of the Local Authority represents demand on the network during the weekday morning and evening peak periods only and does not provide profiled demand throughout the day. As such, this Chapter assessed the significance of the impacts at these times of the day.

8.4.39 This is considered reasonable in light of the fact that, whilst baseline traffic flows would be lower outside of the peak periods, the trip generation potential of the proposed development would also be lower, offsetting any potential change in the relative change in traffic demand on the network.

<table>
<thead>
<tr>
<th>Table 8.5 Baseline Traffic Flows</th>
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<tbody>
<tr>
<td><strong>Receptor</strong></td>
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<tr>
<td>Receptor 1 (A390 West of Site)</td>
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<td></td>
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<tr>
<td>Receptor 2 (Chyvelah Road Roundabout)</td>
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</table>
8.4.40 In respect of baseline capacity in the network, it has been agreed with the Local Highway Authority and the Highways Agency that the significance of the traffic effects of the proposed development shall be tested within the S-PARAMICS model during the course of the consultation period.

8.5 Identification and Evaluation of Key Likely Impacts

Construction

8.5.1 Construction phase impacts will be dependent upon the build-rate which shall in turn be influenced by the complexity of the site and the performance of the regional and national economy, including the presence of competing developments in the locality (this being particularly pertinent to house building activities).

8.5.2 The build-rate will determine the volume of daily traffic movements, in so much that greater build-rates result in higher concentrations of activity over a shorter period of time. Thus, the resultant construction phase impacts may be higher but over a shorter period of time, thereby reducing exposure to potentially sensitive receptors.

8.5.3 In the context of the proposed development it is acknowledged that the outline nature of the planning application means that further detail would be required in order to identify likely construction phase traffic activity. However, in the absence of such data, it is expected that significant civil and infrastructure works would prolong the duration of on-site activity to around two-years (24 months).

8.5.4 The potentially significant construction phase impacts are considered likely to be determined as a result of the following principle activities:-

- Daily arrival and departure of construction staff;
- On-site activity to re-grade the site and facilitate the construction of buildings and associated infrastructure.
- Export/import of any residual material from the re-grading of the site;
- Delivery of construction materials.
- Traffic management measures on the A390 and the delay caused, particularly during construction of the vehicular access.

8.5.5 The second bullet point above is considered within Chapter 9 (Dust & Air Quality) of this ES.

**Magnitude of the Effect**

8.5.6 In the absence of a detailed planning permission and a construction schedule, it is not possible to identify an accurate estimate of the trip generation potential of the construction phase. Nevertheless, it is anticipated that the peak transport related effects will be associated with the regarding of the site, combined with construction staff, and allowances have therefore been made in order to consider the magnitude and significance of the effects during this period.

8.5.7 In this respect, initial calculations indicate that re-grading of the site will require the movement of around 140,000 cubic metres of material. Of this, it is estimated that around 80,000 cubic metres of material will be relocated elsewhere within the site, suggesting a requirement to export circa 60,000 cubic metres of material off site.

8.5.8 In the interests of rigour and in allowance of the fact that the above figures are initial estimates, and are therefore subject to variation following detailed design, this Chapter assumes a net export of 100,000 cubic metres of material.

8.5.9 In this respect, a 4-axle ‘tipper lorry’ can accommodate a typical payload of 9 cubic meters and thus removal of residual material from the site is assumed to comprise 11,111 journeys (22,222 two-way movements).
8.5.10 Assuming this phase to comprise 6 months and allowing for 5-day working week, typical daily heavy goods vehicle movements would be 93 journeys (186 two-way movements). This equates to an hourly trip generation of 12 journeys (24 two-way movements) per hour, based on the hourly trip generation being equal to \(1/8\)th of the daily rate: this reflects a 10 hour working day, allowing for some minor hour-to-hour variation.

8.5.11 Expressing this in a different way, the peak period within the construction phase would result in one heavy goods vehicle movement every 2.5 minutes throughout the day, over a period of 6 months.

8.5.12 Facilitating this will be the recruitment of a number of site construction staff. Initial calculations based on the construction value of the project indicate the potential of the scheme to generate some 216 jobs (Full Time Equivalents). Many of these will be associated with off-site jobs, such as drivers of the heavy goods vehicles, or back-of-house positions. As such, it is assumed for the purpose of this Chapter that there would be a maximum of 100 staff on site at any one time.

<table>
<thead>
<tr>
<th>Table 8.6 Magnitude of Peak Construction Phase Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptor</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Receptor 1 (A390 West of Site)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Receptor 2 (Chyvelah Road Roundabout)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Junction Total</td>
</tr>
</tbody>
</table>
Significance of the Impact

8.5.13 As stated previously within this Chapter, the significance of the effect is determined in combination with the sensitivity of the receptor, as set out at Table 8.4.

8.5.14 In this context, the magnitude of the effects identified above in Table 8.6 indicate that the significance of the construction related effects would be classified as ‘Slight Adverse’ in respect of Receptor 1 (residential properties fronting onto the A390, west of the application site), and ‘Negligible’ in the context of Receptor 2 (Threemilestone).

8.5.15 Consequently, the significance of the peak construction phase impacts are acceptable, particularly in light of their temporary nature. Notwithstanding this, mitigation measures are proposed to reduce the magnitude of the effect further and these are identified at Section 8.6 of this Chapter.

Operational

Traffic Generation

8.5.16 Section 5.0 of the submitted Transport Assessment (Volume 3, Appendix 8.1) sets out the methodologies used to determine the likely trip generation characteristics of the proposed development. The methodologies reflect the potential for multiple visits between the proposed mix of land-uses, the potential to attract existing trade that is already passing the site, and effects of diverting trade away from existing retail destinations.

8.5.17 The submitted Transport Assessment identifies the development trip generations for the weekday peak hours in line with the scope agreed with the Local Highway Authority and Highways Agency. The resultant net traffic flows, taking into account synergies with adjoining land uses, is set out below.
### Table 8.7 Weekday Peak Hour Trip Generation

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Link</th>
<th>Direction of Flow</th>
<th>Morning Peak</th>
<th>Evening Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Net Flows</td>
<td>Net Flows</td>
</tr>
<tr>
<td>Receptor 1 (A390 West of Site)</td>
<td>A390</td>
<td>Westbound</td>
<td>35</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>34</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Two-Way</strong></td>
<td><strong>70</strong></td>
<td><strong>128</strong></td>
</tr>
<tr>
<td></td>
<td>A390 West</td>
<td>Westbound</td>
<td>61</td>
<td>162</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eastbound</td>
<td>101</td>
<td>134</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Two-Way</strong></td>
<td><strong>161</strong></td>
<td><strong>296</strong></td>
</tr>
<tr>
<td>Receptor 2 (Chyvelah Road Roundabout)</td>
<td>Park &amp; Ride</td>
<td>Northbound</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Southbound</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Two-Way</strong></td>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
</tr>
<tr>
<td></td>
<td>A390 Higher Besore Road</td>
<td>Westbound</td>
<td>34</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eastbound</td>
<td>63</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Two-Way</strong></td>
<td><strong>97</strong></td>
<td><strong>156</strong></td>
</tr>
<tr>
<td></td>
<td>Chyvelah Road</td>
<td>Northbound</td>
<td>29</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Southbound</td>
<td>18</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Two-Way</strong></td>
<td><strong>47</strong></td>
<td><strong>95</strong></td>
</tr>
<tr>
<td>Junction Total</td>
<td></td>
<td></td>
<td><strong>164</strong></td>
<td><strong>267</strong></td>
</tr>
</tbody>
</table>

**Magnitude of the Effect**

8.5.18 The above trip generations have been considered in relation to the baseline traffic flows identified within Table 8.7 to provide an indicative the magnitude of change expected. The results are set out at Table 8.8, below.
### Table 8.8 Magnitude of Operational Effects

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Link</th>
<th>Direction of Flow</th>
<th>Morning Peak</th>
<th>Evening Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>2031 Base</td>
<td>2031 Do Something</td>
</tr>
<tr>
<td>Receptor 1 (A390 West of Site)</td>
<td>A390</td>
<td>Westbound</td>
<td>3.7%</td>
<td>3.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eastbound</td>
<td>4.3%</td>
<td>3.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Two-Way</strong></td>
<td><strong>4.0%</strong></td>
<td><strong>3.6%</strong></td>
</tr>
<tr>
<td></td>
<td>A390</td>
<td>Westbound</td>
<td>7.1%</td>
<td>8.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eastbound</td>
<td>12.7%</td>
<td>13.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Two-Way</strong></td>
<td><strong>9.8%</strong></td>
<td><strong>10.6%</strong></td>
</tr>
<tr>
<td></td>
<td>A390 West</td>
<td>Northbound</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Southbound</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Two-Way</strong></td>
<td><strong>0.0%</strong></td>
<td><strong>0.0%</strong></td>
</tr>
<tr>
<td></td>
<td>Park &amp; Ride</td>
<td>Westbound</td>
<td>2.9%</td>
<td>2.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eastbound</td>
<td>7.1%</td>
<td>6.7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Two-Way</strong></td>
<td><strong>4.7%</strong></td>
<td><strong>4.1%</strong></td>
</tr>
<tr>
<td></td>
<td>A390 Higher Besore Road</td>
<td>Northbound</td>
<td>3.0%</td>
<td>2.7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Southbound</td>
<td>3.9%</td>
<td>4.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Two-Way</strong></td>
<td><strong>3.3%</strong></td>
<td><strong>3.0%</strong></td>
</tr>
<tr>
<td></td>
<td>Chyvelah Road</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Junction Total</strong></td>
<td><strong>5.4%</strong></td>
<td><strong>4.8%</strong></td>
</tr>
</tbody>
</table>

**Significance of the Impact**

8.5.19 As stated previously within this Chapter, the significance of the effect is determined in combination with the sensitivity of the receptor, as set out at Table 8.4.

8.5.20 In this context, the magnitude of the effects identified above in Table 8.6 above indicate that the significance of the operational traffic effects would be classified as ‘Negligible’ in respect of both Receptor 1 (residential properties fronting onto the A390, west of the application site), and Receptor 2 (Threemilestone).

8.5.21 In the context of highway safety, it is considered that the change in traffic flows would be unlikely to materially or discernibly alter the risk of accident on the network.
8.5.22 Consequently, the significance of the operational effects are considered to be acceptable. Notwithstanding this, mitigation measures are proposed to reduce the magnitude of the effect further and these are identified at Section 8.6 of this Chapter

**Summary of Magnitude & Significance**

8.5.23 In summary of the above, the magnitude and significance of the calculated impacts is set out below.

**Table 8.9 Summary of Magnitude & Significance**

<table>
<thead>
<tr>
<th>Impact</th>
<th>Receptor Sensitivity</th>
<th>Direct or Indirect</th>
<th>Positive/ Negative</th>
<th>Permanent/ Temporary</th>
<th>Magnitude</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptor 1</td>
<td>Moderate</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Slight</td>
<td>Slight Adverse</td>
</tr>
<tr>
<td>Receptor 2</td>
<td>Low</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>No Impact</td>
<td>Negligible</td>
</tr>
<tr>
<td><strong>Operational</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptor 1</td>
<td>Moderate</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Receptor 2</td>
<td>Low</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Slight</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

8.6 **Mitigation Measures**

8.6.1 Notwithstanding the already small and acceptable environmental impacts identified above, it is proposed to optimise the development traffic effects further through the range of measures as identified below.

8.6.2 It should of course be noted that significant benefits are accrued by virtue of the synergies between the range of land-uses proposed, and these benefits are already reflected within the previously identified traffic effects.

**Construction Phase**

8.6.3 It is proposed that a Construction Environmental Management Plan (CEMP) would be prepared and submitted to the Local Planning Authority prior to the commencement of on-site works. The purpose of the CEMP would be to that
appropriate environmental management practices are followed during the construction phase of the project.

8.6.4 Although measures will be identified within the CEMP, it is possible that they may include some or all of the following:-

- Wheel washing facilities to prevent the transfer of detritus onto the public highway.
- Appropriate road signage directing construction traffic to the appropriate location and warning drivers and other road users of the presence of construction vehicle traffic.
- A Construction Staff Travel Plan that would seek to minimise the number of car-borne visits to the site. Notwithstanding the fact that the topography of the site may naturally limit the potential for on-site car parking, a mini-bus collection service may be operated by the appointed contractor. A mini-bus system could reduce non-hgv movements down to as little as four mini bus trips, potentially down from 100 car trips.
- A Routing Agreement to ensure that all deliveries are occur on roads that are suitable and able to accommodate goods vehicle traffic.
- Traffic Management measures in consultation with Cornwall Council, including road closures, identification and signage of diversionary routes etc.

**Operational Phase**

8.6.5 Mitigation is proposed in the form of a Travel Plan and improvements to public transport services.

8.6.6 A Framework Travel Plan has been prepared and is contained at Volume 3, Appendix 8.1 of the ES (see Appendix O therein). This encompasses the residential, retail and leisure land-uses on the site, with a modal shift target specified to encourage staff, visitors and residents. Measures are also identified to encourage modal shift of customers of the retail units. It is intended that the Final Travel Plan will be implemented in time for the site’s first occupation and will be monitored for a subsequent period of 5 years.
8.6.7 The modal shift targets that are identified within the Travel Plan will help to reduce the level of car-borne traffic to and from the proposed development. The result of this will be to reduce the magnitude of any traffic increase along the A390 as a consequence of the development.

8.6.8 Allied to the Travel Plan measures, it is general practice to ensure that all new development is encouraged to provide reasonable access to public transport services within 400 meters of a dwelling or workplace (reference: paragraph 5.21 of Planning for Public Transport in Developments, IHT, 1999). In this respect, the evaluation of the non-car accessibility credentials of the development undertaken in the submitted Transport Assessment (Volume 3, Appendix 8.1) and replicated at Section 8.4 of this Chapter. It confirms that the whole of the proposed development would be within the desirable maximum walk distance of 400 meters to the nearest bus stop.

8.6.9 In order to facilitate this, it is proposed to extend the existing Number 88 bus service to the development at the existing half hourly frequency, with developer funding a five-year subsidy for any additional expenditure required to facilitate the change above and beyond that committed under the Langarth planning permission.

8.7 **Residual Impacts**

8.7.1 For simplicity, the benefits afforded by introduction of the above mitigation strategies have not been quantified and indeed it is considered that doing so would not alter the conclusions of this Chapter. Thus, for the purpose of this assessment, the residual impacts are considered to be as follows.
Table 8.10 Summary of Residual Impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Receptor Sensitivity</th>
<th>Direct or Indirect</th>
<th>Positive/ Negative</th>
<th>Permanent/ Temporary</th>
<th>Magnitude</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptor 1</td>
<td>Moderate</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Slight</td>
<td>Slight Adverse</td>
</tr>
<tr>
<td>Receptor 2</td>
<td>Low</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>No Impact</td>
<td>Negligible</td>
</tr>
<tr>
<td>Operational</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptor 1</td>
<td>Moderate</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Receptor 2</td>
<td>Low</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Slight</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

8.8  Cumulative Effects

Construction Phase

8.8.1 It is possible that construction of the proposed development will occur concurrent to the construction of other nearby schemes, but particularly the adjoining Langarth development. However, in view that these adjoining developments have, at best, outline planning permission, there is limited information from which to gauge the associated impacts and to undertake a comprehensive cumulative assessment.

8.8.2 Nevertheless, confidence may be taken from the results of the analysis contained herein, which identifies a worst-case impact of ‘Slight Adverse’ at Receptor 1 during the construction phase. This suggests that there is significant scope to accommodate cumulative traffic effects whilst maintaining acceptable thresholds of impact. Indeed, even in a hypothetical situation that resulted in a quadrupling of construction traffic, the magnitude of the effect would be classified as ‘substantial’ and the resultant environmental impact would be ‘Moderate Adverse’ at Receptor 1. This is considered to be acceptable.

8.9  Summary and Conclusions

8.9.1 This Chapter of the ES has been written by Curtins Consulting Ltd in order to assess the environmental impacts of a proposed development at West Langarth,
Penstraze, Cornwall. The findings of the assessment may be summarized as follows:-

- The context of this Chapter has been informed by the technical analysis contained within the submitted Transport Assessment contained at Volume 3, Appendix 8.1 of this ES.
- This Chapter has considered the environmental impacts of traffic to include pedestrian amenity, highway safety and driver delay in the context of the relative change in traffic flows.
- Two receptors have been identified within the study area, these being a number of residential dwellings fronting onto the A390 west of the application site, and the retail park at Threemilestone. The sensitivity of these receptors was noted to be 'moderate' and 'low', respectively.
- The location of the application site has been considered in the context of existing and future consented infrastructure using GIS-based modelling techniques, which confirm that the site relates well by non-car modes to adjoining consented developments within the A390 Development Brief area, the Stadium and Local Centre, Park & Ride, and Threemilestone.
- Baseline traffic flows incorporating committed and future development have been provided by Cornwall Council and used as the basis of the environmental impact analysis. Analysis against peak period flows is considered reasonable in light of the fact that the trip profile of the site is likely to closely match ambient flows on the network, yielding similar relative changes in demand.
- Construction phase impacts could be generated from the arrival and departure of around 100 construction workers, and 93 hgv arrivals (186 two-way trips), per day. Whilst impacts can be significantly reduced with appropriate mitigation, the construction phase impacts would be, at worst, categorised as 'Slight Adverse'. This is considered to be acceptable, particularly in light of the temporary nature of this phase of development.
- Cumulative impacts during construction could arise alongside the construction of adjoining schemes. However, insufficient information is available to measure this effect. Notwithstanding, an arbitrary
quadrupling of construction traffic flows assumed for the proposed development would yield an acceptable 'Moderate Adverse' impact.

- Operational phase impacts have been determined with reference to the trip generation calculations contained within the submitted Transport Assessment. These made allowance for the synergies that would exist between the proposed land-uses and for the potential for shopping trips to divert from existing journeys. The resultant impacts were classified as Negligible on both receptors.

- Mitigation of the operational phases impacts have been proposed by way of a Travel Plan that contains specified mode split targets, and the diversion of the Number 88 bus service.

8.9.2 In view of the above, it is the conclusion of this Chapter of the ES that the proposed development can be accommodated without any unacceptable detriment to the environmental effects of traffic. Furthermore, it is noted that the inclusion of mitigation measures at both construction and operational phases would reduce the effects and impacts of the development further, providing confidence in the conclusion of this assessment.
<table>
<thead>
<tr>
<th>Impact</th>
<th>Impact Significance</th>
<th>Direct/Indirect</th>
<th>Positive/Negative</th>
<th>Temporary/Permanent</th>
<th>Summary of Mitigation/Enhancement</th>
<th>Residual Impact magnitude</th>
<th>Residual Impact significance</th>
<th>Positive/Negative</th>
<th>Temporary/Permanent</th>
<th>Confidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Traffic – Receptor 1</td>
<td>Moderate</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Production of Construction Environmental Management Plan, including Routing Agreement &amp; Construction Travel Plan. Document and measures to be agreed with Cornwall Council.</td>
<td>Slight</td>
<td>Slight</td>
<td>Adverse</td>
<td>Negative</td>
<td>Temporary</td>
</tr>
<tr>
<td>Construction Traffic – Receptor 2</td>
<td>Low</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Production of Construction Environmental Management Plan, including Routing Agreement &amp; Construction Travel Plan. Document and measures to be agreed with Cornwall Council.</td>
<td>No Impact</td>
<td>Negligible</td>
<td>Negative</td>
<td>Temporary</td>
<td>Moderate</td>
</tr>
<tr>
<td>Construction Traffic – Cumulative</td>
<td>Moderate</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Production of Construction Environmental Management Plan, including Routing Agreement &amp; Construction Travel Plan. Document and measures to be agreed with Cornwall Council.</td>
<td>Substantial</td>
<td>Moderate</td>
<td>Adverse</td>
<td>Negative</td>
<td>Temporary</td>
</tr>
<tr>
<td>Operational Traffic – Receptor 1</td>
<td>Moderate</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Diversion of Bus Service #88. Production of Travel Plan with targeted mode switch.</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Permanent</td>
<td>High</td>
</tr>
<tr>
<td>Operational Traffic – Receptor 2</td>
<td>Low</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Diversion of Bus Service #88. Production of Travel Plan with targeted mode switch.</td>
<td>Slight</td>
<td>Negligible</td>
<td>Negative</td>
<td>Permeant</td>
<td>High</td>
</tr>
</tbody>
</table>
9.0 Dust and Air Quality

9.1 Introduction

Brief

9.1.1 URS Infrastructure & Environment Limited (URS) has been appointed to assess the potential for a mixed use development at West Langarth (hereafter referred to as the Proposed Development) to have a significant effect on local air quality. The Proposed Development includes retail units (use Class A1) with associated petrol filling station, food and drink (use Classes A3, A4 and A5), residential development of c. 130 units (use Class C3) and the provision of public open space (including community sports facility and playing pitch provision).

9.1.2 In particular the assessment has considered the suitability of the site for the Proposed Development with respect to existing air quality, existing planning policies and national legislation. Additional mitigation measures have been recommended where appropriate, to minimise the potential for adverse residual effects to be experienced by sensitive receptors (e.g. residential properties).

9.1.3 The nearest Air Quality Management Area (AQMA) to the proposed development is located 5.8 kilometres to the south west, known as Kerrier AQMA, which was declared by Cornwall Council for exceedences of the annual mean NO₂ objective in 2005.

Scope of Work

9.1.4 A review of published ambient air quality data, relevant legislation and planning policy has been undertaken as part of the air quality assessment.

9.1.5 During the construction phase of the proposed development, there is the potential for demolition and construction activities to generate fugitive emissions of particulate matter (dust and PM₁₀). There is the risk of such emissions giving rise to significant adverse effects on amenity or health at
receptors located within 100 metres of the source of emissions (Ref-9.1) unless appropriate mitigation measures are adopted. There are receptors located within 100 metres of the site boundary and therefore an assessment of the significance of effects from fugitive emissions of dust and PM\(_{10}\) from the site has been undertaken. The assessment includes consideration of the risk of adverse effects associated with the potential track out of material at receptors located within 50 metres of roads extending up to 200 metres from the site access.

9.1.6 The nearest nationally or internationally designated ecological site is located approximately 410 metres south west of the site. This site is called Carrick Heaths Site of Special Scientific Interest (SSSI). Therefore, it is considered highly unlikely that the proposed works could emit dust emissions with the potential to significantly affect the nearest ecological receptor sites and the risk to such sites is not considered further in this assessment.

9.1.7 The potential for changes to long term and short term mean concentrations of particulate matter (PM\(_{10}\) and PM\(_{2.5}\)) and nitrogen dioxide (NO\(_2\)) to occur as a result of predicted changes in road traffic movements on the local road network, have been considered specifically for the following scenarios:

- Existing Baseline of 2012 (suitable for model verification);
- Without-Development Scenario of 2031; and
- With-Development Scenario of 2031.

9.1.8 The air quality assessment uses traffic flows prepared by Curtins Consulting as set out in Table 9.9 and Table 9.16 (Ref-9.2). Whilst the Proposed Development opening year is anticipated to be 2017, the impact of this development has been considered in conjunction with a number of large scale committed development projects in the Langarth and Truro area that are due for completion at different stages up to 2031. The future With and Without-development scenarios therefore use the total expected traffic flow by the completion year of 2031 as provided from the Cornwall Council Paramics model for the area. This is considered to be a conservative assessment approach as the full growth in traffic considered herein for 2031 will not have taken place by 2017.
9.1.9 An energy centre for the food store is also included in the development proposals for the Food Store. There is no fixed specification for the energy centre at this stage of the application, therefore a review of appropriate and typical plant for the size and type of development was undertaken and applied in this assessment. The specification and emissions data are described in more detail in paragraphs 9.3.26 and 9.3.27.

9.1.10 The assumed emissions of NO\textsubscript{2} and Carbon Monoxide (CO) from a gas-fired Combined Heat and Power (CHP) plant have also been considered for the With-Development scenario.

9.1.11 In summary the potential air quality impacts at sensitive receptors have been considered specifically with regard to the effect of:

- Fugitive emissions of particulate matter (dust and PM10) during the construction phase;
- Changes to annual mean concentrations of particulate matter (PM10), fine particulate matter (PM2.5) and NO2 as a result of predicted changes in traffic flow on the local road network due to the operation of the scheme in 2031;
- Changes to rolling 8-hour mean concentrations of CO and annual mean and short term concentrations of NO2 (1 hour) as a result of the CHP plant associated with the proposed food store; and
- The effect of changes in long term pollutant concentrations of NO2 associated with changes in road traffic and the CHP plant together have also been presented to capture the combined air quality effects of the proposed development.

9.2 Legislative and Policy Framework

Air Quality Legislation

9.2.1 The Clean Air for Europe (CAFE) programme revisited the management of Air Quality within the EU and replaced the EU Framework Directive 96/62/EC (Ref-

9.2.2 Directive 2008/50/EC (Ref-9.8) is currently transcribed into UK legislation by the Air Quality Standards Regulations 2010 (Ref-9.9), which came into force on 11th June 2010. These limit values are binding in the UK and have been set with the aim of avoiding, preventing or reducing harmful effects on human health and on the environment as a whole.

**National Planning Policy Framework**

9.2.3 The National Planning Policy Framework (NPPF) published in March 2012 (Ref-9.10), paragraph 109 of the NPPF states that:

"*The planning system should contribute to and enhance the natural and local environment by:*

- preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability…"
- *Annex 2 of the NPPF defines 'Pollution' as 'Anything that affects the quality of land, air, water or soils, which might lead to an adverse impact on human health, the natural environment or general amenity. Pollution can arise from a range of emissions, including smoke, fumes, gases, dust, steam, odour, noise and light'.*

9.2.4 There are both national and local policies for the control of air pollution and local action plans for the management of local air quality in Cornwall Council. The effect of the proposed development on the achievement of such policies and plans are matters that may be a material consideration by planning authorities, when making decisions for individual planning applications. Paragraph 124 of the NPPF states that:

"*Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative...*"
impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan.”

9.2.5 The National Planning Practice Guidance (NPPG) (Ref-9.11), provides a summary of the air quality issues set out in the National Planning Policy Framework and goes on to note that the assessment should include the following information:

- the existing air quality in the study area (existing baseline);
- the future air quality without the development in place (future baseline); and
- the future air quality with the development in place (with mitigation).

9.2.6 The guidance then advises that applications should proceed to decision with appropriate planning conditions or planning obligation, if the proposed development (including mitigation) would not lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or fail to comply with the requirements of the Habitats Regulations.

National Air Quality Strategy

9.2.7 The UK National Air Quality Strategy (Ref9-.12) was initially published in 2000, under the requirements of the Environment Act 1995 (Ref-9.13). The most recent revision of the strategy (Ref-9.14) sets objective values for key pollutants as a tool to help Local Authorities manage local air quality improvements in accordance with the EU Air Quality Framework Directive. Some of these objective values have subsequently been laid out within the Air Quality (England) Regulations 2000 (Ref-9.15) and later amendments (Ref-9.16).

9.2.8 The air quality objective values referred to below have been set down in regulation solely for the purposes of local air quality management. Under the local air quality management regime, Cornwall Council has a duty to carry out regular assessments of air quality against the objective values and if it is unlikely that the objective values will be met in the given timescale, they must
designate an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) with the aim of achieving the objective values. The boundary of an AQMA is set by the governing local authority to define the geographical area that is to be subject to the management measures to be set out in a subsequent action plan. Consequently it is not unusual for the boundary of an AQMA to include within it, relevant locations where air quality is not at risk of exceeding an air quality objective.

9.2.9 The UK’s national air quality objective values for the pollutants of relevance to this assessment are displayed in **Table 9.1**.

**Table 9.1 Air Quality Objective Values**

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Value</th>
<th>Maximum Permitted Exceedences</th>
<th>Target Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen Dioxide (NO₂)</td>
<td>Annual Mean</td>
<td>40 µg/m³</td>
<td>None</td>
<td>31/12/05</td>
</tr>
<tr>
<td></td>
<td>Hourly Mean</td>
<td>200 µg/m³</td>
<td></td>
<td>31/12/05</td>
</tr>
<tr>
<td>Particulate Matter (PM₁₀)</td>
<td>Annual Mean</td>
<td>40 µg/m³</td>
<td>None</td>
<td>31/12/04</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>50 µg/m³</td>
<td></td>
<td>31/12/04</td>
</tr>
<tr>
<td>Fine Particulate Matter (PM₂.₅)</td>
<td>Annual Mean</td>
<td>25 µg/m³</td>
<td>None</td>
<td>2020</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>Maximum daily running 8 hour mean</td>
<td>10 mg/m³</td>
<td>None</td>
<td>31/12/03</td>
</tr>
</tbody>
</table>

**Regional and Local Planning Policy**

**Regional Planning Policy**

9.2.10 On the 1st of April 2009, Cornwall became a Unitary Authority and the six Local Authorities which included Carrick District Council ceased to exist. Therefore, all local authorities became part of Cornwall Council. Cornwall Council was one local authority that was part of the Regional Strategy for the South West. However, on the 20th of May 2013, the Secretary of State announced the revocation of the Regional Strategy for the South West under new power enacted in the Localism Act 2011 (Ref-9.17).
Local Planning Policy

9.2.11 The Cornwall Council Local Plan Strategy Pre-submission document was written in March 2013 (Ref-9.18). However, the Cornwall Council Local Plan Strategic Policies Document has reached Regulation 19 stage. The six weeks consultation stage begins on the 1st of September 2014 with the intention to take the Submissions Local Plan plus changes through Cabinet and Full Council during November and December 2014 (Ref-9.19). There is one objective and one policy in the Pre-submission document that are concerned with air quality:

"Objective 8: Promote development that contributes to a healthy and safe population by providing for opportunities for walking and cycling and ensuring the appropriate levels of open space and the protection and improvement of air quality."

"Policy 14- Development Standards: All new development will be expected to achieve the provision of the following:

- 5. Include measures to reduce pollution within Air Quality Management Areas and meet air quality objectives that are proposed by the Local Transport Plan and any Air Quality Action Plans."

Local Air Quality Management

9.2.12 Under the requirements of Part IV of the Environment Act (1995) (Ref-9.13), Cornwall Council has carried out a phased review and assessment of local air quality within their area.

9.2.13 Monitoring of nitrogen dioxide (NO₂) is undertaken in a number of towns and villages across Cornwall. Exceedances of the NO₂ annual mean objective have been identified in Camborne, Pool and Redruth (AQMA declared in 2005), Bodmin (AQMA declared 2008) and Tideford (AQMA declared in 2011). An updated and consolidated Cornwall-wide Air Quality Action Plan was published in January 2013.

9.2.14 Monitoring of NO₂ undertaken during 2012 demonstrated that exceedances of the NO₂ annual mean objective continued within the three existing AQMAs and
these AQMAs should remain. Monitoring undertaken in recent years had indicated that AQMAs were required for Gunnislake and St Austell and work is underway to make these designations (Ref-9.20).

9.2.15 The Cornwall Council Scoping Opinion outlined that due to existing areas of poor air quality near the Proposed Development; a specific detailed dispersion model should be undertaken and form part of the Environmental Statement (Ref-9.21).

9.2.16 The scoping report also states the following:

"Public Health and Protection monitors air quality within Cornwall and in particular at a number of locations on the A390 in Truro. Levels are of particular concern at Tresawls Road and Highertown where traffic is particularly congested. Levels of pollution have increased significantly in this location over the last few years, with one location at Highertown experiencing an increase of over 40% between 2011 and 2013. This has led to a need for a ‘Detailed Assessment’ of air quality to be carried out (due for completion early 2013) with the view to declaring an Air Quality Management Area (AQMA) likely to encompass the proposed development site.”

9.2.17 URS has completed a detailed dispersion modelling assessment including the areas of concern on the A390 at Threemilestone, Gloweth and Highertown.

9.2.18 URS communicated with the Environmental Health Officer for Cornwall Council and the 2014 Detailed Assessment is not yet complete for the Highertown area.

9.3 Methodology and Scope

Overview

9.3.1 There is currently no statutory guidance on the method by which an air quality impact assessment should be undertaken. Several non-statutory bodies have published their own guidance for air quality and development control (Ref-9.22), (Ref-9.23) and (Ref-9.1).

9.3.2 This section will explain the methods used to assess the significance of the:
impact of fugitive emissions of particulate matter from construction phase activities;
the impact of road traffic exhaust emissions on the proposed development and existing sensitive receptors; and
the impact of emissions from the proposed food store CHP plant on existing and proposed receptors.

9.3.3 Air quality sensitive receptors that may be affected by the proposed development have been identified for the construction and operation phases. The methods used to determine the significance of effect associated with air quality impacts are described from Paragraph 9.3.48.

**Fugitive Emissions of Particulate Matter**

9.3.4 Fugitive emissions of airborne particulate matter are readily produced through the action of abrasive forces on materials and therefore a wide range of site preparation and construction activities have the potential to generate this type of emissions, including:

- Demolition;
- earthworks, including the handling, working and storage of materials;
- construction activities; and
- the transfer of dust making materials from the site onto the local road network.

9.3.5 Particulate matter in air is made up of particulates of a variety of sizes, and the concept of a ‘size fraction’ is used to describe particulates with sizes in a defined range. These definitions are based on the collection efficiency of specific sampling methods and each size fraction is especially associated with different types of impacts. In this assessment the term ‘dust’ is used to mean particulate matter in the size fraction 1µm - 75µm in diameter, as defined in BS 6069:1994 (Ref-9.24). Dust impacts are considered in terms of the change in airborne concentration and the change in the rate of deposition of dust onto surfaces.
9.3.6 The size fraction called ‘PM$_{10}$’ is composed of material with an aerodynamic diameter of less than 10 µm in diameter and overlaps with the size fraction for dust. Air quality objectives (Ref-9.16) for PM$_{10}$ has been set for the protection of human health and the term PM$_{10}$ is only used in this assessment when referring to the potential impact of emissions of particulate matter from demolition and construction activities on human health receptors. The short term, 24 hour mean objective for airborne concentrations of PM$_{10}$ is the appropriate air quality objective for assessing the potential impact on health of short term fugitive emissions from demolition and construction sites.

9.3.7 The Institute of Air Quality Management (Ref-9.1) adopts a broad definition of dust that includes the potential for changes in airborne concentration, changes in deposition rates and the risk to human health and public amenity, when considering the significance of effects from emissions of fugitive particulate matter. In this assessment, specific reference is made to the impacts associated with specific size fractions (dust, PM$_{10}$) within the assessment narrative, before considering the overall effect on receptors using an approach that is consistent with the IAQM’s guidance.

9.3.8 The nature of the impact requiring assessment varies between different types of receptor. In general receptors associated with higher baseline dust deposition rates are less sensitive to impacts, such as farms, light and heavy industry or outdoor storage facilities. In comparison some hi-technology industries or food processing plants operate under clean air conditions and increased airborne particulate matter concentrations may have an increased economic cost associated with the extraction of more material by the plants air filtration units.

9.3.9 Table 9.2 provides some generic examples of the type of impacts that may result from fugitive emissions of particulate matter. The sensitivity of receptor types is listed for selected impacts, with sensitivity being described as ‘high’ for receptors that are especially sensitive to the specified impact. For example, industrial painting operations are consider to be more sensitive to the impact of material becoming soiled by depositing material, than residential properties or schools are.
Table 9.2 Types of Impacts of Particulate Matter

<table>
<thead>
<tr>
<th>Nature of Impact</th>
<th>Receptor Types Affected</th>
<th>Relative Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in 24 hour mean PM$_{10}$ concentrations</td>
<td>Residential properties</td>
<td>Receptor sensitivity was considered with Air Quality Objective Value was set</td>
</tr>
<tr>
<td></td>
<td>Schools</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hospitals and Clinics</td>
<td></td>
</tr>
<tr>
<td>Change in rate at which air filtration units require maintenance</td>
<td>Hospitals and clinics</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Hi-tech industries</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Food processing industries</td>
<td>High</td>
</tr>
<tr>
<td>Change in the rate at which material accumulates on glossy surfaces, such as glass or paint work</td>
<td>Painting and furnishing operations</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Residential properties</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Schools</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Food retailers</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Offices</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Museums and Galleries</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Glasshouses</td>
<td>Medium</td>
</tr>
<tr>
<td>Change in the rate at which property or products becomes soiled by deposited material</td>
<td>Food processing industries</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Painting and furnishings operations</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Museums and Galleries</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Residential properties</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Food retailers</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Offices</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Horticultural Land</td>
<td>Medium</td>
</tr>
<tr>
<td>Change in the rate at which mineral material is deposited onto vegetation</td>
<td>Ecological sites</td>
<td>Medium – Low</td>
</tr>
<tr>
<td>Change in the chemical composition of mineral material deposited</td>
<td>Ecological sites</td>
<td>Medium – Low</td>
</tr>
<tr>
<td></td>
<td>Outdoor Storage</td>
<td>Medium – Low</td>
</tr>
<tr>
<td></td>
<td>Horticultural Land</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Agricultural Land</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Road Traffic Emissions**

9.3.10 The incomplete combustion of fuel in vehicle engines results in the presence of hydrocarbons (HC) such as benzene and 1,3-butadiene, sulphur dioxide (SO$_2$), carbon monoxide (CO), PM$_{10}$ and PM$_{2.5}$ in exhaust emissions. In addition, at the high temperatures and pressures found within vehicle engines, some of the nitrogen in the air and the fuel is oxidised to form NO$_x$, mainly in the form of
nitric oxide (NO), which is then converted to NO$_2$ in the atmosphere. NO$_2$ is associated with adverse effects on human health. Better emission control technology and fuel specifications are expected to reduce emissions per vehicle in the long term.

9.3.11 Although SO$_2$, CO, benzene and 1,3-butadiene are also present in motor vehicle exhaust emissions, detailed consideration of the associated impacts on local air quality is not considered relevant in the context of this proposal. Road traffic emissions of these substances have been reviewed by Cornwall Council and nowhere within the administrative area is there a risk of exceeding these objectives. The development proposals would not be capable of compromising the achievement of the relevant air quality objectives for the protection of human health. Emissions of SO$_2$, CO, benzene and 1, 3-butadiene from road traffic are therefore not considered further within this assessment.

9.3.12 During operation, the proposed development has the potential to change vehicle movements on the surrounding road network. An increase in vehicle emissions can increase the exposure at sensitive receptors to concentrations of NO$_2$ and particulate matter (PM$_{10}$ and PM$_{2.5}$). This assessment will quantify the concentration of the pollutants most commonly associated with vehicle emissions at the worst affected receptor locations. Concentrations for both a baseline and with-development scenario have been predicted using applicable modelling techniques. The magnitude of change as a result of the change in vehicle movements due to the development will be used to identify the potential for road traffic emissions to cause a significant effect at sensitive receptors. This assessment follows the guidance for the determination of baseline pollutant concentrations, and uses emissions factors for road traffic from the Highways Agency’s current emissions factors toolkit published in June 2014.

9.3.13 To undertake the assessment of road traffic emissions during the operational phases of the proposed development, the latest version of dispersion model software ‘ADMS-Roads’ (V3.2.4.0) has been used to quantify pollution levels at selected receptors. ADMS-Roads is a modern dispersion model that has an extensive published track record of use in the UK for the assessment of local air quality impacts, including model validation and verification studies (Ref-9.25).
Energy Plant Emissions

9.3.14 The proposals include for the installation of an energy plant in the form of a gas-fired CHP plant as an energy centre for the food store. There is no fixed specification for the energy centre at this stage of the application and therefore, a review of appropriate and typical plant for the size and type of development was undertaken. This assessment assumes an Ener-G 75kw gas CHP system in a custom-built container located in the service yard area of the food store. The emissions data used in the assessment are calculated from guaranteed emissions limits provided by the manufacturer using a catalyst abatement system. These are described in more detail in paragraph 9.3.28.

9.3.15 As the CHP Plant is proposed to be fuelled by natural gas, the main pollutants of concern would be emissions of NO$_X$ and CO. As is the case of vehicle engines and exhausts, at the high temperatures and pressures found within the plant and its stack, some of the nitrogen in the air and the fuel is oxidised to form NO$_X$, mainly in the form of nitric oxide (NO), which is then converted to NO$_2$ in the atmosphere. CO is formed when incomplete combustion of carbon containing fuels occurs due to insufficient oxygen being present. The assessment therefore considers the impact of the energy plant on long term and short term concentrations of NO$_2$ and CO.

9.3.16 This assessment also considers the combined impact of the energy plant and road traffic emissions on long term pollutant concentrations of NO$_2$ at local air quality sensitive receptors.

Prediction of Construction Phase Impacts

9.3.17 At present, there are no statutory UK or EU standards relating to the assessment or control of nuisance dust. The emphasis of the regulation and control of demolition and construction dust should therefore be the adoption of good working practices on site. Good design practice is a process that is informed by impact assessments and is able to avoid the potential for significant adverse environmental effects at the design stage. This approach
assumes that mitigation measures, beyond those inherent in the proposed design, that are identified as being necessary in the impact assessment, will be applied during works (possibly secured by planning conditions, legal requirements or required by regulations) to ensure potential significant adverse effects do not occur. Examples of accepted good site practice include guidelines published by the Building Research Establishment (Ref-9.26), the Greater London Authority (Ref-9.27) and considerate contractor schemes.

9.3.18 A qualitative assessment has been undertaken to assess the significance of any effects on sensitive receptors. The steps in the assessment process are to consider potential sources of emissions on the basis of the four main activity groupings of Demolition, Earthworks, Construction and Track-out (Ref-9.1). For each activity group the same steps are applied with respect to the potential impacts at identified receptors, before coming to an overall conclusion about the significance of the effects predicted.

9.3.19 The steps are:

1. Screen the need for an assessment;
2. Separately for demolition, earthworks, construction and trackout;
   a) Determine potential dust emission magnitude;
   b) Determine sensitivity of the area;
   c) Combine a. and b. to give the risk of dust impacts;
3. Determine the site-specific mitigation; and
4. Examine the residual effects to determine whether or not these are significant

**Construction Phase Road Traffic Emissions**

9.3.20 The construction phase of the proposed development is likely to lead to a small increase in the number of vehicles on the local highway network, for the duration of the construction works only. Environmental Protection UK (EPUK) (Ref-9.22) set out criteria to establish the need for an air quality assessment for the construction phase of a development as being:
"Large, long-term construction sites that would generate large HGV flows (>200 per day) over a period of a year or more."

9.3.21 It is unlikely that a phased development of this size would lead to this number of vehicle movements. The peak additional number of HGV movements to and from the site is expected to be 186 HGV per day during the first 6 months and decrease significantly thereafter. This is not considered to be high enough to have the potential to cause a significant adverse effect at any local air quality sensitive receptor. Construction phase road traffic emissions are therefore not modelled in detail as the effect on local air quality sensitive receptors will not be significant.

**Prediction of Air Quality Impacts**

9.3.22 This assessment has used the latest version of dispersion model software ‘ADMS-Roads’ to quantify pollution levels at the proposed development. ADMS-Roads is a modern dispersion model that has an extensive published track record of use in the UK for the assessment of local air quality impacts, including model validation and verification studies (Ref-9.25).

**ADMS-Roads Dispersion Model Input Data and Model Conditions**

9.3.23 Details of general model conditions are provided in **Table 9.3**.

### Table 9.3 General ADMS-Roads Model Conditions

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface roughness at source</td>
<td>0.2 m</td>
</tr>
<tr>
<td>Minimum Monin-Obukhov length for stable conditions</td>
<td>Model Default-variable with each line of data</td>
</tr>
<tr>
<td>Terrain Types</td>
<td>Flat</td>
</tr>
<tr>
<td>Receptor locations</td>
<td>X, y coordinates determined by GIS</td>
</tr>
<tr>
<td>Emissions</td>
<td>NO\textsubscript{x}, PM\textsubscript{10} and PM\textsubscript{2.5}</td>
</tr>
<tr>
<td>Emission Factors</td>
<td>EFT Version 6.0.1 emission factor dataset</td>
</tr>
<tr>
<td>Meteorological Data</td>
<td>1 year (2012) hourly sequential data from Plymouth Mountbatten Meteorological Station</td>
</tr>
<tr>
<td>Receptors</td>
<td>Selected receptors only (see Table 9.)</td>
</tr>
<tr>
<td>Model Output</td>
<td>Long-term annual mean NO\textsubscript{x} concentrations</td>
</tr>
<tr>
<td></td>
<td>Long-term annual mean PM\textsubscript{10} concentrations</td>
</tr>
</tbody>
</table>
Traffic Data

9.3.24 The traffic data used within this assessment has been supplied by Curtins Consulting (Ref-9.2) and is set out in Table 9.9 and Table 9.16.

9.3.25 The year of 2012 has been used for emission rates for the baseline scenario in line with the meteorological data and measurement data used in the assessment. Year on year improvements in emission rates included in the emissions database have not been observed in practice and therefore as a conservative estimate of 2031 emissions, data for 2020 have been used in recognition that some improvements will indeed be achieved with the introduction of Euro VI standard vehicles across the national road network.

9.3.26 An emission profile was utilised for this assessment. The profile assumed that there were queues of traffic on the western and eastern side of each roundabout which would be switched on by the ADMS Roads model between the peak hours of travel in the morning and evening. During the weekends the queues were switched on between 9am and 6pm. During all the other time periods the queues were turned off to demonstrate a more free flowing traffic network. This was undertaken to produce an ADMS Roads model which represented the actual situation as much as possible.

Dispersion Model Input Data and Model Conditions

9.3.27 Details of general model conditions input to ADMS 5 are provided in Table 9.4.
Table 9.4 General ADMS-5 Model Conditions

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface roughness at source</td>
<td>0.2 m</td>
</tr>
<tr>
<td>Surface roughness at Met Site</td>
<td>0.2 m</td>
</tr>
<tr>
<td>Latitude</td>
<td>50°</td>
</tr>
<tr>
<td>Minimum Monin-Obukhov length for stable</td>
<td>Model Default – variable with each line of data</td>
</tr>
<tr>
<td>conditions</td>
<td></td>
</tr>
<tr>
<td>Terrain Types</td>
<td>Flat</td>
</tr>
<tr>
<td>Receptor locations</td>
<td>X, y coordinates determined by GIS</td>
</tr>
<tr>
<td>Emissions</td>
<td>NO\textsubscript{X} = 0.04 g/s</td>
</tr>
<tr>
<td></td>
<td>CO = 0.03 g/s</td>
</tr>
<tr>
<td>Stack Height</td>
<td>11m</td>
</tr>
<tr>
<td>Stack Diameter</td>
<td>0.1m</td>
</tr>
<tr>
<td>Stack Location</td>
<td>E176412, N46066</td>
</tr>
<tr>
<td>Velocity</td>
<td>10.75 m/s</td>
</tr>
<tr>
<td>Exit Temperature</td>
<td>120 °C</td>
</tr>
<tr>
<td>Meteorological Data</td>
<td>1 year (2012) hourly sequential data from Plymouth Mountbatten Meteorological Station</td>
</tr>
<tr>
<td>Receptors</td>
<td>Selected receptors only (see Table 9.)</td>
</tr>
<tr>
<td>Model Output</td>
<td>Long-term annual mean NO\textsubscript{X} concentrations</td>
</tr>
<tr>
<td></td>
<td>Long-term 8-Hour Rolling Mean CO</td>
</tr>
<tr>
<td></td>
<td>99.79\textsuperscript{th} percentile NO\textsubscript{X} concentrations</td>
</tr>
</tbody>
</table>

9.3.28 The input data used within this assessment was calculated from technical specification data provided by the manufacturer of the proposed plant. (Ref-9.28) and is set out in Table 9.4 above.

**Meteorological Data**

9.3.29 One year (2012) of hourly sequential observation data from Plymouth Mountbatten meteorological station has been used in this assessment. The station is located approximately 70 kilometres east of the site and experiences meteorological conditions that are representative of the conditions experienced in the study area.
Bias Adjustment of Road Contribution Pollutant Concentrations

9.3.30 Model verification has been informed by the monitoring undertaken by Cornwall Council. Recent diffusion tube data for 2012 has been used in this assessment as it corresponds with the baseline traffic and meteorological data. Details of the monitoring sites used in the verification process, and a summary of that process are shown in Table 9.5 below. TRU27 and TRU28 were excluded from the verification process in the assessment because the tubes reported significantly higher concentrations, demonstrably different from those in adjacent road sections. This is considered possibly due to an incline in the road resulting in variable acceleration and braking patterns on one side of the road. Variable vehicle speeds were not provided by the transport consultants for congested sections of the road therefore URS are not able to verify the ADMS Roads model with TRU27 and TRU28 and nor are these locations representative of relevant exposure within the study area.

<table>
<thead>
<tr>
<th>Diffusion Tube</th>
<th>Monitored Road NO\textsubscript{x} (µg/m\textsuperscript{3})</th>
<th>Modelled Road NO\textsubscript{x} (µg/m\textsuperscript{3})</th>
<th>Adjusted Modelled Road NO\textsubscript{x} (µg/m\textsuperscript{3})</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRU2</td>
<td>50.67</td>
<td>37.03</td>
<td>42.43</td>
</tr>
<tr>
<td>TRU4</td>
<td>46.67</td>
<td>52.05</td>
<td>59.02</td>
</tr>
<tr>
<td>TRU6</td>
<td>80.19</td>
<td>59.02</td>
<td>67.63</td>
</tr>
<tr>
<td>TRU8</td>
<td>66.69</td>
<td>61.65</td>
<td>70.64</td>
</tr>
<tr>
<td>TRU29</td>
<td>39.08</td>
<td>57.81</td>
<td>66.25</td>
</tr>
<tr>
<td>TRU30</td>
<td>75.64</td>
<td>44.99</td>
<td>51.55</td>
</tr>
<tr>
<td>TRU31</td>
<td>53.87</td>
<td>38.96</td>
<td>44.64</td>
</tr>
</tbody>
</table>

9.3.31 The blue dots on the chart above (Figure 9.1) show the variation of unadjusted modelled concentrations of NO\textsubscript{2} at the measurement locations. The red dots show the same comparison after the modelled concentrations have been adjusted for model bias. Model bias was quantified by comparing the modelled total NO\textsubscript{2} and road NO\textsubscript{x} values with the measured NO\textsubscript{2} and road NO\textsubscript{x} values for the diffusion tubes. The bias was accounted for by applying the correction factor (1.15) to modelled road NO\textsubscript{x} concentrations.
9.3.32 The uncertainty in the model has been assessed by comparing the adjusted modelled predictions to the measured concentrations of NO$_2$ and calculating the Root Mean Square Error (RMSE). LAQM.TG(09) (Ref-9.32) identifies a standard of model uncertainty, expressed as a RMSE value that is within 10% of the objective value as the ideal. For annual mean nitrogen dioxide 10% of the objective value is 4 µg/m$^3$. A RMSE value of 6.2 µg/m$^3$ was obtained for the model, which can be considered robust as it is considerably lower than 25% of the objective.

9.3.33 Therefore, the application of a correction factor to the modelled road NO$_x$ contribution, to account for the under-prediction of the annual mean NO$_2$ concentrations, was necessary to improve the model performance.

9.3.34 In the absence of PM$_{10}$ and PM$_{2.5}$ monitoring data from within the air quality study area, the factors applied to the primary pollutant NO$_2$ has been applied to these primary pollutants also.

**NOX to NO2 Conversion**

9.3.35 To accompany the publication of the guidance document LAQM.TG(09), a NO$_x$ to NO$_2$ converter was made available as a tool to calculate the road NO$_2$ contribution from modelled road NO$_x$ contributions (Ref-9.30). The tool comes in the form of an MS Excel spreadsheet and uses borough specific data to calculate annual mean concentrations of NO$_2$ from dispersion model output values of annual mean concentrations of NO$_x$. This tool was used to calculate the total NO$_2$ concentrations at receptors from the modelled road NO$_x$ contribution and associated background concentration. Due to the location of the proposed development, “all other urban UK traffic” setting has been selected.

9.3.36 NO$_x$ emissions from the CHP Plant have been converted into NO$_2$ concentrations utilising the following relationships taken from the Environment Agency H1 Guidance document (Ref-9.31):
• Short Term NOX emissions: Assume 50% of NOX is converted into NO2; and
• Long Term NOX emissions: Assume 100% of NOX is converted into NO2.

**Predicting the Number of Days in which the PM10 24-hour mean Objective is Exceeded**

9.3.37 The guidance document LAQM.TG(03) set out the method by which the number of days in which the PM$_{10}$ 24-hr objective is exceeded can be obtained based on a relationship with the predicted PM$_{10}$ annual mean concentration. The most recent guidance (Ref-9.32) suggests no change to this method. As such, the formula used within this assessment is:

\[
\text{No. of Exceedence } s = 0.0014 \times C^3 + \frac{206}{C} - 18.5
\]

*Where C is the annual mean concentration of PM$_{10}$.*

**Predicting the Number of Days in which the NO2 Hourly Mean Objective is Exceeded**

9.3.38 Research projects completed on behalf of Defra and the Devolved Administrations ((Ref-9.33) and (Ref-9.34)) have concluded that the hourly mean NO$_2$ objective is unlikely to be exceeded if annual mean concentrations are predicted to be less the 60 µg/m$^3$.

9.3.39 In 2003, Laxen and Marner concluded:

"...local authorities could reliably base decisions on likely exceedances of the 1-hour objective for nitrogen dioxide alongside busy streets using an annual mean of 60 µg/m$^3$ and above."

9.3.40 The findings presented by Laxen and Marner are further supported by AEAT (Ref-9.34) who revisited the investigation to complete an updated analysis
including new monitoring results and additional monitoring sites. The recommendations of this report are:

"Local authorities should continue to use the threshold of 60 µg/m^3 NO_2 as the trigger for considering a likely exceedence of the hourly mean nitrogen dioxide objective."

9.3.41 Therefore this assessment will evaluate the likelihood of exceeding the hourly mean NO\textsubscript{2} objective by comparing predicted annual mean NO\textsubscript{2} concentrations at all receptors to an annual mean equivalent threshold of 60 µg/m\textsuperscript{3} NO\textsubscript{2}. Where predicted concentrations are below this value, it can be concluded that the hourly mean NO\textsubscript{2} objective (200 µg/m\textsuperscript{3} NO\textsubscript{2} not more than 18 times per year) will be achieved.

**Construction Phase Emissions Assessment of Significance**

9.3.42 For amenity effects (including that of dust), the aim is to bring forward a scheme, including mitigation measures if necessary, that does not introduce the potential for additional complaints to be generated as a result of the proposed development.

**Table 9.6 Descriptors Applied to the Predicted Adverse Effects of Fugitive Emission Particulate Matter**

<table>
<thead>
<tr>
<th>Significance of Effect at Single Receptor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substantial</td>
<td>A significant effect that is likely to be a material consideration in its own right</td>
</tr>
<tr>
<td>Moderate</td>
<td>An significant effect that may be a material consideration in combination with other significant effects, but is unlikely to be a material consideration in its own right</td>
</tr>
<tr>
<td>Slight</td>
<td>An effect that is not significant but may be of local concern</td>
</tr>
<tr>
<td>Negligible</td>
<td>An effect that is not significant change</td>
</tr>
</tbody>
</table>

9.3.43 The scale of the risk of adverse effects occurring due to each group of activities, with mitigation in place is described using the terms high, medium and low risk. The basis for the choice of descriptor is set out for each section. Experience in
the UK (Ref-9.22) is that good site practice is capable of mitigating the impact of fugitive emissions of particulate matter effectively. So that in all but the most exceptional circumstances, effects at receptors (Table 9.6) can be controlled to ensure effects are of negligible or slight adverse significance at worse.

**Operational Emissions Assessment of Significance**

9.3.44 With regard to road traffic emissions, the change in pollutant concentrations with respect to baseline concentrations has been described at receptors that are representative of exposure to impacts on local air quality within the study area. The absolute magnitude of pollutant concentrations in the baseline and with development scenario is also described and this is used to consider the risk of the air quality limit values being exceeded in each scenario.

9.3.45 For a change of a given magnitude, the Institute of Air Quality Management have published recommendations for describing the magnitude of impacts at individual receptors (Table 9.7) and describing the significance (Table 9.8) of such impacts (Ref-9.23).

### Table 9.7 Magnitude of Changes in Ambient Pollutant Concentrations of NO2, PM10 and PM2.5

<table>
<thead>
<tr>
<th>Magnitude of Change</th>
<th>Annual Mean Concentrations of NO2 (µg/m³)</th>
<th>Annual Mean Concentrations of PM10 (µg/m³)</th>
<th>Annual Mean Concentrations of PM2.5 (µg/m³)</th>
<th>Exceedences of the 24-hour mean objective for PM10 (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>Increase/decrease &gt; 4</td>
<td>Increase/decrease &gt; 4</td>
<td>Increase/decrease &gt; 2.5</td>
<td>Increase/decrease &gt; 4</td>
</tr>
<tr>
<td>Medium</td>
<td>Increase/decrease 2 - 4</td>
<td>Increase/decrease 2 - 4</td>
<td>Increase/decrease 1.25 - 2.5</td>
<td>Increase/decrease 2 to 4</td>
</tr>
<tr>
<td>Small</td>
<td>Increase/decrease 0.4 - 2</td>
<td>Increase/decrease 0.4 - 2</td>
<td>Increase/decrease 0.25 - 1.25</td>
<td>Increase/decrease 1 to 2</td>
</tr>
<tr>
<td>Imperceptible</td>
<td>Increase/decrease &lt; 0.4</td>
<td>Increase/decrease &lt; 0.4</td>
<td>Increase/decrease &lt; 0.25</td>
<td>Increase/decrease &lt; 1</td>
</tr>
</tbody>
</table>

9.3.46 A change in predicted annual mean concentrations of NO₂, or PM₁₀ of less than 0.4 µg/m³ is considered (Ref-9.23) to be so small as to be imperceptible. A change (impact) that is imperceptible, given normal bounds of variation, would
9.3.47 The magnitude of the change in the predicted number of exceedances of the 24-hour objective is directly derived from the predicted annual mean value using the relationship defined LAQM.TG(09) (Ref-9.32). The magnitude descriptors in the table above are as proposed by Environmental Protection UK (Ref-9.22).

### Table 9.8 Air Quality Impact Descriptors for Changes in Ambient Pollutant Concentrations of NO2 and PM10

<table>
<thead>
<tr>
<th>Absolute Concentration in Relation to Objective/Limit Value</th>
<th>Change in Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small</td>
</tr>
<tr>
<td>Increase with Scheme</td>
<td></td>
</tr>
<tr>
<td>Above Objective/Limit Value With Scheme (&gt;40 µg/m³)</td>
<td>Slight Adverse</td>
</tr>
<tr>
<td>Just Below Objective/Limit Value With Scheme (36-40 µg/m³)</td>
<td>Slight Adverse</td>
</tr>
<tr>
<td>Below Objective/Limit Value With Scheme (30-36 µg/m³)</td>
<td>Negligible</td>
</tr>
<tr>
<td>Well Below Objective/Limit Value With Scheme (&lt;30 µg/m³)</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

| Decrease With Scheme                                       |             |            |           |
|-----------------------------------------------------------|             |            |           |
| Above Objective/Limit Value Without Scheme (>40 µg/m³)     | Slight Beneficial | Moderate Beneficial | Substantial Beneficial |
| Just Below Objective/Limit Value Without Scheme (36-40 µg/m³) | Slight Beneficial | Moderate Beneficial | Moderate Beneficial |
| Below Objective/Limit Value Without Scheme (30-36 µg/m³)  | Negligible  | Slight Beneficial | Slight Beneficial |
| Well Below Objective/Limit Value Without Scheme (<30 µg/m³) | Negligible  | Negligible  | Slight Beneficial |

9.3.48 All relevant receptors that have been selected to represent locations where people are likely to be present are based on impacts on human health. The air quality objective values have been set at concentrations that provide protection to all members of society, including more vulnerable groups such as the very young, elderly or unwell. As such the sensitivity of receptors was considered in the definition of the air quality objective values and therefore no additional
subdivision of human health receptors on the basis of building or location type is necessary.

9.3.49 For receptors that are predicted to experience a perceptible change, the effect of the change on local air quality and the risk of exceeding the air quality objective value is summarised in Table 9.8. A small increase in annual mean concentrations, at receptors exposed to baseline concentrations that are just below the objective value (36 µg/m$^3$ to 40 µg/m$^3$) is considered to have a slight adverse effect as there is a slight increase in the risk of exceeding the objective value. However, a small increase in annual mean concentration at receptors exposed to baseline concentrations that are below or well below (< 36 µg/m$^3$) is not likely to affect the achievement of the objective value and is therefore not a significant effect (negligible).

Assessment of Significance

9.3.50 The significance of all the reported impacts is then considered for the development in overall terms. The potential for the scheme to contribute to or interfere with the successful implementation of policies and strategies for the management of local air quality are considered if relevant, but the principle focus is any change in the likelihood of future achievement of the air quality objective values set out in Table 9.1 for the following pollutants:

- Annual mean nitrogen dioxide (NO2) concentration of 40 µg/m$^3$;
- Annual mean particulate matter (PM10) concentration of 40 µg/m$^3$;
- Annual mean fine particulate matter (PM2.5) concentrations of 25 µg/m$^3$;
- 24-hour mean PM10 concentration of 50 µg/m$^3$ not to be exceeded on more than 35 days per year; and
- 1-hour mean NO2 concentration of 200 µg/m$^3$ not to be exceeded on more than 18 times per year.
- Daily 8-hour rolling mean CO concentration of 10mg/m$^3$.

9.3.51 The achievements of local authority goals for local air quality management are directly linked to the achievement of the air quality objective values described
above and as such this assessment focuses on the likelihood of future achievement of the air quality objective values.

9.3.52 In terms of the significance of the consequences of any adverse impacts, an effect is reported as being either ‘not significant’ or as being ‘significant’. If the overall effect of the development on local air quality or on amenity is found to be ‘moderate’ or ‘substantial’ this is deemed to be ‘significant’. Effects found to be ‘minor’ are considered to be ‘not significant’, although they may be a matter of local concern. ‘Negligible’ effects are considered to be ‘not significant’.

9.4 Baseline Conditions

Traffic Data

9.4.1 This section reviews the baseline air quality within the assessment area for 2012 and 2031 without-development. The vehicle flows on the local highway network are detailed in Table 9.9.
Table 9.9 Traffic Flow Data for 2012 Baseline and 2031 Without-Development Scenario

<table>
<thead>
<tr>
<th>Link Number</th>
<th>Link Description</th>
<th>2012 Base Year</th>
<th>2031 Without-Development</th>
<th>Speed (kph)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>AADT %HGV V</td>
<td>AADT %HGV V</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Chacewater to Proposed Development</td>
<td>40,599 4</td>
<td>42,167 4</td>
<td>96.5</td>
</tr>
<tr>
<td>2</td>
<td>Proposed Development to Langarth</td>
<td>40,599 4</td>
<td>42,167 4</td>
<td>96.5</td>
</tr>
<tr>
<td>3</td>
<td>Langarth to Threemilestone</td>
<td>40,748 4</td>
<td>41,200 4</td>
<td>96.5</td>
</tr>
<tr>
<td>4</td>
<td>Threemilestone to Chyvelah Vale</td>
<td>54,196 4</td>
<td>44,877 4</td>
<td>80.5</td>
</tr>
<tr>
<td>5</td>
<td>Chyvelah Vale – Treliske Roundabout</td>
<td>58,511 4</td>
<td>52,088 4</td>
<td>64.4</td>
</tr>
<tr>
<td>6</td>
<td>A390 Treliske Roundabout – to Lowen Bre</td>
<td>58,815 4</td>
<td>54,853 4</td>
<td>64.4</td>
</tr>
<tr>
<td>7</td>
<td>Lowen Bre – Treliske Lane</td>
<td>54,531 4</td>
<td>52,720 4</td>
<td>64.4</td>
</tr>
<tr>
<td>8</td>
<td>Treliske Lane – Newbridge Lane</td>
<td>60,495 4</td>
<td>54,853 4</td>
<td>64.4</td>
</tr>
<tr>
<td>9</td>
<td>Newbridge Lane – Former Richard Lander School</td>
<td>56,384 4</td>
<td>54,760 4</td>
<td>64.4</td>
</tr>
<tr>
<td>10</td>
<td>Former Richard Lander School – Penwerris Road</td>
<td>56,322 4</td>
<td>55,144 4</td>
<td>64.4</td>
</tr>
<tr>
<td>11</td>
<td>Penwerris Road – Penwethers Lane</td>
<td>56,670 4</td>
<td>55,554 4</td>
<td>64.4</td>
</tr>
<tr>
<td>12</td>
<td>Penwethers Lane – Malabar Road</td>
<td>53,043 4</td>
<td>52,993 4</td>
<td>64.4</td>
</tr>
<tr>
<td>13</td>
<td>Malabar Road – Dobbs Lane</td>
<td>56,570 4</td>
<td>55,132 4</td>
<td>64.4</td>
</tr>
<tr>
<td>14</td>
<td>Dobbs Lane – Station Road</td>
<td>58,226 4</td>
<td>55,733 4</td>
<td>64.4</td>
</tr>
<tr>
<td>15</td>
<td>East of County Hall Junction</td>
<td>43,159 4</td>
<td>40,177 4</td>
<td>64.4</td>
</tr>
</tbody>
</table>

*traffic speeds estimated from google search of the road links.

Receptors Potentially Affected by Operational Traffic and CHP Plant Emissions

9.4.2 The receptors listed below are included in the ADMS Roads and ADMS 5 model. The air quality study area is displayed in Figure 9.1. The existing, proposed and cumulative receptors and local authority diffusion tubes are displayed in Figures 9.1-9.4. The receptors were chosen because they are either consistent with
residential receptors used in previous planning applications or have been identified as additional receptors or cumulative receptors identified by URS.

### Table 9.10 Air Quality Sensitive Receptors

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Description</th>
<th>Grid Reference</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>Silver Bow</td>
<td>176867</td>
<td>4536</td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>Lemain Agos</td>
<td>177002</td>
<td>45376</td>
<td></td>
</tr>
<tr>
<td>R3</td>
<td>Building North of A390</td>
<td>177231</td>
<td>45462</td>
<td></td>
</tr>
<tr>
<td>R4</td>
<td>Rosedene Farm</td>
<td>177354</td>
<td>45379</td>
<td></td>
</tr>
<tr>
<td>R5</td>
<td>Woodlands</td>
<td>177508</td>
<td>45275</td>
<td></td>
</tr>
<tr>
<td>R6</td>
<td>Caravan Park</td>
<td>177664</td>
<td>45103</td>
<td></td>
</tr>
<tr>
<td>R7</td>
<td>10 Tregavethan View</td>
<td>177830</td>
<td>45110</td>
<td></td>
</tr>
<tr>
<td>R8</td>
<td>17 Tregavethan View</td>
<td>177948</td>
<td>45111</td>
<td></td>
</tr>
<tr>
<td>R9</td>
<td>4 Langarth Close</td>
<td>178038</td>
<td>45114</td>
<td></td>
</tr>
<tr>
<td>R10</td>
<td>Glenarne</td>
<td>178672</td>
<td>45006</td>
<td></td>
</tr>
<tr>
<td>R11</td>
<td>6 &amp; 7 Gloweth Vilas</td>
<td>179339</td>
<td>45064</td>
<td></td>
</tr>
<tr>
<td>R12</td>
<td>Truro College</td>
<td>179021</td>
<td>45035</td>
<td></td>
</tr>
<tr>
<td>R13</td>
<td>116 College Way</td>
<td>179529</td>
<td>45065</td>
<td></td>
</tr>
<tr>
<td>R14</td>
<td>9 Glouth View</td>
<td>179868</td>
<td>44985</td>
<td></td>
</tr>
<tr>
<td>R15</td>
<td>2 Penweris Road</td>
<td>180207</td>
<td>44921</td>
<td></td>
</tr>
<tr>
<td>R16</td>
<td>23 Penweris Road</td>
<td>180409</td>
<td>44882</td>
<td></td>
</tr>
<tr>
<td>R17</td>
<td>40 Kestle Drive</td>
<td>180727</td>
<td>44750</td>
<td></td>
</tr>
<tr>
<td>R18</td>
<td>60a Highertown</td>
<td>180872</td>
<td>44734</td>
<td></td>
</tr>
<tr>
<td>R19</td>
<td>Dalvenie</td>
<td>181303</td>
<td>44630</td>
<td></td>
</tr>
<tr>
<td>R20</td>
<td>West Langarth Farm</td>
<td>176332</td>
<td>45937</td>
<td></td>
</tr>
<tr>
<td>R21</td>
<td>Hawthorn Cottage</td>
<td>176078</td>
<td>46103</td>
<td></td>
</tr>
<tr>
<td>C1*</td>
<td>Cumulative Scheme PA11/06124</td>
<td>177702</td>
<td>45329</td>
<td></td>
</tr>
<tr>
<td>C2*</td>
<td>Cumulative Scheme PA11/06125</td>
<td>177523</td>
<td>45474</td>
<td></td>
</tr>
<tr>
<td>C3*</td>
<td>Cumulative Scheme PA12/090369 (outline application) and PA12/09036</td>
<td>179051</td>
<td>45440</td>
<td></td>
</tr>
<tr>
<td>C4*</td>
<td>Cumulative Scheme PA13/10454</td>
<td>178542</td>
<td>45345</td>
<td></td>
</tr>
<tr>
<td>C5*</td>
<td>Cumulative Scheme OA12/11527</td>
<td>177953</td>
<td>45208</td>
<td></td>
</tr>
<tr>
<td>C6*</td>
<td>Cumulative Scheme PA14/03065</td>
<td>177003</td>
<td>45580</td>
<td></td>
</tr>
<tr>
<td>C7*</td>
<td>Cumulative Scheme PA12/10941 (outline application) and PA14/05421</td>
<td>180384</td>
<td>44756</td>
<td></td>
</tr>
<tr>
<td>P1*</td>
<td>Proposed Apartments</td>
<td>176585</td>
<td>45795</td>
<td></td>
</tr>
<tr>
<td>P2*</td>
<td>Proposed Housing off site road</td>
<td>17669</td>
<td>45837</td>
<td></td>
</tr>
<tr>
<td>P3*</td>
<td>Mixed Use Building</td>
<td>176591</td>
<td>45936</td>
<td></td>
</tr>
<tr>
<td>P4*</td>
<td>Proposed Sports Complex</td>
<td>176357</td>
<td>45984</td>
<td></td>
</tr>
<tr>
<td>P5*</td>
<td>Proposed Tennis Court</td>
<td>176282</td>
<td>46034</td>
<td></td>
</tr>
</tbody>
</table>

*only present in the future with and without-development scenarios.

*only present in the future with-development scenario.


Background Concentrations of Air Pollutants

9.4.3 Cornwall Council does undertake monitoring in the vicinity of the site. However, all of the sites are classified as roadside sites therefore they cannot be used for background data for this assessment. As there is no local source of background data for NO$_2$, PM$_{10}$ and PM$_{2.5}$, concentrations have been sourced from Defra’s 2013 background maps (Ref-9.30) for 2012 and 2030. Primary A roads in have been removed from the Defra background maps as they were explicitly modelled by ADMS Roads.

Table 9.11 Annual Mean Background Concentration Data for 2012 and 2030

<table>
<thead>
<tr>
<th>Receptor</th>
<th>2012</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO$_2$ (µg/m$^3$)</td>
<td>PM$_{10}$ (µg/m$^3$)</td>
</tr>
<tr>
<td>R1</td>
<td>7.5</td>
<td>17.1</td>
</tr>
<tr>
<td>R2</td>
<td>7.4</td>
<td>17.5</td>
</tr>
<tr>
<td>R3</td>
<td>7.4</td>
<td>17.5</td>
</tr>
<tr>
<td>R4</td>
<td>7.4</td>
<td>17.5</td>
</tr>
<tr>
<td>R5</td>
<td>7.4</td>
<td>17.5</td>
</tr>
<tr>
<td>R6</td>
<td>7.4</td>
<td>17.5</td>
</tr>
<tr>
<td>R7</td>
<td>7.4</td>
<td>17.5</td>
</tr>
<tr>
<td>R8</td>
<td>7.4</td>
<td>17.5</td>
</tr>
<tr>
<td>R9</td>
<td>7.3</td>
<td>17.2</td>
</tr>
<tr>
<td>R10</td>
<td>7.3</td>
<td>17.2</td>
</tr>
<tr>
<td>R11</td>
<td>7.9</td>
<td>16.8</td>
</tr>
<tr>
<td>R12</td>
<td>7.9</td>
<td>16.8</td>
</tr>
<tr>
<td>R13</td>
<td>7.9</td>
<td>16.8</td>
</tr>
<tr>
<td>R14</td>
<td>7.8</td>
<td>16.0</td>
</tr>
<tr>
<td>R15</td>
<td>8.1</td>
<td>16.0</td>
</tr>
<tr>
<td>R16</td>
<td>8.1</td>
<td>16.0</td>
</tr>
<tr>
<td>R17</td>
<td>8.1</td>
<td>16.0</td>
</tr>
<tr>
<td>R18</td>
<td>8.1</td>
<td>16.0</td>
</tr>
<tr>
<td>R19</td>
<td>8.7</td>
<td>16.1</td>
</tr>
<tr>
<td>R20</td>
<td>7.5</td>
<td>17.1</td>
</tr>
<tr>
<td>R21</td>
<td>7.5</td>
<td>17.1</td>
</tr>
</tbody>
</table>
9.4.4 The background concentration for the Cumulative Receptors and the Proposed Receptors is only used for the 2031 scenario. The 2030 background concentrations for C1 to C7 range from 5.9 to 7.0 µg/m$^3$ for NO$_2$, 15.7 to 16.4µg/m$^3$ for PM$_{10}$ and 8.5 to 8.7µg/m$^3$ for PM$_{2.5}$.

9.4.5 All of the proposed receptors have the same background concentration of 5.9µg/m$^3$ for NO$_2$, 16.0 µg/m$^3$ for PM$_{10}$ and 8.5µg/m$^3$ for PM$_{2.5}$.

Air Quality Review and Assessment

9.4.6 Under the requirements of Part IV of the Environment Act (1995) (Ref-9.13), Cornwall Council has carried out a phased review and assessment of local air quality within their district.

9.4.7 Monitoring of nitrogen dioxide (NO$_2$) is undertaken in a number of towns and villages across Cornwall. Exceedances of the NO$_2$ annual mean objective have been identified in Camborne, Pool and Redruth (AQMA declared in 2005), Bodmin (AQMA declared 2008) and Tideford (AQMA declared in 2011). An updated and consolidated Cornwall-wide Air Quality Action Plan was published in January 2013.

9.4.8 Monitoring of NO$_2$ undertaken during 2012 indicated exceedances of the NO$_2$ annual mean objective were continuing within the three existing AQMAs and these AQMAs should remain. Monitoring undertaken in recent years had indicated that AQMAs were required for Gunnislake and St Austell and work is underway to make these designations (Ref-9.20)

Air Quality Monitoring

9.4.9 Currently, Cornwall Council does not have any automatic monitoring sites close to the proposed development site. The closest continuous monitoring site (CM2) during the 2012 monitoring campaign is located in Camborne which is 12.3 kilometres from the proposed development site.
9.4.10 The nearest diffusion tube locations are displayed in Table 9.12. TRU 2 is located closest to the proposed development and the NO₂ concentration in 2012 was 31µg/m³ which is below the air quality objective. However, there are 3 tubes TRU27, TRU28 and TRU29 located 3.9km from the proposed development that have NO₂ concentrations above the air quality objective.

Table 9.12 Annual Mean NO₂ Concentrations measured by diffusion tubes in the vicinity of the proposed development

<table>
<thead>
<tr>
<th>Diffusion Tube</th>
<th>Grid Reference</th>
<th>Location Type</th>
<th>Distance to the Proposed Development</th>
<th>Annual Mean Concentrations (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
<td></td>
<td>2010</td>
</tr>
<tr>
<td>TRU2</td>
<td>178142</td>
<td>45149</td>
<td>Roadside 1.4km south east</td>
<td>25.1</td>
</tr>
<tr>
<td>TRU4</td>
<td>179438</td>
<td>45079</td>
<td>Roadside 2.6km south east</td>
<td>33.0</td>
</tr>
<tr>
<td>TRU6</td>
<td>179515</td>
<td>45078</td>
<td>Roadside 2.7km south east</td>
<td>41.2</td>
</tr>
<tr>
<td>TRU8</td>
<td>179536</td>
<td>45072</td>
<td>Roadside 2.7km south east</td>
<td>38.1</td>
</tr>
<tr>
<td>TRU27</td>
<td>180641</td>
<td>44799</td>
<td>Roadside 3.9km south east</td>
<td>92.6</td>
</tr>
<tr>
<td>TRU28</td>
<td>180700</td>
<td>44777</td>
<td>Roadside 3.9km south east</td>
<td>-</td>
</tr>
<tr>
<td>TRU29</td>
<td>180851</td>
<td>44722</td>
<td>Roadside 4.1km south east</td>
<td>-</td>
</tr>
<tr>
<td>TWU30</td>
<td>180673</td>
<td>44800</td>
<td>Roadside 3.9km south east</td>
<td>-</td>
</tr>
<tr>
<td>TRU31</td>
<td>180782</td>
<td>44762</td>
<td>Roadside 4.0km south east</td>
<td>-</td>
</tr>
</tbody>
</table>

Bold denotes an exceedance of the NO₂ air quality objective.

Pollutant Concentrations

Predicted Baseline Traffic Pollutant Concentrations

9.4.11 To characterise air pollutant concentrations adjacent to roads that would be affected by the proposed development traffic, predictions have been made at a number of sensitive receptors for the 2012 baseline year using ADMS Roads
(version 3.2.4.0). The results for the 2012 baseline scenario model are displayed in Table 9.13.
Table 9.13 Air Quality Statistics Predicted for Baseline Scenario in 2012

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Annual Mean NO₂ (µg/m³)</th>
<th>Annual Mean PM₁₀ (µg/m³)</th>
<th>Annual Mean PM₂.⁵ (µg/m³)</th>
<th>No. Days PM₁₀ &gt;50 µg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>17.8</td>
<td>18.9</td>
<td>10.7</td>
<td>3</td>
</tr>
<tr>
<td>R2</td>
<td>14.4</td>
<td>18.7</td>
<td>10.4</td>
<td>3</td>
</tr>
<tr>
<td>R3</td>
<td>14.5</td>
<td>18.7</td>
<td>10.4</td>
<td>3</td>
</tr>
<tr>
<td>R4</td>
<td>15.1</td>
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<tr>
<td>R5</td>
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<td>19.1</td>
<td>10.6</td>
<td>3</td>
</tr>
<tr>
<td>R6</td>
<td>20.2</td>
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<td>11.0</td>
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<tr>
<td>R7</td>
<td>30.0</td>
<td>21.4</td>
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<tr>
<td>R8</td>
<td>28.5</td>
<td>21.5</td>
<td>12.2</td>
<td>6</td>
</tr>
<tr>
<td>R9</td>
<td>30.0</td>
<td>21.6</td>
<td>12.4</td>
<td>6</td>
</tr>
<tr>
<td>R10</td>
<td>30.4</td>
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</tr>
<tr>
<td>R11</td>
<td>30.7</td>
<td>21.1</td>
<td>12.5</td>
<td>5</td>
</tr>
<tr>
<td>R12</td>
<td>31.1</td>
<td>21.0</td>
<td>12.4</td>
<td>5</td>
</tr>
<tr>
<td>R13</td>
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<tr>
<td>R14</td>
<td>28.6</td>
<td>19.9</td>
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<td>4</td>
</tr>
<tr>
<td>R15</td>
<td>27.3</td>
<td>19.1</td>
<td>11.5</td>
<td>3</td>
</tr>
<tr>
<td>R16</td>
<td>23.3</td>
<td>18.7</td>
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<tr>
<td>R17</td>
<td>28.8</td>
<td>19.9</td>
<td>11.9</td>
<td>4</td>
</tr>
<tr>
<td>R18</td>
<td>32.1</td>
<td>20.6</td>
<td>12.3</td>
<td>5</td>
</tr>
<tr>
<td>R19</td>
<td>35.1</td>
<td>20.5</td>
<td>12.4</td>
<td>5</td>
</tr>
<tr>
<td>R20</td>
<td>15.5</td>
<td>18.5</td>
<td>10.4</td>
<td>2</td>
</tr>
<tr>
<td>R21</td>
<td>23.2</td>
<td>20.0</td>
<td>11.4</td>
<td>4</td>
</tr>
<tr>
<td>Objective Value</td>
<td>40</td>
<td>40</td>
<td>25</td>
<td>35</td>
</tr>
</tbody>
</table>

9.4.12 In the 2012 baseline scenario, predicted annual mean concentrations of NO₂ are well below the annual mean objective. All of the receptors in the study area are all well below the annual mean equivalent value (60 µg/m³) for the hourly mean NO₂ objective, therefore exceedances of the hourly objective are unlikely within the study area.

9.4.13 In the 2012 baseline scenario annual mean concentrations of PM₁₀ and PM₂.⁵ are also predicted to be well below the air quality objective for that pollutant at all locations within the air quality study area. The number of exceedances of the 24-hr PM₁₀ objective is well below the relevant air quality objective.
Predicted Future Without-Development Traffic Pollutant Concentration

9.4.14 Predicted annual mean concentrations of NO₂, PM₁₀ and PM₂.₅, and the number of days of exceedances of the 24-hr 50 µg/m³ PM₁₀ air quality objective, at the selected receptors during the 2031 without-development scenario, are listed in Table 9.14.
### Table 9.14 Air Quality Statistics Predicted for the Future Without-Development Scenario in 2031

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Annual Mean NO(_2) (µg/m(^3))</th>
<th>Annual Mean PM(_{10}) (µg/m(^3))</th>
<th>Annual Mean PM(_{2.5}) (µg/m(^3))</th>
<th>No. Days PM(_{10}) &gt;50 µg/m(^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>16.6</td>
<td>17.9</td>
<td>9.7</td>
<td>2</td>
</tr>
<tr>
<td>R2</td>
<td>13.1</td>
<td>17.6</td>
<td>9.4</td>
<td>2</td>
</tr>
<tr>
<td>R3</td>
<td>13.2</td>
<td>17.7</td>
<td>9.4</td>
<td>2</td>
</tr>
<tr>
<td>R4</td>
<td>13.9</td>
<td>17.8</td>
<td>9.5</td>
<td>2</td>
</tr>
<tr>
<td>R5</td>
<td>14.9</td>
<td>17.9</td>
<td>9.6</td>
<td>2</td>
</tr>
<tr>
<td>R6</td>
<td>18.5</td>
<td>18.6</td>
<td>10.0</td>
<td>2</td>
</tr>
<tr>
<td>R7</td>
<td>27.2</td>
<td>20.0</td>
<td>10.9</td>
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</tr>
<tr>
<td>R8</td>
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<td>19.9</td>
<td>10.8</td>
<td>4</td>
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<tr>
<td>R9</td>
<td>25.9</td>
<td>19.9</td>
<td>10.9</td>
<td>4</td>
</tr>
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<td>R17</td>
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<td>R18</td>
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<td>10.4</td>
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</tr>
<tr>
<td>C2</td>
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<td>1</td>
</tr>
<tr>
<td>C3</td>
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<td>16.0</td>
<td>8.9</td>
<td>1</td>
</tr>
<tr>
<td>C4</td>
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<td>8.8</td>
<td>1</td>
</tr>
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</tr>
<tr>
<td>C7</td>
<td>16.6</td>
<td>16.6</td>
<td>9.5</td>
<td>1</td>
</tr>
<tr>
<td>Objective Value</td>
<td>40</td>
<td>40</td>
<td>25</td>
<td>35</td>
</tr>
</tbody>
</table>

9.4.15 In the 2031 Without-Development scenario predicted annual mean concentrations of NO\(_2\) in the future without-development scenario are below or well below the annual mean national objective at all existing and cumulative receptors within the study area. As these concentrations are also well below the
annual mean equivalent value (60 µg/m$^3$) for the hourly mean NO$_2$ objective, exceedances of the hourly objective are well below within the study area.

9.4.16 Similarly, in the future without-development scenario annual mean concentrations of PM$_{10}$ and PM$_{2.5}$ are also predicted to be well below the air quality objective for that pollutant at all existing receptors and cumulative receptors within the air quality study area. The number of exceedances of the 24-hr PM$_{10}$ objective is also well below the relevant air quality objective.

9.5 Identification and Evaluation of Key Likely Impacts

Construction Impacts

9.5.1 Several aspects of the construction process are currently known, these are:

- Enabling works which includes site clearance, surveys, demolition, groundworks, and creation of the access and spine road. This work is expected to be undertaken from July 2015 to December 2015;
- Construction which includes the fit out of Retail, Petrol Filling Station, and mixed use areas. This work is expected to be undertaken from January 2016 to February 2017;
- Construction of the residential areas of up to 90 units is expected to be undertaken from January 2016 to May 2017;
- Construction of the Community and Sports Building and sports pitches. This work is expected to be undertaken between March 2016 to March 2017;
- Landscaping and open space works is expected to be undertaken from February 2017 to June 2017; and
- The whole proposed development is expected to be completed in July 2017.

9.5.2 As with the majority of construction projects of this type, the early phases of the works are likely to involve demolition, excavations and earthworks, temporary stockpiling of potentially dusty materials. These activities are likely to be the principle sources of dust during these early phases. During the middle
phases, when the buildings are erected, the principle sources of dust are likely to be from the cutting and grinding of materials and the movement of construction related road vehicles. The latter phases, when the majority of the buildings and infrastructure are complete, will involve the landscaping and finishing works. During these phases, the principal sources of dust will include the storage, handling and movement of materials generated during the associated earthworks. When assessing the impact of dust emissions generated during construction works, receptors are defined as the nearest potentially sensitive receptors to the boundary of the site in each direction. These receptors have the potential to experience impacts of greater magnitude due to emissions of particulate matter generated by the works, when compared with other more distant or less sensitive receptors. The IAQM guidance (Ref-9.1), outlines that an assessment is required where there is:

- a human receptor within 350m of the site boundary;
- an ecological receptor within 50m of the site boundary; or
- a human or ecological receptor within 50m of the route used by construction vehicles on the public highway, up to 500m from the site entrance.

9.5.3 There are no ecologically sensitive receptors close to the site, but the other two criteria are satisfied therefore and an assessment is required as set out in IAQM guidance (Ref-9.1).

9.5.4 The receptors located close enough to the application site to potentially be adversely affected by the construction phase are residential properties along the A390.

9.5.5 The potential impacts considered at the residential properties are:

- effects on Amenity and Property including changes to the rate of deposition of particulate matter onto glossy surface and other property;
- changes in 24 hour mean concentrations that might increase the risk of exposure to PM10 at levels that could exceed the 24-hr objective; and
• effects of dust deposition on ecologically sensitive habitats and plant communities.

9.5.6 The construction dust assessment has been undertaken with the assumption that standard dust mitigation practices such as those outlined in Section 9.6 are in place. These would be expected to form the basis of any Construction Emissions Management Plan (CEMP) for a development of this size and type.

Demolition

9.5.7 There is currently a building on the south west boundary of the proposed development site. The total building volume for demolition is estimated to be significantly less than 20,000m³ at approximately 4,650m³ and therefore the emission magnitude is small. There are estimated to be less than 10 properties within 50 m of potential large-scale demolition areas of the site. Sensitivity of the area to dust soiling due to demolition is therefore assessed as low. An area of low sensitivity with a low emission magnitude site is at a low risk of adverse impacts due to construction dust. Site specific mitigation measures such as those assumed to be inherent in the CEMP will ensure that impacts due to construction dust on amenity and property are negligible.

9.5.8 Annual mean PM$_{10}$ concentrations at the site are currently less than 24µg/m³ with less than 10 properties within 50 m of potential small-scale demolition areas of the site. The sensitivity of the area to human health impacts is therefore assessed as low. An area of low sensitivity to human health impacts from construction dust is at a low risk of adverse impacts due to construction dust. Site specific mitigation measures such as those assumed to be inherent in the CEMP will ensure that impacts due to construction dust on amenity and property are negligible.

9.5.9 Sensitivity of the area to ecological impacts is not applicable, as there are no ecologically sensitive receptors within 50 m of the site.
9.5.10 Site clearance works, the digging of trenches for foundations and utilities and temporary stockpiling of material represent the principal activities that may generate emissions of particulate material. The potential for stockpiles of materials to generate dust depends on the nature of the material. Earth is soft and friable compared to hardcore. However, hardcore generally has lower moisture content than soil, and consequently they can both be a potential source of dust. The total area of the site is more than 10,000 m$^2$. The potential dust emission magnitude for earthworks is therefore assessed as large. There are estimated to be less than 10 existing properties within 50 m of earthworks. Sensitivity of the area to dust soiling due to earthworks is therefore assessed as low. An area of low sensitivity with a large dust emission magnitude site is at low risk of adverse impacts due to construction dust. Site specific mitigation measures such as those assumed to be inherent in the CEMP will ensure that impacts due to construction dust on amenity and property are negligible.

9.5.11 Annual mean PM$_{10}$ concentrations at the site are currently less than 24 µg/m$^3$, with less than 10 properties within 50 m of earthworks, therefore the sensitivity of the area to human health impacts is low. An area of low sensitivity to human health impacts from construction dust is at a low risk of adverse impacts due to construction dust. Site specific mitigation measures such as those assumed to be inherent in the CEMP will ensure that impacts due to construction dust on amenity and property are negligible.

9.5.12 Sensitivity of the area to ecological impacts is not applicable, as there are no ecologically sensitive receptors within 50 m of the site.

9.5.13 Dust emissions during construction can give rise to elevated dust deposition and PM$_{10}$ concentrations. These are generally short-lived changes over a few hours or days, which occur over a limited time period of several weeks or months. The construction of the Retail, Petrol Filling Station and mixed use area
is expected to take place between January 2016 and February 2017. The construction of the residential area is expected to take place between January 2016 and May 2017. The construction of the community and sports building and sports pitches is expected to take place between March 2016 and March 2017.

9.5.14 The total building volume is estimated to be greater than 100,000 m$^3$. The potential dust emission magnitude for construction is therefore assessed as large. There are estimated to be less than 10 properties within 50 m of construction. Sensitivity of the area to dust soiling due to construction is therefore assessed as low. An area of low sensitivity with a large dust emission magnitude site is at low risk of adverse impacts due to construction dust. Site specific mitigation measures such as those assumed to be inherent in the CEMP will ensure that impacts due to construction dust on amenity and property are negligible.

9.5.15 Annual mean PM$_{10}$ concentrations at the site are currently less than 24 µg/m$^3$, with less than 10 properties within 50 m of construction work, therefore the sensitivity of the area to human health impacts is low. An area of low sensitivity to human health impacts from construction dust is at a low risk of adverse impacts due to construction dust. Site specific mitigation measures such as those assumed to be inherent in the CEMP will ensure that impacts due to construction dust on amenity and property are negligible.

9.5.16 Sensitivity of the area to ecological impacts is not applicable, as there are no ecologically sensitive receptors within 50 m of the site.

**Trackout**

9.5.17 The HGV movements are expected to peak during the enabling works phase which is predicted to occur in the first 6 months. During this enabling works phase there is predicted to be a daily flow of 93HGV outward movements per day. The potential dust emission magnitude of trackout from this number of outward movements is assessed as large as it is greater than the assessment criteria of 50. The number of outward movements is expected to decrease to
between 10 and 50 after 6 months reducing the emissions magnitude to medium.

9.5.18 The main trackout route will be west along the A390 towards the A30. There are predicted to be 100 full time workers on site. Some of these workers would access the site via their own vehicles. However, part of the CEMP is to provide offsite parking, so where possible workers will be transported to site in a minibus minimising the potential for trackout from cars leaving the site.

9.5.19 There are estimated to be between 10 and 100 properties within 50 m of trackout routes. Sensitivity of the area to dust soiling due to trackout is therefore assessed as medium. An area of high magnitude with medium dust sensitivity is at a medium risk of adverse impacts due to trackout. After 6 months, the magnitude is anticipated to be reduced to medium with medium dust sensitivity, resulting in a low risk of adverse impacts due to trackout. Ensuring that the CEMP includes mitigation measures specific to trackout as outlined in Section 9.6 will ensure the impact of trackout is negligible at sensitive receptors beyond the site boundary.

9.5.20 Annual mean PM$_{10}$ concentrations at the site are currently less than 24 µg/m$^3$, with between 10 and 100 properties within 50 m of trackout routes, therefore the sensitivity of the area to human health impacts is low. An area of low sensitivity to human health impacts from construction dust is at a low risk of adverse impacts due to construction dust. Site specific mitigation measures such as those assumed to be inherent in the CEMP will ensure that impacts due to construction dust on amenity and property are negligible.

9.5.21 Sensitivity of the area to ecological impacts is not applicable, as there are no ecologically sensitive receptors within 50 m of the site.

9.5.22 The risk of impacts with mitigation applied as outlined in Section 9.6 is determined by combining the dust emission magnitude with the sensitivity of the area. The significance of the identified risk associated with each of the four construction phase activities is summarised in Table 9.15. Overall the effects of the construction phase activities are considered to be negligible (IAQM, 2014).
Table 9.15 Summary of Significance of Construction Phase Dust Effects

<table>
<thead>
<tr>
<th>Potential Impact</th>
<th>Demolition</th>
<th>Earthworks</th>
<th>Construction</th>
<th>Trackout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects on Amenity and Property</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Slight Adverse during first 6 months reducing to Negligible</td>
</tr>
<tr>
<td>Exposure to PM$_{10}$ at levels that could exceed the 24 hour air quality objective</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Overall Effect</td>
<td></td>
<td></td>
<td>Negligible and Not Significant</td>
<td></td>
</tr>
</tbody>
</table>

**Operational Road Traffic**

**Traffic Generation in 2031 With-Development**

9.5.23 Traffic flow data for the with-development scenario is displayed in **Table 9.16**.
### Table 9.16 Traffic Flow in the 2031 With-Development Scenario

<table>
<thead>
<tr>
<th>Link Number</th>
<th>Link Description</th>
<th>2031 With Development</th>
<th>Speed (kph)</th>
<th>Change between 2031 With-Development and Without-Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>AADT</td>
<td>%HGV</td>
<td>(kph)</td>
</tr>
<tr>
<td>1</td>
<td>Chacewater to Proposed Development</td>
<td>45,988</td>
<td>4</td>
<td>96.5</td>
</tr>
<tr>
<td>2</td>
<td>Proposed Development to Langarth</td>
<td>47,613</td>
<td>4</td>
<td>96.5</td>
</tr>
<tr>
<td>3</td>
<td>Langarth to Threemilestone</td>
<td>46,646</td>
<td>4</td>
<td>96.5</td>
</tr>
<tr>
<td>4</td>
<td>Threemilestone to Chyvelah Vale</td>
<td>50,323</td>
<td>4</td>
<td>80.5</td>
</tr>
<tr>
<td>5</td>
<td>Chyvelah Vale – Treliske Roundabout</td>
<td>57,534</td>
<td>4</td>
<td>64.4</td>
</tr>
<tr>
<td>6</td>
<td>A390 Treliske Roundabout – to Lowen Bre</td>
<td>60,299</td>
<td>4</td>
<td>64.4</td>
</tr>
<tr>
<td>7</td>
<td>Lowen Bre – Treliske Lane</td>
<td>58,166</td>
<td>4</td>
<td>64.4</td>
</tr>
<tr>
<td>8</td>
<td>Treliske Lane – Newbridge Lane</td>
<td>60,299</td>
<td>4</td>
<td>64.4</td>
</tr>
<tr>
<td>9</td>
<td>Newbridge Lane – Former Richard Lander School</td>
<td>60,206</td>
<td>4</td>
<td>64.4</td>
</tr>
<tr>
<td>10</td>
<td>Former Richard Lander School – Penwerris Road</td>
<td>60,590</td>
<td>4</td>
<td>64.4</td>
</tr>
<tr>
<td>11</td>
<td>Penwerris Road – Penwethers Lane</td>
<td>61,000</td>
<td>4</td>
<td>64.4</td>
</tr>
<tr>
<td>12</td>
<td>Penwethers Lane – Malabar Road</td>
<td>58,439</td>
<td>4</td>
<td>64.4</td>
</tr>
<tr>
<td>13</td>
<td>Malabar Road – Dobbs Lane</td>
<td>60,578</td>
<td>4</td>
<td>64.4</td>
</tr>
<tr>
<td>14</td>
<td>Dobbs Lane – Station Road</td>
<td>61,179</td>
<td>4</td>
<td>64.4</td>
</tr>
<tr>
<td>15</td>
<td>East of County Hall Junction</td>
<td>45,623</td>
<td>4</td>
<td>64.4</td>
</tr>
<tr>
<td>Site Acc1</td>
<td>Site Access 1 from the A390 to the entrance to the residential area</td>
<td>9,266</td>
<td>1</td>
<td>16.1</td>
</tr>
<tr>
<td>Site Acc 2*</td>
<td>Site Access to the east Residential area</td>
<td>120</td>
<td>0</td>
<td>16.1</td>
</tr>
<tr>
<td>Site Acc 3*</td>
<td>Site Access west into the retail car park</td>
<td>9,146</td>
<td>1</td>
<td>16.1</td>
</tr>
<tr>
<td>Site Acc 4</td>
<td>Car park to the south of the retail section</td>
<td>9,146</td>
<td>1</td>
<td>16.1</td>
</tr>
</tbody>
</table>

*Traffic counts for these links were estimated from the development traffic data sent to URS by Curtins.

9.5.24 Predicted annual mean concentrations of NO$_2$, PM$_{10}$, PM$_{2.5}$ and the number of exceedences of the 24-hr 50 µg/m$^3$ air quality objectives, at the selected air quality sensitive receptors in the year of full operation (2031), are listed in Table 9.17.
# Table 9.17 Air Quality Statistics Predicted for the With-Development Scenario in 2031

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Annual Mean NO₂ (µg/m³)</th>
<th>Annual Mean PM₁₀ (µg/m³)</th>
<th>Annual Mean PM₂.₅ (µg/m³)</th>
<th>No. Days PM₁₀ &gt;50 µg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>18.2</td>
<td>18.1</td>
<td>9.9</td>
<td>2</td>
</tr>
<tr>
<td>R2</td>
<td>14.3</td>
<td>17.8</td>
<td>9.5</td>
<td>2</td>
</tr>
<tr>
<td>R3</td>
<td>14.4</td>
<td>17.8</td>
<td>9.5</td>
<td>2</td>
</tr>
<tr>
<td>R4</td>
<td>15.1</td>
<td>17.9</td>
<td>9.6</td>
<td>2</td>
</tr>
<tr>
<td>R5</td>
<td>16.3</td>
<td>18.2</td>
<td>9.7</td>
<td>2</td>
</tr>
<tr>
<td>R6</td>
<td>21.1</td>
<td>18.9</td>
<td>10.3</td>
<td>3</td>
</tr>
<tr>
<td>R7</td>
<td>34.7</td>
<td>21.1</td>
<td>11.7</td>
<td>5</td>
</tr>
<tr>
<td>R8</td>
<td>27.7</td>
<td>20.4</td>
<td>11.1</td>
<td>4</td>
</tr>
<tr>
<td>R9</td>
<td>28.6</td>
<td>20.4</td>
<td>11.2</td>
<td>4</td>
</tr>
<tr>
<td>R10</td>
<td>28.5</td>
<td>20.4</td>
<td>11.2</td>
<td>4</td>
</tr>
<tr>
<td>R11</td>
<td>30.2</td>
<td>19.9</td>
<td>11.4</td>
<td>4</td>
</tr>
<tr>
<td>R12</td>
<td>30.3</td>
<td>19.8</td>
<td>11.3</td>
<td>4</td>
</tr>
<tr>
<td>R13</td>
<td>35.4</td>
<td>20.4</td>
<td>11.7</td>
<td>4</td>
</tr>
<tr>
<td>R14</td>
<td>28.6</td>
<td>19.0</td>
<td>10.8</td>
<td>3</td>
</tr>
<tr>
<td>R15</td>
<td>26.9</td>
<td>18.2</td>
<td>10.5</td>
<td>2</td>
</tr>
<tr>
<td>R16</td>
<td>23.0</td>
<td>17.8</td>
<td>10.2</td>
<td>2</td>
</tr>
<tr>
<td>R17</td>
<td>29.1</td>
<td>19.0</td>
<td>11.0</td>
<td>3</td>
</tr>
<tr>
<td>R18</td>
<td>33.0</td>
<td>19.9</td>
<td>11.5</td>
<td>4</td>
</tr>
<tr>
<td>R19</td>
<td>35.7</td>
<td>19.6</td>
<td>11.5</td>
<td>3</td>
</tr>
<tr>
<td>R20</td>
<td>17.7</td>
<td>17.9</td>
<td>9.7</td>
<td>2</td>
</tr>
<tr>
<td>R21</td>
<td>24.0</td>
<td>19.2</td>
<td>10.6</td>
<td>3</td>
</tr>
<tr>
<td>C1</td>
<td>10.9</td>
<td>17.2</td>
<td>9.1</td>
<td>1</td>
</tr>
<tr>
<td>C2</td>
<td>9.8</td>
<td>17.0</td>
<td>9.0</td>
<td>1</td>
</tr>
<tr>
<td>C3</td>
<td>9.2</td>
<td>16.1</td>
<td>8.9</td>
<td>1</td>
</tr>
<tr>
<td>C4</td>
<td>8.9</td>
<td>16.6</td>
<td>8.8</td>
<td>1</td>
</tr>
<tr>
<td>C5</td>
<td>15.1</td>
<td>17.9</td>
<td>9.6</td>
<td>2</td>
</tr>
<tr>
<td>C6</td>
<td>15.9</td>
<td>18.1</td>
<td>9.7</td>
<td>2</td>
</tr>
<tr>
<td>C7</td>
<td>17.7</td>
<td>16.8</td>
<td>9.6</td>
<td>1</td>
</tr>
<tr>
<td>P1</td>
<td>20.6</td>
<td>18.3</td>
<td>10.0</td>
<td>2</td>
</tr>
<tr>
<td>P2</td>
<td>13.5</td>
<td>17.2</td>
<td>9.3</td>
<td>1</td>
</tr>
<tr>
<td>P3</td>
<td>13.6</td>
<td>17.1</td>
<td>9.2</td>
<td>1</td>
</tr>
<tr>
<td>P4</td>
<td>14.0</td>
<td>17.3</td>
<td>9.3</td>
<td>1</td>
</tr>
<tr>
<td>P5</td>
<td>12.7</td>
<td>17.1</td>
<td>9.2</td>
<td>1</td>
</tr>
<tr>
<td>Objective Value</td>
<td>40</td>
<td>40</td>
<td>25</td>
<td>35</td>
</tr>
</tbody>
</table>
9.5.25 As in the without-development scenario, predicted annual mean concentrations of NO₂ with the development in place are below or well below the objective value at existing, proposed and cumulative receptors. This is due to improvements in background pollutant concentration between baseline year and year of assessment. As these concentrations are also well below the annual mean equivalent value (60 µg/m³) for the hourly mean NO₂ objective, exceedences of the hourly objective are unlikely within the study area with the proposed development.

9.5.26 In the with-development scenario annual mean concentrations of PM₁₀ and PM₂.₅ are predicted to be well below the air quality objective for each pollutant at all locations, existing and proposed, within the air quality study area. The number of exceedences of the 24-hr PM₁₀ objective is also well below the relevant air quality objective.

9.5.27 As annual mean concentrations of NO₂, PM₁₀ and PM₂.₅ are below or well below the respective objectives at the proposed receptor locations, the site would be considered suitable for use as a residential development.

9.5.28 The changes that are predicted to occur as a result of the proposed development, in relation to the without-development conditions for each of the sensitive receptors are listed in Table 9.18.
Table 9.18 Change in Road Traffic Air Quality Statistics Predicted in 2031

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Annual Mean NO₂ (µg/m³)</th>
<th>Annual Mean PM₁₀ (µg/m³)</th>
<th>Annual Mean PM₂.₅ (µg/m³)</th>
<th>No. Days PM₁₀ &gt;50 µg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>+1.6 (S)</td>
<td>+0.3 (I)</td>
<td>+0.2 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R2</td>
<td>+1.2 (S)</td>
<td>+0.2 (I)</td>
<td>+0.1 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R3</td>
<td>+1.1 (S)</td>
<td>+0.2 (I)</td>
<td>+0.1 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R4</td>
<td>+1.2 (S)</td>
<td>+0.2 (I)</td>
<td>+0.1 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R5</td>
<td>+1.4 (S)</td>
<td>+0.2 (I)</td>
<td>+0.1 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R6</td>
<td>+2.6 (M)</td>
<td>+0.4 (S)</td>
<td>+0.2 (I)</td>
<td>+1 (S)</td>
</tr>
<tr>
<td>R7</td>
<td>+7.5 (L)</td>
<td>+1.1(S)</td>
<td>+0.8 (S)</td>
<td>+1 (S)</td>
</tr>
<tr>
<td>R8</td>
<td>+3.0 (M)</td>
<td>+0.5 (S)</td>
<td>+0.3 (S)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R9</td>
<td>+2.8 (M)</td>
<td>+0.5 (S)</td>
<td>+0.3 (S)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R10</td>
<td>+2.4 (M)</td>
<td>+0.4 (S)</td>
<td>+0.3 (S)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R11</td>
<td>+2.2 (M)</td>
<td>+0.4 (S)</td>
<td>+0.2 (I)</td>
<td>+1 (S)</td>
</tr>
<tr>
<td>R12</td>
<td>+2.3 (M)</td>
<td>+0.4 (S)</td>
<td>+0.2 (I)</td>
<td>+1 (S)</td>
</tr>
<tr>
<td>R13</td>
<td>+2.6 (M)</td>
<td>+0.4 (S)</td>
<td>+0.3 (S)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R14</td>
<td>+2.1 (M)</td>
<td>+0.3 (I)</td>
<td>+0.2 (I)</td>
<td>+1 (S)</td>
</tr>
<tr>
<td>R15</td>
<td>+2.0 (M)</td>
<td>+0.3 (I)</td>
<td>+0.2 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R16</td>
<td>+1.6 (S)</td>
<td>+0.3 (I)</td>
<td>+0.2 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R17</td>
<td>+2.0 (M)</td>
<td>+0.3 (I)</td>
<td>+0.2 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R18</td>
<td>+2.5 (M)</td>
<td>+0.4 (S)</td>
<td>+0.3 (S)</td>
<td>+1 (S)</td>
</tr>
<tr>
<td>R19</td>
<td>+2.5 (M)</td>
<td>+0.4 (S)</td>
<td>+0.2 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R20</td>
<td>+3.5 (M)</td>
<td>+0.5 (S)</td>
<td>+0.3 (S)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>R21</td>
<td>+1.7(S)</td>
<td>+0.3 (I)</td>
<td>+0.2 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>C1</td>
<td>+0.8 (S)</td>
<td>+0.1 (I)</td>
<td>+0.1 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>C2</td>
<td>+0.6 (S)</td>
<td>+0.1 (I)</td>
<td>+0.1 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>C3</td>
<td>+0.3 (I)</td>
<td>+&lt;0.1 (I)</td>
<td>+&lt;0.1 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>C4</td>
<td>+0.4 (S)</td>
<td>+0.1 (I)</td>
<td>+&lt;0.1 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>C5</td>
<td>+1.7 (S)</td>
<td>+0.2 (I)</td>
<td>+0.2 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>C6</td>
<td>+1.4 (S)</td>
<td>+0.2 (I)</td>
<td>+0.1 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
<tr>
<td>C7</td>
<td>+1.1 (S)</td>
<td>+0.2 (I)</td>
<td>+0.1 (I)</td>
<td>+&lt;1 (I)</td>
</tr>
</tbody>
</table>

Magnitude of Change displayed in Parenthesis: (I) = Imperceptible, (S) = Small, (M) = Medium, (L) = Large

9.5.29 The existing receptor R7 located on the roundabout off the A390 and Chyvelah Road is the only receptor predicted to have a large change in annual mean NO₂ concentration. Since the NO₂ concentration is below the annual mean NO₂ objective, this large change will result in a slight adverse impact using the assessment method in Table 9.8.
9.5.30 With regards to a medium change in annual mean concentrations of NO$_2$ existing receptors located at the caravan site to the west of the roundabout off the A390 and Chyvelah Road (R6), residential properties to the east of the roundabout off the A390 and Chyvelah Road (R8, R9 and R10), residential properties and the college located to the east of the roundabout of the A390 and Chyvelah Vale (R12 and R11), residential properties located around the roundabout off the A390 and Penventinnie Lane (R13), residential properties located off the roundabout with the A390 and Valley View Drive (R15), residential properties located off the A390 Highertown (R17, R18 and R19), residential properties located immediately to the west of the entrance to the proposed development (R20) are all predicted to have a medium change. As all these receptors are below the NO$_2$ annual mean objective a medium change in concentration will result in a slight adverse impact using the assessment method in Table 9.8.

9.5.31 With regards to a small change in annual mean concentrations of NO$_2$ existing receptors located to the east of the proposed development (R1, R2, R3, R4 and R5), residential properties located off Penwerris Road to the north of the A390 Tresawls Road (R16), and residential properties located north west of the proposed development site (R21) are all predicted to have a small change. As all of these receptors are well below the NO$_2$ air quality objective a small change will result in a negligible impact using the assessment method in Table 9.8.

9.5.32 All of the cumulative receptors located at sights of committed developments are predicted to experience a small or imperceptible change in annual mean NO$_2$ concentration. As all of these receptors are well below the annual mean NO$_2$ objective this will result in a negligible impact.

9.5.33 With regards to a small change in annual mean concentrations of PM$_{10}$ existing receptors located around the roundabout with the A390 and Chyvelah Road (R6, R7 and R8), residential properties located to the east of the roundabout with the A390 and Cheyvelah Road (R9 and R10), residential receptors located to the east of the roundabout of the A390 and Chyvelah Vale (R12 and R11),
residential receptors located around the roundabout with the A390 and Penventinnie Lane (R13), residential properties located along Highertown A390 (R18 and R19) and residential properties immediately to the west of the proposed development site access (R20) are all predicted to have a small change. As all of the existing receptors are predicted to have a PM$_{10}$ concentration well below the annual mean PM$_{10}$ objective this will result in a negligible impact.

9.5.34 With regards to a imperceptible change in annual mean concentrations of PM$_{10}$ receptors located immediately to the east of the proposed development (R1, R2, R3, R4 and R5), residential properties located to the east of the roundabout with the A390 and Penventinnie Lane (R14, R15, R16 and R17) and residential properties located to the north west of the proposed development (R21) are all predicted to have an imperceptible change. As all of these receptors are well below the annual mean PM$_{10}$ objective this will result in a negligible impact.

9.5.35 All of the cumulative receptors are predicted to an imperceptible change in annual mean PM$_{10}$ objective. As all of these receptors are well below the annual mean PM$_{10}$ objective this will result in a negligible impact.

9.5.36 With regards to a small change in annual mean concentrations of PM$_{2.5}$ receptors located to the east of the roundabout with the A390 and Chyvelah Road (R7, R8, R9 and R10), receptors located off the roundabout with the A390 and Penventinnie Lane (R13), receptors located just off Highertown A390 (R18), and residential properties located immediately to the west of the proposed development (R20) are predicted to have a small change in annual mean PM$_{2.5}$ concentration. As all of the receptors are well below the PM$_{2.5}$ annual mean objective this will result in a negligible impact.

9.5.37 With regards to an imperceptible change in annual mean concentration of PM$_{2.5}$ receptors located to the east of the proposed development (R1, R2, R3, R4 and R5), receptors located to the east of the roundabout with the A390 and Chevylah Vale (R12 and R11), receptors located to the east of the roundabout with the A390 and Penventinnie Lane (R14, R15 and R16), receptors located off Highertown A390 (R17 and R19), and residential properties to the north west of
the proposed development (R21) are predicted to have a imperceptible change in annual mean PM$_{2.5}$ concentrations. As all of the receptors are predicted to have a PM$_{2.5}$ concentration well below the annual PM$_{2.5}$ air quality objective this will result in a negligible impact.

9.5.38 All of the cumulative receptors are predicted to an imperceptible change in annual mean PM$_{2.5}$ objective. As all of these receptors are well below the annual mean PM$_{2.5}$ objective this will result in a negligible impact.

9.5.39 There is also an imperceptible or small change in the number of days in PM$_{10}$ 24-hr objective is achieved at all existing and cumulative receptors.

9.5.40 In summary, the impact of the proposed development would have a negligible effect on surrounding receptors and the site is considered suitable for residential use. Therefore, the overall effect of the proposal on local air quality is considered to be not significant and the proposals are also considered to be consistent with relevant planning policy.

**Operational CHP Plant Emissions**

9.5.41 The receptors affected by the emissions from the CHP plant are limited to those within a radius of approximately 300m from the stack as can be seen in the contour map in Figure 9.5. The process concentrations at the closest receptors to the CHP plant are listed in Table 9.19. Environment Agency H1 Guidance document ([Error! Reference source not found.]) indicates that process emissions can be considered insignificant based on the following criteria:

- the long term process contribution (PC) is <1% of the long term environmental standard, and
- the short term process contribution (PC) is <10% of the short term environmental standard.
### Table 9.19 Long-term and Short-term process contribution associated with the proposed CHP Plant

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Change in Annual Mean NO$_2$ (µg/m$^3$)</th>
<th>Process Contribution as a % of Limit of 40µg/m$^3$</th>
<th>Change 1-hour NO$_2$ (µg/m$^3$)</th>
<th>Process Contribution as a % of Limit of 200µg/m$^3$</th>
<th>Daily 8-Hour Running Mean of CO (mg/m$^3$)</th>
<th>Process Contribution as a % of Limit of 10mg/m$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>R20</td>
<td>+0.2 (I)</td>
<td>0.5</td>
<td>+3.6</td>
<td>1.8</td>
<td>0.0001</td>
<td>0.0004</td>
</tr>
<tr>
<td>R21</td>
<td>+0.2 (I)</td>
<td>0.4</td>
<td>+2.1</td>
<td>1.0</td>
<td>0.0001</td>
<td>0.0003</td>
</tr>
<tr>
<td>P1</td>
<td>+0.12 (I)</td>
<td>0.3</td>
<td>+2.2</td>
<td>1.1</td>
<td>0.0001</td>
<td>0.0002</td>
</tr>
<tr>
<td>P2</td>
<td>+0.1 (I)</td>
<td>0.3</td>
<td>+2.3</td>
<td>1.1</td>
<td>0.0001</td>
<td>0.0002</td>
</tr>
<tr>
<td>P3</td>
<td>+0.2 (I)</td>
<td>0.6</td>
<td>+3.6</td>
<td>1.8</td>
<td>0.0002</td>
<td>0.0004</td>
</tr>
<tr>
<td>P4</td>
<td>+0.3 (I)</td>
<td>0.8</td>
<td>+7.5</td>
<td>3.7</td>
<td>0.0002</td>
<td>0.0006</td>
</tr>
<tr>
<td>P5</td>
<td>+0.5 (S)</td>
<td>1.3</td>
<td>+4.1</td>
<td>2.1</td>
<td>0.0001</td>
<td>0.0002</td>
</tr>
<tr>
<td>Objective Value</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Magnitude of Change displayed in Parenthesis: (I) = Imperceptible, (S) = Small, (M) = Medium, (L) = Large

9.5.42 It can be seen that for CO, the process contribution is significantly lower than 1% of the air quality objective concentration. It is concluded that ground level concentrations of CO in the vicinity of the proposed CHP plant are so small as to be imperceptible and as such cannot be considered significant for local air quality. The emissions of CO are therefore not considered any further in this assessment (Ref-9.31).

9.5.43 The process contribution is less than 1% of the annual mean NO$_2$ objective at all receptors in the vicinity of the CHP plant with the exception of P5, which corresponds to the proposed receptor of the tennis courts. This is not likely to be a location relevant for annual mean exposure, however the magnitude of the change is considered small and so the cumulative effect of CHP and road emissions will be assessed at this location. The magnitude of change in annual mean concentrations at the remaining receptors in the vicinity of the CHP plant are so small as to be imperceptible and are therefore not significant in terms of local air quality on their own, but may be significant when considered in...
conjunction with the roads contribution to the annual mean concentration. This is considered further in the following sub-section and as detailed in Table 9.20.

9.5.44 When considering the short term 1-hour concentrations of NO\textsubscript{2} it can be seen that the process concentration at all sites is significantly less than 10% of the objective limit of 200 µg/m\textsuperscript{3}. When added to twice the background concentration in accordance with H1 Guidance, the maximum 99.79\textsuperscript{th} percentile concentration at any location is 22.25µg/m\textsuperscript{3} at receptor P4 which corresponds to the proposed Sports Complex. There is therefore no risk of an exceedence of the NO\textsubscript{2} 1-hour objective of 200 µg/m\textsuperscript{3} due to emissions from the CHP plant. Cumulative exceedences of the 1-hour objective need not be considered further.

**Operational Road Traffic and CHP Plant Emissions**

9.5.45 Predicted annual mean concentrations of NO\textsubscript{2}, as a result of Operational Road Traffic Emissions combined with CHP Plant Emissions at the selected sensitive receptors are listed in Table 9.20. All other receptors are unaffected by emission from the CHP plant.

**Table 9.20 Annual Mean Air Quality Statistics Predicted for the With-Development Scenario in 2031**

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Annual Mean NO\textsubscript{2} (µg/m\textsuperscript{3})</th>
<th>Change in Annual Mean NO\textsubscript{2} (µg/m\textsuperscript{3})</th>
</tr>
</thead>
<tbody>
<tr>
<td>R20</td>
<td>17.9</td>
<td>+3.6 (M)</td>
</tr>
<tr>
<td>R21</td>
<td>24.1</td>
<td>+1.9 (S)</td>
</tr>
<tr>
<td>P1</td>
<td>20.8</td>
<td>-</td>
</tr>
<tr>
<td>P2</td>
<td>13.6</td>
<td>-</td>
</tr>
<tr>
<td>P3</td>
<td>13.8</td>
<td>-</td>
</tr>
<tr>
<td>P4</td>
<td>14.3</td>
<td>-</td>
</tr>
<tr>
<td>P5</td>
<td>13.2</td>
<td>-</td>
</tr>
<tr>
<td>Objective Value</td>
<td>40</td>
<td>-</td>
</tr>
</tbody>
</table>

Magnitude of Change displayed in Parenthesis: (I) = Imperceptible, (S) = Small, (M) = Medium, (L) = Large

9.5.46 The contribution to the total concentration at each receptor from the CHP plant is very small and so the overall significance of impact for existing receptors R20
and R21 is unchanged from when road traffic emissions were considered alone. The impact on each receptor is negligible.

9.5.47 The proposed receptors are all predicted to have a NO$_2$ concentration well below the NO$_2$ annual mean objective with the road and CHP emission contribution combined.

**Summary of Impacts**

9.5.48 **Table 9.21** displays a summary of the impacts for construction, road traffic emissions and changes in emissions resulting from the CHP plant associated with the proposed development.

**Table 9.21 Summary of Impacts**

<table>
<thead>
<tr>
<th>Impact</th>
<th>Receptor Sensitivity</th>
<th>Direct or Indirect</th>
<th>Positive/ Negative</th>
<th>Permanent/ Temporary</th>
<th>Magnitude</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demolition (dust soiling)</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Demolition (human health)</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Earthworks (dust soiling)</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Earthworks (human health)</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Construction (dust soiling)</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Construction (human health)</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Trackout (dust soiling)</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Slight Adverse</td>
<td>Slight Adverse reducing to Negligible after 6 months</td>
</tr>
<tr>
<td>Trackout (human health)</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td><strong>Operational</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes in traffic flow around the air quality study area resulting in changes in air quality</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Negligible to Slight Adverse</td>
<td>Negligible</td>
</tr>
<tr>
<td>Changes in emissions resulting from the CHP Plant associated with the proposed development</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Changes in emissions resulting from the CHP Plant combined with emissions from changes in traffic associated with the proposed development</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
9.6 Mitigation Measures

Construction Phase

9.6.1 A number of standard and commonplace dust mitigation practices would be expected to form the basis of a CEMP for a development of this size and type. These measures are based on a number of good practice guides (Ref-9.1) for the construction industry and outlined below for each of the four stages of the construction work. Where significant impacts are predicted, additional site specific mitigation measures may be recommended which need to be agreed with the Planning Authority and included in the CEMP.

9.6.2 Measures Specific to Demolition:

- soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust);
- ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as water can be directed to where it is needed;
- avoid explosive blasting, using appropriate manual or mechanical alternatives; and
- bag and remove biological debris or damp down such material before demolition.

9.6.3 Measures Specific to Earthworks:

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable; and
- Only remove the cover in small areas during work and not all at once.
9.6.4 Measures Specific to Construction:

- Avoid scabbling (roughening of concrete surfaces);
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery; and
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored to prevent dust.

9.6.5 Measures Specific to Trackout:

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- Record all inspections of haul routes and any subsequent action in a site log book;
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits; and
- Access gates to be located at least 10 m from receptors where possible.

9.6.6 If effective mitigation measures are in place, as outlined above, significant effects on receptors are likely to be prevented resulting in a residual effect that is not significant.

**Operational Phase**

9.6.7 No mitigation is required for the operational phase beyond that already incorporated into the assumed design of the energy centre plant e.g. a catalyst abatement system. A Framework Travel Plan has been prepared for future site employees to further reduce air quality effects.

**9.7 Residual Impacts**

9.7.1 A summary of the residual impacts is presented in Table 9.22 below.
Table 9.22 Summary of Residual Impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation / Enhancement</th>
<th>Residual Impact Magnitude</th>
<th>Residual Impact Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demolition (dust soiling)</td>
<td>The construction assessment (Error! Reference source not found.) has embedded mitigation in place therefore the residual impact will not change.</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Demolition (human health)</td>
<td>The construction assessment (Error! Reference source not found.) has embedded mitigation in place therefore the residual impact will not change.</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Earthworks (dust soiling)</td>
<td>The construction assessment (Error! Reference source not found.) has embedded mitigation in place therefore the residual impact will not change.</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Earthworks (human health)</td>
<td>The construction assessment (Error! Reference source not found.) has embedded mitigation in place therefore the residual impact will not change.</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Construction (dust soiling)</td>
<td>The construction assessment (Error! Reference source not found.) has embedded mitigation in place therefore the residual impact will not change.</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Construction (human health)</td>
<td>The construction assessment (Error! Reference source not found.) has embedded mitigation in place therefore the residual impact will not change.</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Trackout (dust soiling)</td>
<td>The construction assessment (Error! Reference source not found.) has embedded mitigation in place therefore the residual impact will not change.</td>
<td>Slight Adverse</td>
<td>Slight Adverse reducing to Negligible after 6 months</td>
</tr>
<tr>
<td>Trackout (human health)</td>
<td>The construction assessment (Error! Reference source not found.) has embedded mitigation in place therefore the residual impact will not change.</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td><strong>Operational</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes in traffic flow around the air quality study area resulting in changes in air quality</td>
<td>No mitigation is proposed for the proposed development.</td>
<td>Slight Adverse to Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Changes in emissions resulting from the CHP Plant associated with the proposed development</td>
<td>Mitigation included in plant design with catalyst abatement system</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Changes in emissions resulting from the CHP Plant combined with operational traffic</td>
<td>Mitigation included in plant design with catalyst abatement system</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
9.8 Cumulative Effects

Construction Phase

9.8.1 The nearest cumulative scheme to the proposed development is PA14/03065 (C6). Cumulative schemes PA11/06125 (C2) and PA11/06124 (C1) are also located to the east of the proposed development. HGVs travelling to all the sites are predicted to travel along the A390 so residential properties located adjacent to the A390 may experience slight adverse impact in terms of dust soiling although it should be recognised that each site will be in a different phase of construction at any one time and so potential cumulative impacts will vary over the Proposed Development period. Mitigation measures included in Section 9.6 will help to minimise construction dust emissions from the Proposed Development. The cumulative schemes in the vicinity of the site will all be required to develop and follow a stringent CEMP. It is therefore concluded that cumulative impacts due to the Proposed Development and nearby committed developments will be negligible on sensitive receptors in the vicinity of the site.

Operational Phase

9.8.2 The traffic data used for the 2031 without-development scenario and 2031 with-development scenario has included the traffic increases due to existing committed development schemes. These are:

- The consented Langarth Farm proposal including the Stadium (PA11/06124 and for Stadium PA11/06125 plus PA12/09036);
- The Maiden Green proposal minus the supermarket (PA14/00703);
- The Willow Green proposal minus the supermarket (PA13/10454);
- The consented proposal for land between A390, the Park and Ride and Willow Green Farm (PA12/11527); and
- Former Richard Lander School redevelopment (approved PA12/10941 and the live amended application PA14/05421) essentially the same scheme as both applications propose 226 dwellings.
9.8.3 The cumulative impact of these schemes has therefore been considered in conjunction with the proposed development. The concentrations at the proposed receptors are displayed in Table 9.14, Table 9.17 and Table 9.20.

9.9 Summary and Conclusions

9.9.1 In general construction activities have the potential to generate fugitive dust emissions as a result of demolition, construction, earthworks or track-out of material. For the proposed development, the emission of any airborne particulate matter generated by these activities would be controlled using on site management practices to the extent that the propose development would give rise to effects at works slight adverse significance on dust deposition rates at the nearest sensitive receptors. The impact of fugitive emissions of PM$_{10}$ at these receptors, with the proposed receptors, with proposed mitigation would be negligible.

9.9.2 The advanced dispersion model ADMS-Roads has been used to quantify the change in pollutant concentrations at receptors along the A390 from west of the proposed development entrance to the County Hall in Highbertown for the baseline year of 2012 and the future assessment year of 2031, with and without the development, accounting for committed developments. Annual mean pollutant concentrations were also predicted at five proposed receptors on the proposed development site. Annual mean pollutant concentrations were predicted at seven cumulative schemes near to the proposed development.

9.9.3 In the 2012 baseline scenario predicted annual mean concentrations of NO$_2$, PM$_{10}$ and PM$_{2.5}$ are below or well below the annual mean objective. All of the receptors in the study area all well below the annual mean equivalent value (60 µg/m$^3$) for the hourly mean NO$_2$ objective, therefore exceedances of the hourly objective are unlikely within the study area.

9.9.4 In the 2031 Without-Development scenario, predicted annual mean concentrations of NO$_2$, PM$_{10}$ and PM$_{2.5}$ are below or well below the annual mean national objective at all existing and cumulative receptors within the study area.
As these concentrations are also well below the annual mean equivalent value (60 µg/m³) for the hourly mean NO₂ objective, exceedances of the hourly objective are unlikely within the study area. The number of exceedances of the 24-hr PM₁₀ objective is also well below the relevant air quality objective.

9.9.5 In the 2031 With-Development scenario predicted annual mean concentrations of NO₂, PM₁₀ and PM₂.₅ in the future With-Development scenario are below or well below the annual mean national objective at all existing and cumulative receptors within the study area. As these concentrations are also well below the annual mean equivalent value (60 µg/m³) for the hourly mean NO₂ objective, exceedances of the hourly objective are well below within the study area. The number of exceedances of the 24-hr PM₁₀ objective is also well below the relevant air quality objective. There are medium, small changes in NO₂, PM₁₀ and PM₂.₅ concentrations at some receptors, but the resultant annual mean concentrations of those particular pollutants are either below or well below the air quality objective and result in an impact of negligible to slight adverse significance.

9.9.6 The emissions from the CHP plant associated with the Food Store have a negligible impact on local air quality.

9.9.7 The combined effect of the CHP Plant and the traffic emissions will result in an impact of negligible significance.

9.9.8 In conclusion, the overall impact of the mixed use development would be negligible on surrounding receptors. As annual mean concentrations of all pollutants are predicted to be well below or below relevant objectives at proposed receptor locations, the site is considered suitable for mixed development use. The overall impact of the Proposed Development is considered unlikely to contravene Cornwall Council’s local planning policy.

9.9.9 The summary of air quality impact is displayed in Table 9.23.
### Table 9.23 Summary of Air Quality Impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Impact Significance</th>
<th>Direct/Indirect</th>
<th>Positive/Negative</th>
<th>Temporary/Permanent</th>
<th>Summary of Mitigation/Enhancement</th>
<th>Residual Impact magnitude</th>
<th>Residual Impact significance</th>
<th>Positive/Negative</th>
<th>Temporary/Permanent</th>
<th>Confidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition (dust soiling)</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>See mitigation measures in Section 9.6 which are assumed to be inherent in the CEMP</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Temporary</td>
<td>High</td>
</tr>
<tr>
<td>Demolition (human health)</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>See mitigation measures in Section 9.6 which are assumed to be inherent in the CEMP</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Temporary</td>
<td>High</td>
</tr>
<tr>
<td>Earthworks (dust soiling)</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>See mitigation measures in Section 9.6 which are assumed to be inherent in the CEMP</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Temporary</td>
<td>High</td>
</tr>
<tr>
<td>Earthworks (human health)</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>See mitigation measures in Section 9.6 which are assumed to be inherent in the CEMP</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Temporary</td>
<td>High</td>
</tr>
<tr>
<td>Construction (dust soiling)</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>See mitigation measures in Section 9.6 which are assumed to be inherent in the CEMP</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Temporary</td>
<td>High</td>
</tr>
<tr>
<td>Construction (human health)</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>See mitigation measures in Section 9.6 which are assumed to be inherent in the CEMP</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Temporary</td>
<td>High</td>
</tr>
<tr>
<td>Trackout (dust)</td>
<td>Slight Adverse</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>See mitigation measures in Section 9.6 which are assumed to be inherent in the CEMP</td>
<td>Slight Adverse</td>
<td>Negligible</td>
<td>Negative</td>
<td>Temporary</td>
<td>High</td>
</tr>
<tr>
<td>--------------------------------</td>
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<td>-----------------------------</td>
<td>-----------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trackout (human health)</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demolition (human health)</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earthworks (dust soiling)</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earthworks (human health)</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction (dust soiling)</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction (human health)</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Assumed to be inherent in the CEMP, reducing to Negligible after 6 months, See mitigation measures in Section 9.6 which are assumed to be inherent in the CEMP.
<table>
<thead>
<tr>
<th>Changes in traffic flow around the air quality study area resulting in changes in air quality</th>
<th>Slight Adverse to Negligible</th>
<th>Direct</th>
<th>Negative</th>
<th>Permanent</th>
<th>No mitigation is proposed.</th>
<th>Negligible</th>
<th>Negligible</th>
<th>Negative</th>
<th>Permanent</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in emissions resulting from the CHP Plant associated with the proposed development</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>No mitigation is proposed. Already included in catalyst abatement system assumed for energy centre design.</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Permanent</td>
<td>High</td>
</tr>
<tr>
<td>Changes in emissions resulting from the CHP Plant combined with operational traffic</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>No mitigation is proposed. Already included in catalyst abatement system assumed in energy centre design.</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Permanent</td>
<td>High</td>
</tr>
</tbody>
</table>
Reference List


Ref-9.2 Curtins Consulting (2014), Email Communication between S. Choak and A. Danskin on the 28th of August 2014


Ref-9.4 Council of European Communities (1999), First Daughter Directive on limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air, 1999/30/EC

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Ref-9.8 Council of European Communities (2008), Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe

Ref-9.9 H.M. Government (2010), The Air Quality Standards Regulations, SI 1001, the Stationary Office

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Ref-9.29  Defra (2003), Air Quality Management Technical Guidance 2003 LAQM, TG(03)


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Ref-9.33  Laxen and Marner (2003), Analysis of Relationship Between 1-hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites

Ref-9.34  AEAT (2008), Analysis of the relationship between annual mean nitrogen dioxide concentration and exceedences of the 1-hour mean AQS Objective
10.0 Noise and Vibration

10.1 Introduction

10.1.1 This Chapter of the Environmental Statement (ES) describes the assessment of potential noise and vibration impacts associated with the proposed West Langarth development (hereafter referred to as the Proposed Development). This Chapter assesses the Proposed Development during the demolition, construction and completed development stages. In particular, it considers potential impacts on identified receptors in terms of:

- Predicted noise levels from demolition and construction;
- Noise from building services plant and operation of the completed development; and
- Any increases to road traffic attributed to the Proposed Development.

10.1.2 The Chapter also provides an assessment of the suitability of the site for the proposed uses, in terms of existing noise and vibration, and the need to provide an adequate internal and external noise environment.

10.2 Noise and Vibration Terminology

10.2.1 For the purposes of this ES Chapter, the following terminology and abbreviations will be used:

- dB(A) – The unit of noise measurement that expresses the loudness in terms of decibels (dB) based on a weighting factor for humans sensitivity to sound (A);
- Hz – Hertz;
- LA1, LA5, LA10, LA50, LA90, LA99 – A-weighted sound pressure level exceeded for 1, 5, 10, 50, 90 or 99% of the measured time;
- LAeq – Equivalent continuous A-weighted sound pressure level over a given period of time;
• LAmax – The maximum A-weighted sound pressure level over a given period of time;
• VDV – Vibration Dose Values in ms-1.75. The vibration measurement parameter that based on a form of acceleration that is frequency weighted to reflect human sensitivity to various frequencies;
• PPV – Peak Particle Velocity in millimetres per second (mm/s). The vibration measurement parameter that is usually used to describe vibration in relation to sudden impulse events;
• SWL – Sound Power Level; and
• SPL – Sound Pressure Level.

10.2.2 Where decibel (dB(A)) levels are followed by a given noise indicator (e.g. LAeq), then the annotation will read as dB LAeq.

10.3 Legislative and Policy Framework

National Planning Guidance


10.3.1 The National Planning Policy Framework (NPPF) was published on 27th March 2012. The document sets out the Government’s planning policies for England and how these are expected to be applied. As a result of the NPPF, the following noise related policy and guidance has been replaced:

• Planning Policy Statement (PPS) 23: Planning and Pollution Control; and
• Planning Policy Guidance 24: Planning and Noise (PPG24) (Ref. 1-2).

10.3.2 The NPPF provides for the production of distinctive local and neighbourhood plans by Councils, in consultation with local people, which should be developed to reflect the needs and priorities of their communities. The paragraphs from the NPPF relating to noise are set out below:

• Paragraph 109: The planning system should contribute to and enhance the natural and local environment by:
- Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.

- Paragraph 123: Planning policies and decisions should aim to:
  - Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
  - Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
  - Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
  - Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

- Paragraph 143: In preparing Local Plans, local planning authorities should:
  - Set out environmental criteria, in line with the policies in this Framework, against which planning applications will be assessed so as to ensure that permitted operations do not have unacceptable adverse impacts on the natural and historic environment or human health, including from noise, dust, visual intrusion, traffic, tip- and quarry-slope stability, differential settlement of quarry backfill, mining subsidence, increased flood risk, impacts on the flow and quantity of surface and groundwater and migration of contamination from the site; and take into account the cumulative effects of multiple impacts from individual sites and/or a number of sites in a locality; and
  - When developing noise limits, recognise that some noisy short-term activities, which may otherwise be regarded as unacceptable, are unavoidable to facilitate minerals extraction.
• Paragraph 144: When determining planning applications, local planning authorities should:
  - Ensure that any unavoidable noise, dust and particle emissions and any blasting vibrations are controlled, mitigated or removed at source, and establish appropriate noise limits for extraction in proximity to noise sensitive properties.

• Applications for planning permission must be determined in accordance with the Development Plan (which includes any local plan or neighbourhood plans which have been adopted for the area), unless material considerations indicate otherwise. The NPPF must be taken into account in the preparation of local and neighbourhood plans, and is a material consideration in the determination of planning applications. Planning policies and decision must reflect, and where appropriate, promote relevant EU obligations and statutory requirements.

• The planning system is required to contribute to and enhance the natural and local environment. Consequently, the aim is to prevent both new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution or vibration.

• Therefore planning policies and decisions should aim to:
  - Avoid noise from giving rise to significant adverse effects on health and quality of life as a result of new development;
  - Mitigate and reduce to a minimum other adverse effects on quality of life arising from noise from new development (including through the use of conditions);
  - Recognise that development will often create some noise, and balance the requirement to restrict the effects of the operational noise against the need for the development; and
  - Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.
**Planning Policy Guidance Note 24 (withdrawn)**

10.3.3 PPG24 provided guidance on planning and noise, and contained the criteria which were most widely used in the UK when determining the suitability of sites for development.

10.3.4 In addition to introducing Noise Exposure Categories (NEC), PPG24 outlined the considerations to be taken into account in determining planning applications both for noise sensitive development and for those activities that generate noise, and advised on the use of conditions to minimise the effect.

10.3.5 PPG24 guidance has been superseded by the NPPF. The NPPF makes general reference to noise and amenity but does not contain any methodology for the assessment of noise nor does its technical appendices. Therefore, the NPPF places impetus on the local authority to produce their local planning policy and make reference to guidance that should be followed. The use of the methodology contained within PPG24 remains valid in lieu of local planning policy for assessing noise effects from and upon new developments and this has been agreed in correspondence with Mark Hitchins (EHO - Cornwall Council) in a telephone conversation of 14 August 2014.


10.3.6 The Noise Policy Statement for England (NPSE) (Ref. 1-3) seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. The statement applies to all forms of noise, including environmental noise, neighbours noise and neighbourhood noise.

10.3.7 The statement sets out the long term vision of the government’s noise policy, which is to “promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development”.

10.3.8 The NPSE adopts established concepts from toxicology that are currently being applied to noise effects. The concept details noise levels, at which the effects of
an exposure may be classified into a specific category. The classification categories as detailed within NPSE are as follows:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
- Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

10.3.9 It is recognised that SOAEL does not have a single objective noise-based level that is applicable to all sources of noise in all situations; therefore the SOAEL is likely to be different for different sources, receptors and at different times of the day.

10.3.10 The first aim of the NPSE is to avoid significant adverse effects on health and quality of life, taking into account the guiding principles of sustainable development. The second aim considers situations where effects are established between the LOAEL and SOAEL. In such circumstances, all reasonable steps should be taken to mitigate and minimise the effects. However this does not mean that such adverse effects cannot occur. The third aim seeks to improve health and quality of life, where possible, through the pro-active management of noise, whilst also taking account of the guiding principles of sustainable development.

10.3.11 The Department for Environment, Food and Rural Affairs (DEFRA) have led a research contract to identify the SOAEL and LOAEL for a limited range of noise sources, however no guidance from this research has been issued at this time.
Regional and Local Planning Policy Guidance

Noise and Dust Control on Construction and Demolition Sites

10.3.12 Cornwall Council has a guidance note (Ref. 1-4) which sets out the procedures for managing the environmental impact of construction works, including noise and vibration impacts.

10.3.13 There is currently no regional planning policy guidance relating to noise. The Cornwall Local Plan Strategic Policies Document is currently in development.

British Standards

British Standard 7445

10.3.14 British Standard (BS) 7445 ‘Description and Measurement of Environmental Noise’ (Ref. 1-5) defines parameters, procedures and instrumentation required for noise measurement and analysis.

British Standard 8233

10.3.15 British Standard 8233 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’ (Ref. 1-6) provides criteria for the assessment of internal noise levels for various uses including dwellings and commercial properties.

British Standard 6472

10.3.16 British Standard 6472-1 ‘Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting’ (Ref. 1-7) presents recommended frequency weighted vibration spectra (for continuous vibration) and vibration dose values (VDV) (for intermittent vibration) above which adverse comment is likely to occur in residential properties.
British Standard 5228

10.3.17 British Standard 5228 ‘Noise and Vibration Control on Construction and Open sites’ (Ref. 1-8) provides a ‘best practice’ guide for noise and vibration control, and includes sound power level (SWL) data for individual plant as well as a calculation method for noise from construction activities.

British Standard 7385

10.3.18 British Standard 7385 ‘Evaluation and measurement for vibration in buildings’ (Ref. 1-9) presents guide values or limits for transient vibration, above which there is a likelihood of cosmetic damage.

British Standard 4142

10.3.19 British Standard 4142 ‘Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas’ (Ref. 1-10) can be used for assessing the impact of noise from mechanical services plant. The method compares the difference between ‘rating level’ of the new noise, with the ‘background level’ at the receptor position.

Other Standards and Guidance

Control of Pollution Act 1974

10.3.20 The Control of Pollution Act 1974 (CoPA) requires that ‘Best Practicable Means’ (as defined in section 72 of CoPA) (Ref. 1-11) are adopted to control construction noise on any given site. CoPA makes reference to BS 5228 as best practicable means.

Calculation of Road Traffic Noise

10.3.21 Department of Transport/Welsh Office Memorandum ‘Calculation of Road Traffic Noise (CRTN)’ (Ref. 1-12) describes procedures for traffic noise calculation, and
is suitable for environmental assessments of schemes where road traffic noise may have an impact.

**Design Manual for Road and Bridges**

10.3.22 The Highways Agency ‘Design Manual for Road and Bridges Volume 11 Section 3 Part 7-Traffic Noise and Vibration’ (DMRB) (Ref. 1-13) provides guidance on the appropriate level of assessment to be used when assessing the noise and vibration impacts arising from all road projects, including new construction, improvements and maintenance.

**World Health Organisation (WHO) Guidelines for Community Noise**

10.3.23 The WHO ‘Guidelines for Community Noise’ (Ref. 1-14) provides guidelines based on scientific knowledge about the health impacts of community noise.

**Building Bulletin 93**

10.3.24 Building Bulletin 93 (Ref. 1-15) provides guidance on suitable noise levels for nurseries to ensure that any issues likely to prevent compliance, due to basic planning and design are addressed.

**10.4 Methodology and Scope**

10.4.1 This section presents the general methodology used to assess each type of noise and vibration impact, in terms of application of the standards and guidance used, the types of data and analyses carried out and the derivation of the presented significance or compliance criteria used in the assessments.

**Description of Impact Categories**

10.4.2 The following terminology has been used in the ES to define residual impacts:

- **Adverse** – detrimental or negative impacts to an environmental resource or receptor;
10.4.3 Where adverse or beneficial impacts have been identified, these have been assessed against the following scale:

- **Minor** – slight, very short or highly localised impact of no significant consequence;
- **Moderate** – limited impact (by extent, duration or magnitude), which may be considered significant; or
- **Major** – considerable impact (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

### Ambient Noise and Vibration

10.4.4 The effect of existing external noise and vibration is assessed with respect to achieving suitable internal and external noise levels for the various uses of the Proposed Development. The assessment uses the ambient noise levels measured during the baseline survey. For school hours, only the daytime noise levels are relevant.

10.4.5 Although PPG24 has been withdrawn, it is still considered to be useful by Cornwall Council for understanding the suitability of a site for its intended use. For residential uses, PPG24 defines Noise Exposure Categories (NECs) with regards to day and night-time external noise. The categories relate to different noise bands depending on the source of noise (i.e. road, rail, air or mixed noise sources). Table 10.1 details the classification of NECs covering daytime and night-time periods for different noise sources. The values refer to the average ($L_{Aeq}$) noise level throughout the day or night-time periods respectively.
### Table 10.1 Noise Exposure Categories for New Dwellings, $L_{Aeq,T}$ (dB)

<table>
<thead>
<tr>
<th>Noise Source</th>
<th>Noise Exposure Category</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Traffic</td>
<td>07:00 – 23:00</td>
<td>&lt;55</td>
<td>55</td>
<td>63</td>
<td>&gt;72</td>
</tr>
<tr>
<td></td>
<td>23:00 – 07:00</td>
<td>&lt;45</td>
<td>45</td>
<td>57</td>
<td>&gt;66</td>
</tr>
<tr>
<td>Rail Traffic</td>
<td>07:00 – 23:00</td>
<td>&lt;55</td>
<td>55</td>
<td>66</td>
<td>&gt;74</td>
</tr>
<tr>
<td></td>
<td>23:00 – 07:00</td>
<td>&lt;45</td>
<td>45</td>
<td>59</td>
<td>&gt;66</td>
</tr>
<tr>
<td>Air Traffic</td>
<td>07:00 – 23:00</td>
<td>&lt;57</td>
<td>57</td>
<td>66</td>
<td>&gt;72</td>
</tr>
<tr>
<td></td>
<td>23:00 – 07:00</td>
<td>&lt;47</td>
<td>47</td>
<td>59</td>
<td>&gt;68</td>
</tr>
<tr>
<td>Mixed Sources</td>
<td>07:00 – 23:00</td>
<td>&lt;55</td>
<td>55</td>
<td>63</td>
<td>&gt;72</td>
</tr>
<tr>
<td></td>
<td>23:00 – 07:00</td>
<td>&lt;45</td>
<td>45</td>
<td>57</td>
<td>&gt;66</td>
</tr>
</tbody>
</table>

10.4.6 PPG24 advises that where individual night-time noise events regularly exceed 82dB $L_{A_{max}}$ it should be treated as NEC C, unless already in NEC D. Table 10.2 provides guidance relating to each NEC as given in PPG24.

### Table 10.2 Descriptive Guidance in Relation to NECs

<table>
<thead>
<tr>
<th>NEC</th>
<th>PPG 24 Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.</td>
</tr>
<tr>
<td>B</td>
<td>Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.</td>
</tr>
<tr>
<td>C</td>
<td>Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter Sites available, conditions should be imposed to ensure a</td>
</tr>
<tr>
<td>D</td>
<td>Planning permission should normally be refused.</td>
</tr>
</tbody>
</table>
**Internal Noise Levels within Buildings**

10.4.7 Criteria for provision of suitable living conditions inside dwellings are provided in BS 8233. Table 10.3 presents the desirable internal noise levels for dwellings that should not be exceeded in new developments.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Location</th>
<th>Daytime (07:00 to 23:00)</th>
<th>Night-time (23:00 to 07:00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resting</td>
<td>Living room</td>
<td>35 dB $L_{Aeq,16h}$</td>
<td>-</td>
</tr>
<tr>
<td>Dining</td>
<td>Dining room/area</td>
<td>40 dB $L_{Aeq,16h}$</td>
<td>-</td>
</tr>
<tr>
<td>Sleeping (daytime resting)</td>
<td>Bedroom</td>
<td>35 dB $L_{Aeq,16h}$</td>
<td>30 dB $L_{Aeq,8h}$</td>
</tr>
<tr>
<td>Study and work requiring concentration</td>
<td>Meeting room, executive office</td>
<td>35-40 dB $L_{Aeq,T}$</td>
<td>-</td>
</tr>
</tbody>
</table>

10.4.8 Regular individual noise events at night have the potential to disturb the sleep of inhabitants in dwellings. BS 8233 states that: “A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night”.

10.4.9 The WHO Guidelines for Community Noise provide guidance on noise levels of single noise events that may cause sleep disturbance by stating: “To avoid sleep disturbance, indoor guideline values for bedrooms are ... 45 dB $L_{Amax}$ for single sound events”. Consequently, a noise level of 45 dB $L_{Amax,F}$ has been adopted as a suitable internal noise level for impulse noise events that should not normally be exceeded at night.

10.4.10 BS 8233 provides guidance on suitable noise levels for external spaces that are used for amenity areas (e.g. gardens and patios). An upper guideline value of 55 dB $L_{Aeq,T}$ is considered to be acceptable for outdoor amenity areas.
10.4.11 Section 1 of Building Bulletin 93 defines the recommended internal noise levels for school classrooms. Noise limits are specified in terms of the $L_{A_{eq,30mins}}$ (the highest average noise level over any 30 minute period). Achieving these levels is based on the existing external noise levels, the type of external noise insulation and the level of noise from ventilation systems. The most critical noise limit is presented in Table 10.4.

### Table 10.4 BB93 Recommended Internal Noise Levels

<table>
<thead>
<tr>
<th>Application</th>
<th>Recommended Noise Level, dB $L_{A_{eq,30mins}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursery School playrooms and quiet rooms</td>
<td>35</td>
</tr>
</tbody>
</table>

10.4.12 BB 93 defines criteria for outdoor noise levels, which are given in Table 10.5 below. These criteria relate to the use of outdoor spaces for teaching and sport activities. Noise limits are again specified in terms of the $L_{A_{eq,30mins}}$.

### Table 10.5 BB93 Recommended External Noise Levels

<table>
<thead>
<tr>
<th>Application</th>
<th>Recommended Noise Level, dB $L_{A_{eq,30mins}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>No special measures required to control noise.</td>
<td>45 or less</td>
</tr>
<tr>
<td>External teaching areas.</td>
<td>50</td>
</tr>
<tr>
<td>Playgrounds, playing fields and recreational areas.</td>
<td>55</td>
</tr>
<tr>
<td>Recommended upper limit for external areas.</td>
<td>60</td>
</tr>
</tbody>
</table>

**Noise and Vibration from Construction Activities**

10.4.13 BS 5228 provides practical information on demolition and construction noise and vibration reduction measures, and promotes a ‘Best Practice Means’ approach to control noise and vibration. The calculation method provided in BS 5228 is based on the number and types of equipment operating, their associated Sound Power Level (SWL), and the distance to receptors, together with the effects of any screening.
10.4.14 There are no current national standards or guidelines that give noise limits for construction sites. BS 5228 provides some guidance on acceptable levels of construction noise. Additionally, BS 5228 provides example criteria for the assessment of significance of construction noise impacts.

10.4.15 Significance criteria for construction noise have been derived from BS5228. A semantic scale for description of the construction noise impacts on human receptors is shown in Table 10.6.

**Table 10.6 Semantic Scale for Description of Construction Noise Impacts**

<table>
<thead>
<tr>
<th>Description</th>
<th>Impact Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daytime noise levels less than existing ambient noise levels or below 65 dB(A)</td>
<td>Negligible</td>
</tr>
<tr>
<td>Daytime noise levels between 65 and 75 dB(A)</td>
<td>Minor Adverse</td>
</tr>
<tr>
<td>Daytime noise levels greater than 75 dB(A), for a total of less than 10 days in any 15-day period, or for a total of days less than or equal to 40 in any 6-month period</td>
<td>Moderate Adverse</td>
</tr>
<tr>
<td>Daytime noise levels greater than 75 dB(A), for a total of more than 10 days in any 15-day period, or for a total of days more than 40 in any 6-month period</td>
<td>Major Adverse</td>
</tr>
</tbody>
</table>

**Construction Vibration – Human Receptors**

10.4.16 BS5228 Part 2 provides further guidance on the perception of vibration within occupied buildings. This provides a simple method of determining annoyance alongside evaluation of cosmetic damage associated with vibration.

10.4.17 Table 10.7 details potential PPV levels and their potential effect on humans, and provides a semantic scale for description of construction vibration impacts on human receptors.
Table 10.7 Guidance on Human Effects of Vibration Levels (PPV)

<table>
<thead>
<tr>
<th>Vibration Level</th>
<th>Effect</th>
<th>Impact Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.14 mm/s</td>
<td>Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.</td>
<td>Negligible</td>
</tr>
<tr>
<td>0.3 mm/s</td>
<td>Vibration might be just perceptible in residential environments.</td>
<td>Minor Adverse</td>
</tr>
<tr>
<td>1.0 mm/s</td>
<td>It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.</td>
<td>Moderate Adverse</td>
</tr>
<tr>
<td>10 mm/s</td>
<td>Vibration is likely to be intolerable for any more than a very brief exposure to this level.</td>
<td>Major Adverse</td>
</tr>
</tbody>
</table>

**Construction Vibration – Structural Receptors**

10.4.18 Vibration as a result of construction activities has the potential to impact on adjacent buildings. The criteria used in this assessment relate to the potential for cosmetic damage, not structural damage. The principal concern is generally transient vibration due to piling. Cosmetic damage is most likely to occur within the first 20 metres (m) of piling activities; at greater distances damage is less likely to occur. Likely levels of vibration at given distances can be estimated from existing piling vibration data, as provided in BS 5228 Part 2.

10.4.19 BS 7385 establishes the basic principles for carrying out vibration measurements and processing the data, with regard to evaluating vibration effects on buildings. Recommended PPV vibration limits for transient excitation for different types of buildings are presented in Table 10.8.
Table 10.8 Peak Particle Velocity Limits for Cosmetic Damage

<table>
<thead>
<tr>
<th>Type of Building</th>
<th>Peak Component Particle Velocity 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vibration in Frequency Range of 4 Hz to 15 Hz</td>
</tr>
<tr>
<td>Reinforced or framed structures</td>
<td>50 mm/s at 4 Hz and above</td>
</tr>
<tr>
<td>Industrial and heavy commercial buildings</td>
<td></td>
</tr>
<tr>
<td>Un-reinforced or light framed structures</td>
<td>15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz</td>
</tr>
<tr>
<td>Residential or light commercial type buildings</td>
<td></td>
</tr>
</tbody>
</table>

1 - Values referred to are at the base of the building. 2 - At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded; mm/s – millimetres per second.

10.4.20 Where vibration experienced at structures exceeds the values shown above in Table 10.8, this would be considered to be a significant impact.

**Construction Traffic Noise**

10.4.21 Construction traffic noise has been assessed by considering the short-term increase in traffic flows on the surrounding road network during works, following the principles of CRTN and DMRB.

10.4.22 The criteria for the assessment of traffic noise changes arising from construction works have been taken from Table 3.1 of DMRB and are provided in Table 10.9.

**Table 10.9 Road Traffic Noise Assessment Criteria (Temporary Changes)**

<table>
<thead>
<tr>
<th>Noise Change Band</th>
<th>Magnitude of Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 dB(A)</td>
<td>No change</td>
</tr>
<tr>
<td>0.1 – 0.9 dB(A)</td>
<td>Negligible</td>
</tr>
<tr>
<td>1 – 2.9 dB(A)</td>
<td>Minor</td>
</tr>
<tr>
<td>3 – 4.9 dB(A)</td>
<td>Moderate</td>
</tr>
<tr>
<td>5 dB(A) or more</td>
<td>Major</td>
</tr>
</tbody>
</table>
Operational Noise

Traffic Noise

10.4.23 Operational traffic noise has been assessed by considering the long-term increase in traffic flows following completion of the Proposed Development, following the principles of CRTN and DMRB.

10.4.24 The criteria for the assessment of traffic noise changes arising from the Proposed Development have been taken from Table 3.2 of DMRB and are provided in Table 10.10.

Table 10.10 Road Traffic Noise Assessment Criteria (Permanent Changes)

<table>
<thead>
<tr>
<th>Noise Change Band</th>
<th>Magnitude of Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 dB(A)</td>
<td>No change</td>
</tr>
<tr>
<td>0.1 – 2.9 dB(A)</td>
<td>Negligible</td>
</tr>
<tr>
<td>3 – 4.9 dB(A)</td>
<td>Minor</td>
</tr>
<tr>
<td>5 – 9.9 dB(A)</td>
<td>Moderate</td>
</tr>
<tr>
<td>10 dB(A) or more</td>
<td>Major</td>
</tr>
</tbody>
</table>

Building Services Noise

10.4.25 BS4142 provides guidance as to the likely community response to new fixed noise sources (e.g. building plant or services) affecting sensitive residential receptors.

10.4.26 The rating method detailed within this standard is widely accepted by Local Authorities as a means of assessing building plant noise. The standard compares the ‘rating level’ of the new noise source with the existing ‘background level’. The greater this difference the greater the likelihood of complaints. BS4142 requires separate analysis for day and night time periods.
10.4.27 The significance of the new noise, based on this difference, is given in Table 10.11.

**Table 10.11 BS 4142 Noise Rating**

<table>
<thead>
<tr>
<th>Difference between Rating Level 1 and Background Level 2</th>
<th>BS 4142 Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10 dB(A) or less</td>
<td>Positive indication that complaints are unlikely.</td>
</tr>
<tr>
<td>+5 dB(A)</td>
<td>Marginal significance.</td>
</tr>
<tr>
<td>+10 dB(A) or more</td>
<td>Indicates complaints are likely.</td>
</tr>
</tbody>
</table>

1 - The Rating Level is the noise level attributable to the new source(s), plus a 5 dB(A) penalty if the new source has tonal or intermittent characteristics; 2 - The Background Level is taken as the $L_{A90}$; this is the ambient noise level in the absence of the source which is exceeded for 90% of the time.

10.4.28 For rating noise levels 10 dB(A) below the minimum night time background noise levels this provides a “positive indication that complaints are unlikely” and therefore equates to an impact of negligible significance.

**Baseline Noise Survey**

10.4.29 Long term automated (LT) and short term attended (ST) noise measurements were undertaken between 14th and 19th August 2014. The surveys were undertaken in order to establish the baseline noise environment across the Site and to determine background noise levels at nearby sensitive receptors. The baseline noise survey was undertaken in accordance with best practice as specified in BS 7445.

10.4.30 Noise monitoring was undertaken using Rion NL-52 Type 1 sound level meters. A Rion NC-74 Type 1 field calibrator was used to calibrate the meters before and after the measurements. No significant calibration drift was detected. The sound level meters log environmental noise measurement parameters including average ambient ($L_{Aeq}$), maximum ($L_{Amax}$) and background ($L_{A90}$) noise levels.
**Sensitive Receptors and Site Map**

10.4.31 Potential sensitive receptors in proximity to the Site which will be taken into consideration when assessing the impacts associated with noise and vibration levels from the construction and operational phases of the proposed development include:

- R1: Hawthorn Cottage and Penmore
- R2: Croftside and The Ramblers
- R3: West Langarth Farm
- R4: Trevone
- R5: Little Trenoweth
- R5: Little Regarded Farm

10.4.32 Figure 10.1 presents the site, the monitoring locations and nearest sensitive receptors. A key to the map is presented in Table 10.12. All of these are residential in nature and are therefore considered to be of high sensitivity.
### Table 10.12 Receptors and Monitoring Locations

<table>
<thead>
<tr>
<th>Map location</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position 1</td>
<td>Free field measurement position. Northern tip of proposed supermarket service yard.</td>
<td>Short term measurement position. Representative of R6</td>
</tr>
<tr>
<td>Position 2</td>
<td>Free field measurement position. East of equipment shed and due north of West Langarth Farm.</td>
<td>Both short term attended and long term unattended measurement position. Representative of R1, R2 and R3</td>
</tr>
<tr>
<td>Position 3</td>
<td>Free field measurement position. Southern boundary of site. Approximately 50m from the south eastern tip of the site.</td>
<td>Short term measurement position. Representative of R4 and R5</td>
</tr>
<tr>
<td>R1</td>
<td>Hawthorn Cottage and Penmore</td>
<td>Sensitive receptor</td>
</tr>
<tr>
<td>R2</td>
<td>Croftside and The Ramblers</td>
<td>Sensitive receptor</td>
</tr>
<tr>
<td>R3</td>
<td>West Langarth Farm</td>
<td>Sensitive receptor</td>
</tr>
<tr>
<td>R4</td>
<td>Trevone</td>
<td>Sensitive receptor</td>
</tr>
<tr>
<td>R5</td>
<td>Normadlin</td>
<td>Sensitive receptor</td>
</tr>
<tr>
<td>R6</td>
<td>Little Regarded Farm</td>
<td>Sensitive receptor</td>
</tr>
</tbody>
</table>

### Baseline Conditions

#### Noise

10.4.33 The site is located in a rural area. The noise environment of proposed development site and surrounding area is influenced predominantly by road traffic on the A390 which bounds the site to the south.

10.4.34 Liaison with Truro Airfield (approximately 850m north of the long term unattended noise monitor) revealed that one aircraft landed in the late morning and took off in the late afternoon of Tuesday 19th August.

10.4.35 Observations made on site during the attended measurements indicate that the wind turbines at Four Burrows windfarm (approximately 1 kilometre to the north) were operational.
10.4.36 A time history in terms of $L_{A90}$, $L_{Aeq}$, $L_{A10}$ and $L_{Amax}$ for the long term unattended monitoring is provided in Figure 10.2.

10.4.37 Table 10.13 presents a summary of the long term and short term monitoring results.

### Table 10.13 Noise Survey Results 14th August 2014 to 19th August 2014

<table>
<thead>
<tr>
<th>Position</th>
<th>Average Free-Field Ambient Level $L_{Aeq}$ dB</th>
<th>Typical Highest Night-time Maximum Level $L_{Amax}$ dB</th>
<th>Typical Background Level $L_{A90}$ dB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daytime (07:00 – 23:00)</td>
<td>Night-time (23:00 – 07:00)</td>
<td></td>
</tr>
<tr>
<td>1 Short Term</td>
<td>45</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>2 Short Term</td>
<td>49</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>2 Long Term</td>
<td>53</td>
<td>43</td>
<td>62</td>
</tr>
<tr>
<td>3 Short Term</td>
<td>49</td>
<td>42</td>
<td></td>
</tr>
</tbody>
</table>

**Vibration**

10.4.38 There was no subjective evidence of ambient vibration due to road traffic or other sources during Site visits. As such, ambient vibration is scoped out of this assessment.

10.5 Potential Impacts

10.5.1 This section discusses the existing ambient noise and vibration environment and the consequences of the existing conditions for the Proposed Development. Impacts to sensitive receptors associated with noise and vibration arising from the Proposed Development during the demolition, construction and operational phases are then considered.
Demolition and Construction Noise and Vibration

10.5.2 Noise and vibration levels experienced by local receptors during demolition and construction works depend upon a number of variables, the most significant of which are:

- The noise generated by plant or equipment used on Site, generally expressed as Sound Power Levels (SWL) or the vibration generated by the plant;
- The periods of use of the plant on Site, known as its on-time;
- The distance between the noise/vibration source and the receptor;
- The noise attenuation due to ground absorption, air absorption and barrier effects;
- In some instances, the reflection of noise due to the presence of hard surfaces such as the sides of buildings; and
- The nature of the ground with respect to vibration transmission.

Key construction activities are likely to comprise:

- Enabling works (site clearance, surveys, demolition, groundworks, access and spine road etc) – July 2015 to December 2015 (6 months);
- Construction (including fit out) of Retail/PFS/mixed use areas (Café & restaurants / residential [up to 40 units] etc) January 2016 to February 2017 (14 months);
- Construction of purely Residential areas (up to 90 units) – January 2016 to May 2017 (18 months);
- Construction of Community and Sports Building and sports pitches – March 2016 to March 2017 (12 months); and
- Landscaping and open space works - February 2017 to June 2017 (5 months).

10.5.3 Piling works may also be required, depending upon ground conditions and detailed construction proposals.

10.5.4 It is possible to predict noise and vibration levels, using the methodology given in BS 5228-1: 2009+A1: 2014 ‘Code of Practice for Noise and Vibration Control on Construction and Open Sites’; however, in order to do this with any accuracy
and meaning, specific details of the Site layout, plant and construction methods proposed to be used by the specific contractor are required. Therefore, at this stage, in advance of detailed Site layouts and contractor engagement, the focus is on the likelihood of potential impacts and mitigation options to minimise any impacts.

10.5.5 In terms of the likely noise impacts, the initial enabling and groundworks are likely to generate the most noise during the works. The construction and fitting out of the new buildings, plus associated landscaping are likely to result in lower noise levels. The potential for vibration impacts is likely to be limited to any piling works.

Construction Traffic

10.5.6 It is expected that construction vehicles will utilise the proposed access position. All vehicles will therefore access/egress the site via the A390.

10.5.7 A worst case two-way daily flow of 186 HGV movements has been estimated by PCL Planning for the purposes of a preliminary construction traffic noise assessment.

10.5.8 2012 baseline flow data has been provided by Curtins on 22 August 2014. For the purposes of our assessment it is assumed that HGVs make up 10% of this baseline flow. The results of the assessment reveal that the percentage increase in daily HGV flows due to construction traffic is less than 5%. Consequently in accordance with Table 10.19 above, the impact from construction traffic is assessed as negligible. Notwithstanding this, in order to ensure that significant construction traffic impacts do not occur, it is recommended that best practice measures should be adopted to control potential adverse impacts. These best practice measures are detailed in Section 10.6.
Suitability of Site

PPG24 Noise Classification Results – Proposed Development

10.5.9 The results of the baseline survey indicate that the entire site falls within Noise Exposure Category A during both the daytime and the night-time. Consequently the guidance contained within PPG24 states that:

“Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.”

Internal Noise Levels to Residential Properties

10.5.10 Noise predictions have been used to derive glazing requirements which will achieve the required $L_{Aeq,T}$ (as stated in BS 8233) of 35 dB threshold noise level for habitable rooms during the daytime and 30 dB for suitable sleeping conditions during the night.

10.5.11 To achieve the internal noise levels specified above, external noise ingress must be controlled by the building facade. Glazing recommendations are given using the $R_{w+C_{tr}}$ index, a commonly used single figure term used to specify the sound insulation requirements of facades affected by traffic noise.

10.5.12 Building regulations require that for all new residential developments, standard thermal double glazing should be installed for energy efficiency. A partially open window provides an $R_{w+C_{tr}}$ of approximately 15 dB. Thermal double glazing provides an $R_{w+C_{tr}}$ of approximately 30 dB. The results of the baseline monitoring reveal that day time noise levels at the façades of the proposed house will be 53 dB $L_{Aeq,16h}$. The attenuation required to achieve the daytime noise criterion of 35 dBA for adequate resting conditions is 18 dB. Thermal double glazing is therefore considered to provide adequate attenuation. It is recommended however that a ventilation strategy is utilised which will not compromise the acoustic performance of the glazing.
Operational Road Traffic

10.5.13 Road traffic flow data for the future baseline year and the future baseline including development traffic flows are presented in Table 10.14.

Table 10.14 Operational Road Traffic Flow

<table>
<thead>
<tr>
<th>Road Link</th>
<th>Future Baseline (2031)</th>
<th>Operational Road Traffic (2031)</th>
<th>Predicted Change in Traffic Noise Level</th>
<th>Impact Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AAWT</td>
<td>AAWT</td>
<td>dBA</td>
<td></td>
</tr>
<tr>
<td>Chacewater to Proposed Development</td>
<td>50,682</td>
<td>54,715</td>
<td>0.3</td>
<td>Negligible</td>
</tr>
<tr>
<td>Proposed Development to Langarth</td>
<td>50,682</td>
<td>56,443</td>
<td>0.5</td>
<td>Negligible</td>
</tr>
<tr>
<td>Langarth to Threemilestone</td>
<td>39,663</td>
<td>45,424</td>
<td>0.6</td>
<td>Negligible</td>
</tr>
<tr>
<td>Threemilestone to Chyvelah Vale</td>
<td>57,875</td>
<td>63,636</td>
<td>0.4</td>
<td>Negligible</td>
</tr>
<tr>
<td>Chyvelah Vale - Treliske Roundabout</td>
<td>52,409</td>
<td>58,170</td>
<td>0.5</td>
<td>Negligible</td>
</tr>
<tr>
<td>A390 Treliske Rbt - to Lowen Bre</td>
<td>68,853</td>
<td>74,614</td>
<td>0.3</td>
<td>Negligible</td>
</tr>
<tr>
<td>Lowen Bre - Treliske Lane</td>
<td>66,971</td>
<td>72,731</td>
<td>0.4</td>
<td>Negligible</td>
</tr>
<tr>
<td>Treliske Lane - Newbridge Lane</td>
<td>70,123</td>
<td>75,884</td>
<td>0.3</td>
<td>Negligible</td>
</tr>
<tr>
<td>Newbridge Lane - Former Richard Lander School</td>
<td>70,466</td>
<td>76,227</td>
<td>0.3</td>
<td>Negligible</td>
</tr>
<tr>
<td>Former Richard Lander School - Penwerris Road</td>
<td>70,117</td>
<td>75,878</td>
<td>0.3</td>
<td>Negligible</td>
</tr>
<tr>
<td>Penwerris Road - Penwethers Lane</td>
<td>66,090</td>
<td>71,851</td>
<td>0.4</td>
<td>Negligible</td>
</tr>
<tr>
<td>Penwethers Lane - Malabar Road</td>
<td>69,713</td>
<td>75,474</td>
<td>0.3</td>
<td>Negligible</td>
</tr>
<tr>
<td>Malabar Road - Dobbs Lane</td>
<td>71,710</td>
<td>77,471</td>
<td>0.3</td>
<td>Negligible</td>
</tr>
<tr>
<td>Dobbs Lane - Station Road</td>
<td>71,549</td>
<td>77,310</td>
<td>0.3</td>
<td>Negligible</td>
</tr>
<tr>
<td>East of County Hall Junction</td>
<td>52,557</td>
<td>58,318</td>
<td>0.5</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
10.5.14 It is concluded that the noise effect due to changes in road traffic flows as a result of the Proposed Development will be of negligible significance.

**Retail Car Park**

10.5.15 Noise predictions have been carried out to quantify the noise impact from the retail car park associated with the proposed supermarket. Noise measurement data from previous projects has been utilised representing the noise emissions from a typical car manoeuvring, parking and driver / passenger activities.

10.5.16 Assuming an absolute worst case scenario in which all 650 of the proposed car parking spaces are used in a single hour, noise levels predicted at the nearest residential windows approximately 100m from the centre point of the car park are no greater than 40 dBA. This predicted level is 5 dB below the lowest measured daytime $L_{Aeq,15min}$ and would only increase ambient noise levels by 1 dB. As a consequence, the predicted noise impact from the car park is assessed as negligible.

**Building Services Plant Noise**

10.5.17 Table 10.15 presents recommended operational noise limits for proposed building services plant, service yard noise and noise from supermarket deliveries experienced at nearby sensitive receptors and the on-site receptors. These operational noise limits were derived from background noise measurements presented in Table 10.13 and noise criteria presented in Table 10.11.

10.5.18 It is assumed that the plant will operate as intended and will not be tonal or impulsive in nature. Should the noise exhibit any acoustic features such as a continuous note (whine, hiss, screech, hum, etc.) or contain distinct impulses (bangs, clicks, clatters or thumps) then a 5 dB penalty should be imposed as described in BS 4142. Noise limits have been capped to a minimum rating noise level of 35 dB $L_{Aeq,T}$, which is described as ‘very low’ in BS 4142.
Table 10.15 Recommended Operational Noise Limits for Noise Sensitive Properties

<table>
<thead>
<tr>
<th>Receptor Group</th>
<th>Daytime (07:00-23:00) Operational Noise Limit $L_{Aeq,1h}$ dB</th>
<th>Night-time (23:00-07:00) Operational Noise Limit $L_{Aeq,5min}$ dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>All receptors</td>
<td>35*</td>
<td>35*</td>
</tr>
</tbody>
</table>

* capped to a minimum noise limit of 35 dB

10.5.19 As the building services plant will be designed to achieve the recommended limits shown in Table 10.15; operational building services noise effects are assessed as negligible at all receptors.

Sports Fields

10.5.20 The final Illustrative Masterplan (1111_100) and the final Parameters Plan (1111_010) issued for the proposed development indicates that there are three sports pitches proposed at the western end of the site. Due to the separation between the pitches and existing receptors (West Langarth Farm), there is a possibility for noise from sports activities to have an adverse noise impact. It is anticipated that the magnitude of any adverse impact would be no more than slight and that mitigation measures could be employed to reduce this to negligible.

Summary of Impacts

10.5.21 A summary of the construction and operational noise and vibration impacts is presented in Table 10.16.
Table 10.16 Summary of Impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Receptor Sensitivity</th>
<th>Direct or Indirect</th>
<th>Positive/ Negative</th>
<th>Permanent/ Temporary</th>
<th>Magnitude</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demolition and Construction Noise and Vibration</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Slight</td>
<td>Negligible to minor</td>
</tr>
<tr>
<td>Construction Traffic</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Operational</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Car Park</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Fixed Plant</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Sports Fields</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Slight</td>
<td>Negligible to minor</td>
</tr>
</tbody>
</table>

10.6 Mitigation Measures

Demolition and Construction Noise and Vibration

10.6.1 The preferred approach for controlling construction noise and vibration is to reduce levels at source where possible, but with due regard to practicality. Sometimes a greater noise level may be acceptable if the overall demolition/construction time, and therefore length of disruption, is reduced.

10.6.2 Noise and vibration will be managed to reduce effects, and mitigation measures will be documented via a Construction Environmental Management Plan (CEMP). On-Site, good practice procedure will be followed in order to mitigate noise and vibration effects. Measures to be considered include:

- Use of hoarding around the work Site perimeter to assist in the screening of noise generation from low-level sources;
- Hydraulic techniques for breaking to be used in preference to percussive techniques where practical;
- Use of rotary bored rather the driven piling techniques, where possible and where there is a risk of vibration induced building damage;
• Off-Site pre-fabrication to be used, where practical;
• All plant and equipment to be used for the works to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use;
• Plant to be certified to meet relevant current legislation as defined by BS 5228 standards;
• All Contractors to be made familiar with current legislation and the guidance in BS 5228 (Parts 1 and 2), which should form a prerequisite of their appointment;
• Loading and unloading of vehicles, dismantling of Site equipment such as scaffolding or moving equipment or materials around the Site to be conducted in such a manner as to minimise noise generation and where practical to be conducted away from noise sensitive areas;
• Deviation from approved method statements to be permitted only with prior approval from the lead Contractor and other relevant parties. This should be facilitated by formal review before any deviation is undertaken; and
• Noise complaints to be reported to the Contractor and immediately investigated.

10.6.3 In addition, it is recommended that the construction contractor should be a member of the ‘Considerate Constructors Scheme’ which is an initiative open to all contractors undertaking building work.

10.6.4 It is also recommended that the construction schedule is designed so that high noise and vibration emitting activities are not undertaken at the closest approach to nearest receptors for a full working day. By undertaking such works at the closest approach for shorter time periods over a working day this will reduce the overall impact upon receptors located in close proximity to the Site.

**Construction Traffic Noise Mitigation**

10.6.5 Although construction traffic noise is unlikely to be significant, it is recommended that the following measures are employed as best practice:
• Vehicles employed for any activity associated with the construction works will, where reasonably practicable, be fitted with effective exhaust silencers and shall be maintained in good working order and operated in a manner such that noise emissions are controlled and limited as far as reasonably practicable;
• Time slots are adopted for deliveries to ensure that convoys of vehicles do not arrive simultaneously and to avoid unnecessary idling on Site;
• Strict control to prevent temporary parking on kerbside in the vicinity of noise sensitive receptors near the Site; and
• The use of sufficient clear signage to ensure that construction vehicles use only designated routes.

Operational Phase

Sports Fields

10.6.6 At present there is no information regarding the intensity of sports activities proposed. There are however a range of mitigation measures that could be utilised to reduce any adverse effects. Noise control measures could include:

• Controls over of the hours of use
• Barriers

10.6.7 It is considered that any adverse impact from noise associated with the sports pitches could be mitigated to negligible.

10.6.8 No other mitigation measures are deemed to be necessary to control noise impact in relation to the operation of the proposed development.

10.7 Residual Impacts

10.7.1 A summary of residual impacts is tabulated below.
Table 10.17 Summary of Residual Impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation / Enhancement</th>
<th>Residual Impact Magnitude</th>
<th>Residual Impact Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demolition and Construction</td>
<td>Good practice procedures</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Noise and Vibration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operational</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic</td>
<td>None</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Car Park</td>
<td>None</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Fixed Plant</td>
<td>None</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Sports Fields</td>
<td>Operational controls and /</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>or barriers</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10.8  Cumulative effects

10.8.1 Other schemes that have been considered in conjunction with the proposed development include:

- The consented Langarth Farm proposal including the Stadium (PA11/06124 and for Stadium PA11/06125 plus PA12/09036);
- The Maiden Green proposal minus the supermarket (PA14/00703);
- The Willow Green proposal minus the supermarket (PA13/10454);
- The consented proposal for land between A390, the P&R and Willow Green Farm - PA12/11527;
- Pollards proposal – subject of current outline application (PA14/03065) – this app proposes up to 78 units and is expected to make up for a shortfall on the wider Langarth site which has permission for up to 1,500 units; and
- Former Richard Lander School redevelopment (approved PA12/10941 / live amended application PA14/05421) – essentially the same scheme as both apps propose 226 dwellings.

Construction Phase

10.8.2 Based on previous studies, schemes that are within 200m of the Site can give rise to a potential noise impact should demolition and construction works take place simultaneously on all sites.
10.8.3 Of the above listed developments, only the Pollards proposal and the consented Langarth Farm proposal are within 200m of the Site.

10.8.4 The precise scale of additional noise effects will be dependent on the exact works taking place at each location; however the introduction of site hoardings and compliance with the mitigation measures detailed within this chapter will reduce these effects. It has been assumed that the other developments will also incorporate best available mitigation measures during their demolition and construction phases.

10.8.5 Detailed assessments of construction noise are not available for all of the cumulative schemes so it is not possible to undertake a quantitative assessment of the cumulative noise effects. However, the number of proposed developments in the surrounding area means that cumulative construction effects may occur. Particular care should be taken to ensure that individual receptors are not subject to significant adverse cumulative levels of demolition/construction noise. This can be achieved through scheduling of construction activities to ensure that they are undertaken at locations which maximise the separation distance between sites at which simultaneous constructions activities are taking place to ensure that potential cumulative construction noise effects are minimised.

**Operational Phase**

**Building Services**

10.8.6 Due to the distances between the cumulative schemes and the nearest receptors, it is considered that the operational noise limits advised in the noise assessments for each scheme would not be exceeded with all developments in operation.

10.8.7 Overall, it is considered that cumulative building services noise would be of negligible significance.
Operational Traffic Noise

10.8.8 With reference to the traffic noise assessment criteria for permanent changes from Table 10.10, the increase in noise due to operational traffic is anticipated to be limited to a negligible impact along all relevant road links.

10.9 Summary and Conclusions

10.9.2 A summary of noise and vibration impacts is presented below in Table 10.18.
### Table 10.18: Summary of Noise and Vibration Impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Impact Significance</th>
<th>Direct/Indirect</th>
<th>Positive/Negative</th>
<th>Temporary/Permanent</th>
<th>Summary of Mitigation/Enhancement</th>
<th>Residual Impact Magnitude</th>
<th>Residual Impact Significance</th>
<th>Positive/Negative</th>
<th>Temporary/Permanent</th>
<th>Confidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition and Construction Noise and Vibration</td>
<td>Negligible to minor</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Good practice measures</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Temporary</td>
<td>High</td>
</tr>
<tr>
<td>Construction Traffic</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>None</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Temporary</td>
<td>High</td>
</tr>
<tr>
<td>Operational Traffic</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>None</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Permanent</td>
<td>High</td>
</tr>
<tr>
<td>Car Park</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>None</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Permanent</td>
<td>High</td>
</tr>
<tr>
<td>Fixed Plant</td>
<td>Negligible</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>None</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Permanent</td>
<td>High</td>
</tr>
<tr>
<td>Sports Fields</td>
<td>Negligible to minor</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Operational controls and / or barriers</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Permanent</td>
<td>High</td>
</tr>
</tbody>
</table>
References

Ref. 1-1 Department for Communities and Local Government (DCLG) (2012); National Planning Policy Framework.
Ref. 1-3 Department for Environment, Food and Rural Affairs (2010); Noise Policy Statement for England (NPSE).
Ref. 1-4 Cornwall Council, Public Health and Protection (2010), Guidance Note - Noise and Dust Control on Construction and Demolition Sites
Ref. 1-5 British Standards Institute, (1991); BS7445 - Description and Measurement of Environmental Noise. Part 2: Guide to the Acquisition of Data Pertinent to Land Use, BSi, London.
Ref. 1-6 British Standards Institute, (2014); BS8233 - Code of Practice for Sound Insulation and Noise Reduction for Buildings, BSi, London.
Ref. 1-9 British Standards Institute, (1990); BS7385 - Evaluation and Measurement from Vibration in Buildings, BSi, London.
Ref. 1-11 Her Majesty’s Stationary Office, (1974); Section 72 of the Control of Pollution Act.
Ref. 1-12 Department of Transport/Welsh Office, (1998); Calculation of Road Traffic Noise.
Ref. 1-15 Department for Education and Skills (DfES) (2006); Building Bulletin 93 ‘Acoustic Design of Schools’
11.0 Water Resources, Flood Risk and Drainage

11.1 Introduction

11.1.1 The following chapter provides an assessment of the proposed development in relation to water resources, flood risk, water quality and surface water drainage. Where changes to the base line are identified the assessment proposes mitigation and enhancements.

11.1.2 The description of the site is outlined in Section 3 of the Environmental Statement.

11.2 Legislative and Policy Framework

11.2.1 The ‘Technical Guidance to the National Planning Policy Framework’ (TGNPPF), published in March 2012 by the Department for Communities and Local Government, defines the requirement for a Flood Risk Assessment. The guidance document TGNPPF defines Flood Zone 1 as ‘land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding’.

11.2.2 The site lies within the administrative area of Cornwall Council. Cornwall Council is the Local Planning Authority (LPA) that controls flood risk and surface water management through policies 13H and 13I of the Carrick District Local Plan 1998 and the saved policies of the Cornwall Structure Plan 2004.

11.2.3 The Environment Agency publication ‘Groundwater Protection: Principles and Practise (GP3), August 2013’ has been considered in relation to the proposed development.

11.3 Methodology and Scope

11.3.1 The Source-Pathway-Receptor model, used within this assessment, looks to initially identify, from a review of local conditions, the cause(s) or ‘Source(s)’ of
flood risk to and arising from a development. The presence of a source of flooding does not always imply a risk. It is the flooding mechanism(s) or 'Pathway(s)' that determines the risk to the Receptor and the extent of any consequence.

11.3.2 Receptors include any people or structures within the range of the Source which are also connected to the Source by a viable Pathway. The varying effect of flooding on the 'Receptor' is subject to its sensitivity, for example if the Receptor is permanently occupied, such as a residential property, or partially occupied, such as an office building.

11.3.3 In order for there to be a flood risk, all elements of the model must be present and connected. It therefore follows that effective mitigation can be provided by removing one element of the model, for example removing the Pathway or Receptor.

11.3.4 The degree of environmental impacts are generally described in terms such as substantial, moderate, slight and negligible. There are no known published 'significance' criteria for assessing the effects on the water environment by new development. Therefore, the significance of an effect has been determined from criteria developed from best practice techniques and specialist experience.

11.3.5 The significance of an effect is derived from measures of magnitude or scale of impact, the sensitivity of the resource, the nature of the receptor, estimated duration of impact and the predicted change in relation to the baseline.

11.3.6 In the case of this assessment the following criteria have been adopted, Table 11.1 below refers.
The assessment has primarily taken the form of a summary desk-study with baseline data obtained from the following sources.

- Ordnance and Topographical Survey mapping
- Environment Agency Flood Data Map, Historic Flood Map and Detailed River Network Map
- British Geological Survey mapping
- South West Water sewer records.

### 11.4 Baseline Conditions

#### Existing Catchment Characteristics

11.4.1 The site comprises an area of approximately 17.64 ha of sloping agricultural land. To the south the site is bounded by West Langarth Farm, a number of isolated properties and the A390 road corridor. The remaining three sides of the development are bounded by agricultural fields. The eastern boundary abuts the consented Langarth mixed use development.
11.4.2 From detailed topographical survey, contours indicate a general fall from south west to north east (at a gradient varying between 1 in 9 and 1 in 20) across the majority of the site.

11.4.3 Site levels range from 107.0 to 80.0 m AOD with the highest elevations located alongside the A390 and the lowest along the northern boundary.

11.4.4 The Langarth Stream, a tributary to the River Kenwyn and designated as a Secondary River, is located to the east of the site at a lower elevation.

11.4.5 To the north of the site a tributary to the Langarth Stream runs generally in a west to east direction at a lower elevation. The watercourse is designated as a tertiary river and six contributory sources are identified within a 500 m radius of the approximate site centre. It is likely that these sources are springs / issues associated with the geology of the area.

11.4.6 A review of the publically available Environment Agency Flood Data Map indicates that the site is within Flood Zone 1.

11.4.7 No historic flood events have been identified or recorded on the Environment Agency Historic Flood Map for the site or watercourses within the vicinity.

11.4.8 The British Geological Society (BGS) Flood Data suggests no susceptibility to groundwater flooding across the majority of the site. To the north, a narrow tract of land associated with the tertiary river is shown to have potential for groundwater flooding.

11.4.9 The site is located along a ridge and unlikely to experience overland flow from adjacent land.

11.4.10 No artificial sources or structures such as reservoirs or culverts / bridges are identified, on the Environment Agency River Network Map, within or adjacent to the site.
11.4.11 The determined Receptors are summarised in Table 11.2 below.

**Table 11.2 Receptors**

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Receptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (International/National)</td>
<td>-</td>
</tr>
<tr>
<td>Moderate (Regional)</td>
<td>River Kenwyn</td>
</tr>
<tr>
<td>Low (Local)</td>
<td>Langarth Stream / Groundwater</td>
</tr>
</tbody>
</table>

11.5 Identification and Evaluation of Key Likely Impacts

**Construction**

11.5.1 There are a number of construction activities that have the potential to impact upon water resources (including water quality), flood risk and drainage during the construction phase of the proposed development. The potential impacts identified comprise:

- Siltation of local watercourses in the locality/downstream as a result of high suspended solids content within surface water runoff due to excavation / deposition of earthwork materials.
- Pollution of local watercourses and groundwater as a result of oil / fuel / chemical / construction materials (eg. cement based) spillages from construction processes.
- Increased flood risk due to increased surface water runoff resulting from interim completion of impermeable surfaces and corresponding attenuation facilities.

11.5.2 During earth moving operations there is the potential for surface water runoff to transport suspended solids, attributable to mud and dust, within overland flow into the local watercourse / Langarth Stream. This is considered to have a slight adverse effect due to ability to reverse the effect by de-silting.
11.5.3 Both groundwater and open watercourses are vulnerable to pollution as a result of accidental spillages of oil / fuel / chemical / construction materials. If groundwater and/or the Langarth Stream were exposed to pollution in this way then it is considered this would have a moderate adverse effect.

11.5.4 If the approved SUDs are not implemented prior to the construction of the impermeable areas, associated with the development, there is a risk that there will be a short term increase in the rate and volume of runoff into the adjacent watercourses. This may temporarily increase flood risk to downstream land owners and therefore represents a moderate adverse effect.

**Operational**

11.5.5 The operation of the proposed development has the potential to result in changes to the current drainage regime and effect water resources in the following ways:

- Substantial increase in impermeable surface area would increase surface water runoff and could result in increased flooding within the locality / downstream.
- Pollution of groundwater / watercourses due to increase in pollutants within surface runoff from paved areas related to vehicle parking areas and the petrol filling station.
- Reduction in nutrient rich runoff attributable to crop fertilisers.
- Reduction in chemical rich runoff attributable to pesticides

11.5.6 A substantial impact for any development is the increased impermeability of a site and the subsequent increase in surface water runoff generated during rain fall events. If not appropriately dealt with this could lead to increased flooding in the locality/downstream. Potentially, the impact of this activity without mitigation would have a moderate adverse effect on the environment.

11.5.7 As with the construction phase there is a risk of pollution to groundwater and watercourses from fuel / oil or chemical leaks and spillages. These can range
from fuel and oil leaking from vehicles on private parking areas to road traffic accidents resulting in ruptured fuel tanks. The proposed Petrol Filling Station also poses a potential source of pollution in the event of a spillage / accident. Without careful design and incorporation of sustainable urban drainage systems the impact on groundwater and watercourses is considered to be moderate adverse.

11.5.8 It can be assumed, generally, that agricultural land will entail the spraying or dressing of crops with pesticides and fertilisers and that the residual chemicals associated with these processes will enter an adjacent watercourse. This will provide a nutrient rich environment, which will encourage the growth of algae and reduce the oxygen content of the water. By removing the source of these pollutants a moderate beneficial impact would result.

Table 11.3 Summary of Impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Receptor Sensitivity</th>
<th>Direct or Indirect</th>
<th>Positive/ Negative</th>
<th>Permanent/ Temporary</th>
<th>Magnitude</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Suspended Solids in surface water runoff</td>
<td>Minor</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>slight</td>
<td>Minor</td>
</tr>
<tr>
<td>Spillages</td>
<td>Minor</td>
<td>Indirect &amp; Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>moderate</td>
<td>Minor</td>
</tr>
<tr>
<td>Increased Impermeable Area</td>
<td>Minor</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>moderate</td>
<td>Minor</td>
</tr>
<tr>
<td><strong>Operational</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substantial increase in impermeable area</td>
<td>Minor</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>moderate</td>
<td>Minor</td>
</tr>
<tr>
<td>Increase in pollutants due to surface water runoff</td>
<td>Minor</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>moderate</td>
<td>Minor</td>
</tr>
<tr>
<td>Reduction in fertilizer and pesticide runoff</td>
<td>Minor</td>
<td>Direct</td>
<td>Positive</td>
<td>Permanent</td>
<td>moderate</td>
<td>Minor</td>
</tr>
</tbody>
</table>
11.6 Mitigation Measures

Construction Phase

11.6.1 As with all site works the Contractor is responsible for complying with current legislation and guidelines. Construction Site Management shall be employed to protect both the groundwater and local watercourses and all works shall be undertaken in line with the recommendations of Pollution Prevention Guidelines (PPG) 5 ‘Works in, near or liable to affect watercourses’ and (PPG) 6 ‘Working at Construction and Demolition Sites’. With careful site practises the identified impacts associated with the construction phase can be avoided or quickly mitigated with appropriate spill kits. A Construction Environmental Management Plan (CEMP) shall be prepared at an early stage of the product and regularly updated / revised to take account of new information or scheme changes.

11.6.2 To ensure that surface water flows are controlled during the construction process the infiltration / attenuation facilities shall be designed, constructed and operational prior to the construction of hard surfaced area which will drain to those facilities.

Operational Phase

11.6.3 Detailed design of any development will look to address and mitigate impacts attributable to the operation of the site and its associated infrastructure.

11.6.4 Construction of paved surfaces will increase both the impermeable area of the site and the corresponding surface water runoff volume. With adherence to current policy and best practice guidelines, surface water systems can either be designed to infiltrate surface water runoff or store it and release it at the undeveloped Greenfield rate.

11.6.5 To mitigate against this impact the surface water drainage strategy incorporates a variety of sustainable drainage measures (including retention basins,
soakaways and permeable paving). These measures should retain the surface water generated within the site boundary and infiltrate it into the ground to recharge groundwater baseflow or store it and discharge it at a restricted rate equivalent to the 1 in 1 year Greenfield runoff rate for the undeveloped site.

11.6.6 The proposed systems will be designed to accommodate surface water runoff for all rainfall events up to and including the 1 in 100 year event plus an additional allowance of 30% to take account of the possible effects of climate change up to the year 2115.

11.6.7 With regard to the potential impact of pollution of groundwater and watercourses stemming from spillages / accidents, with correct design the contaminants can be captured, maintained and treated onsite. In particular the retail car parking and petrol filling station shall follow the guidance set out within the Environment Agency document ‘Use and design of oil separators in surface water drainage systems: PPG3’ and incorporate a petrol interceptor.

11.7 Residual Impacts

Construction Phase

11.7.1 With the correct site management (through implementation of a CEMP and SWMP) and adherence to current guidance it is considered that the first two construction impacts identified will have a negligible impact on the site or surroundings.

11.7.2 In relation to the third construction impact identified, with correct programming of the works the effect would be negligible.

Operational Phase

11.7.3 With correct design of the infiltration facilities the operational impacts identified can be reduced. With adherence to current policy, for example the ‘Flood and Water Management Act 2010’, and design guidelines, such as Ciria C697 ‘The
SUDS Manual’, it is considered that a **negligible** impact would be achieved for both surface water runoff and water quality.

### Table 11.4 Summary of Residual Impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation / Enhancement</th>
<th>Residual Impact Magnitude</th>
<th>Residual Impact Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suspended solids</td>
<td>Use of current best practice</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Spillages</td>
<td>Use of current best practice</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Increased runoff from impermeable areas</td>
<td>Suds structures to be constructed and completed at an early stage of the development</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Operational</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased runoff</td>
<td>Use of Suds to intercept flows and infiltrate them to recharge groundwater or attenuate them with a restricted discharge rate equivalent to the 1 in 1 year greenfield runoff rate for the undeveloped site.</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Increased pollutants attributable to parking areas</td>
<td>Use of Suds to improve water quality</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Reduction in pollutants from agricultural land</td>
<td>Reduction of pollutants within watercourse</td>
<td>Minor Positive</td>
<td>Slight Beneficial</td>
</tr>
</tbody>
</table>

### 11.8 Cumulative effects

11.8.1 Cumulative effect is considered to be the result of many small effects on a receptor which individually make little or no difference, however once multiplied from a number of schemes can be sufficient to cause a noticeable change.

11.8.2 It is therefore important in defining the likely cumulative effects to consider the topography of the individual sites and its interaction, the relevant activities and the thresholds of sensitivity of the existing environment.

11.8.3 The prediction and evaluation of cumulative effects is not straightforward as the relationship between developments is potentially complex and subject to change if schemes are postponed or amended. In addition, the publically
available information for individual sites will be varied in detail depending upon their scale and development programme.

11.8.4 Developments that have been considered within this assessment comprise the following:

- Consented Langarth Farm (incl. Stadium) PA11/06124, PA11/06125 & PA12/09036
- Maiden Green proposal (minus supermarket) PA14/00703
- Willow Green proposal (minus the supermarket) PA13/10454
- Pollards Outline application PA14/03065
- Consented Former Richard Lander School redevelopment PA12/10941

11.8.5 After a review of the Flood Risk Assessments submitted with the planning applications it is noted that the sites within the catchment of Langarth Stream utilise a combination of infiltration and attenuation to mitigate their impact.

**Construction Phase**

11.8.6 With correct site management the cumulative effect of spillages and high suspended solids on the downstream watercourse will be negligible.

11.8.7 With the enforcement of CEMP’s through the planning process the risk of interim flooding associated with the construction of impermeable areas can be mitigated by the commissioning of surface water systems at the outset of the development.

**Operational Phase**

11.8.8 All the developments which contribute to the Langarth Stream catchment are proposed to incorporate Sustainable Drainage Systems comprising infiltration and attenuation.
11.8.9 With the combined surface water systems designed in accordance with current best practice the cumulative adverse effect on the downstream watercourse should be negligible.

11.8.10 In addition, where sites are currently classified as agricultural there will be a net reduction in residues from pesticides and fertiliser entering the watercourse.

**11.9 Summary and Conclusions**

11.9.1 A Flood Risk Assessment has been undertaken and the proposed development would neither be at risk of flooding nor increase the risk of severity of flooding elsewhere.

11.9.2 A surface water drainage strategy has been prepared, which incorporates sustainable drainage systems measures, to mitigate against any adverse effects relating to surface water runoff rates and volumes from the proposed development.

11.9.3 The proposed SUDS measures will be designed to accommodate surface water runoff for all rainfall events up to and including the 1 in 100 year event plus an allowance 30% to take account of the possible effects of climate change up to the year 2115.

11.9.4 Surface water runoff from the proposed development will be retained and infiltrated into the underlying strata or discharged at the greenfield runoff rate associated with the undeveloped site. Therefore flows to Langarth Stream, a tributary to the River Kenwyn, should not be increased.

11.9.5 With careful adherence to current design guidelines there should be no detrimental impact on flood risk or surface water quality.

11.9.6 It is concluded from this assessment that there should be a negligible impact on the environment, in terms of water resources, flood risk and drainage, as a result of the development proposals.
Table 11.5 Summary of Flood Risk and Drainage Impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Impact Significance</th>
<th>Direct / Indirect</th>
<th>Positive / Negative</th>
<th>Temporary / Permanent</th>
<th>Summary of Mitigation / Enhancement</th>
<th>Residual Impact magnitude</th>
<th>Residual Impact significance</th>
<th>Positive / Negative</th>
<th>Temporary / Permanent</th>
<th>Confidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary silt and nutrient build up within watercourse</td>
<td>Minor</td>
<td>Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Careful site management and adherence to procedures, use of CEMP</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Temporary</td>
<td>High</td>
</tr>
<tr>
<td>Pollution of watercourse during construction period</td>
<td>Moderate</td>
<td>Indirect &amp; Direct</td>
<td>Negative</td>
<td>Temporary</td>
<td>Careful site management and adherence to procedures</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Temporary</td>
<td>High</td>
</tr>
<tr>
<td>Increase in surface water runoff rate and volume</td>
<td>Moderate</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Development incorporates sufficient sustainable drainage systems to intercept, attenuate and infiltrate surface water generated within the site boundary. Systems will contain flows up to the 1 in 100 year event plus 30% climate change factor. Overall impact results in water retained for longer in upstream catchment.</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Positive</td>
<td>Permanent</td>
<td>High</td>
</tr>
<tr>
<td>Pollutants entering watercourse</td>
<td>Moderate</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Use of pollution control systems such as porous paving</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negative</td>
<td>Permanent</td>
<td>High</td>
</tr>
<tr>
<td>Reduction in nutrient / chemical rich runoff entering watercourse</td>
<td>Minor</td>
<td>Direct</td>
<td>Positive</td>
<td>Permanent</td>
<td>Not Applicable</td>
<td>Slight Beneficial</td>
<td>Slight Beneficial</td>
<td>Positive</td>
<td>Permanent</td>
<td>High</td>
</tr>
</tbody>
</table>
12.0 Material Assets – Cultural Heritage

12.1 Introduction

12.1.1 This chapter relating to cultural heritage (Material Assets) has been prepared by CgMs Consulting and provides an assessment of cultural heritage resources on the application site and within its immediate surroundings (1km radius), and considers the impacts of the proposed development at West Langarth, Threemilestone, Truro, Cornwall, on these resources.

12.1.2 This chapter describes the methods used to establish baseline conditions currently existing on the application site; the methodology used to determine potential impacts and the mitigation measures required to prevent, reduce or offset (where possible) any significant adverse impacts; and the likely residual impacts after these measures have been implemented.

12.1.3 Cultural heritage includes a wide range of features resulting from human intervention in the landscape, varying in scope from buried archaeological remains up to late 20th century industrial structures. Cultural heritage can be divided into the following two categories:

**Archaeology**

- Scheduled Ancient Monuments (SAMs) (statutory)
- World Heritage Sites (WHS) (non-statutory)
- Archaeological finds and sites (non-statutory)

**Built Heritage**

- Listed Buildings (Grades I, II* and II) (statutory)

12.1.4 Conservation Areas, Registered Historic Battlefields, Registered Parks and Gardens, and Shipwrecks are not considered within this chapter because there are no such designations within, or adjacent to the application site.
12.2 Legislative and Policy Framework

12.2.1 The following provides a summary of legislation, national planning policy and development plan policy relevant to the environmental effects under consideration, further detail of which are provided in Chapter 3 – Planning Policy Framework and Volume 3 – Technical Appendix 12.1:

- **Statutory Framework**
  - The Planning (Listed Building and Conservation Areas) Act 1990 Section 66(1), Section 69 and Section 72

- **National Plan Policy**
  - Section 12 Conserving and Enhancing the Historic Environment of the National Planning Policy Framework (NPPF);
  - National Planning Practice Guidance (NPPG);

- **Development Plan Policy**
  - Carrick District Council Local Plan (adopted April 1998):
    - Policy 4S
    - Policy 4T
    - Policy 4U
  - Cornwall Local Plan 2010-2030 Strategic Policies Pre Submission Version (Consultation Draft Published 2013) emerging policy:
    - Policy 24 Historic Environment Core Policy 30

12.3 Methodology and Scope

12.3.1 This section provides an assessment of the method(s) used to establish the baseline and sources of baseline data.

12.3.2 To inform the preparation of this chapter, an Archaeological Desk-Based Assessment was undertaken in August 2014 (Volume 3 – Technical Appendix 12.1). This was implemented in accordance with the Institute for Archaeologists (IfA) ‘Standard and Guidance for Historic Environment Desk-Based Assessment’ (IfA 2012), and included a walkover survey of the application site and visits to...
all heritage assets within a 1km search radius relating to its immediate surroundings.

**Relevant Guidance**

12.3.3 Assessment of impact on cultural heritage resources by the proposed scheme has been conducted in line with the latest and most comprehensive guidance, these provided in:

- “Design Manual for Roads and Bridges Volume 11; Section 3; Part 2 ‘Cultural Heritage’” (DMRB) published by the Highways Agency in 2007;
- Planning Policy Statement 5: Historic Environment Planning Practice Guide published by Department for Communities and Local Government, Department for Culture, Media and Sport and English Heritage 2010;
- Conservation Principles, Policies and Guidance published by English Heritage 2008;
- Annex 1 of 'Scheduled Monuments: Identifying, protecting, conserving and investigating nationally important archaeological sites under the Ancient Monuments and Archaeological Areas Act 1979' that sets out a series of criteria against which the national importance, or otherwise, of any recorded archaeological remains can be judged;
- The draft “Good Practice Guide in Planning” published by English Heritage in July 2014, which has been prepared to replace their existing Planning Policy Statement 5: Historic Environment Planning Practice Guide; and

12.3.4 These documents do not provide a prescriptive approach to assessment but identify principles and good practice that have been applied in the methodology for this assessment.
Study Area

12.3.5 In order to identify the potential heritage assets that may be affected by proposed development, a 1km radius of the application site (the study area) was examined.

Sources of Information

12.3.6 The following data sources have been used in the compilation of baseline data with data from within a 1km radius of the application site reviewed:

- Cornwall and Scilly Historic Environment Record (HER);
- English Heritage National Monument Record, Swindon (NMR);
- English Heritage National Heritage List (NHL);
- English Heritage Schedule of Ancient Monuments;
- English Heritage's Register of Battlefields;
- English Heritage's Register of Historic Parks and Gardens;
- Cornwall Record Office and Local Studies Library;
- Published/unpublished sources; and
- Site inspection and map regression exercise.

12.4 Assessment Criteria and Assignment of Significance

Receptor Sensitivity/Value

12.4.1 The sensitivity of a cultural heritage asset will depend on factors such as the condition of the asset and the perceived heritage value/importance of the asset. The sensitivity of the receptor (heritage asset) is defined by its importance in terms of national, regional or local statutory or non-statutory protection and grading of the asset. The non-statutory criteria used by the Secretary of State for Scheduling Ancient Monuments provide relevant criteria to assist this process, as does the advice contained at paragraphs 113 to 124 of the English Heritage Historic Environment Planning Practice Guide. Table 12.1 below sets out the criteria for assessing sensitivity.
### Table 12.1 Criteria for assessing sensitivity of receptors

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Receptor</th>
<th>Receptor characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td>World Heritage Sites (WHS)</td>
<td>The receptor has little ability to absorb change without fundamentally altering its present character, or is of international or national importance</td>
</tr>
<tr>
<td></td>
<td>Scheduled Ancient Monuments (SAMs) and Areas of Archaeological Importance;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Archaeological sites of schedulable quality &amp; importance;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Listed buildings and their settings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Registered Historic Landscapes and their settings</td>
<td></td>
</tr>
<tr>
<td><strong>Moderate</strong></td>
<td>Local Authority designated sites e.g. Conservation Areas and their settings;</td>
<td>The receptor has moderate capacity to absorb change without significantly altering its present character, or is of high importance</td>
</tr>
<tr>
<td></td>
<td>Undesignated sites of demonstrable regional importance</td>
<td></td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>Sites with specific and substantial importance to local interest groups;</td>
<td>The receptor is tolerant of change without detriment to its character, is of low or local importance</td>
</tr>
<tr>
<td></td>
<td>Sites whose importance is limited by poor preservation and poor survival of contextual associations</td>
<td></td>
</tr>
<tr>
<td><strong>Negligible</strong></td>
<td>Sites with no surviving archaeological or historic component</td>
<td>-</td>
</tr>
<tr>
<td><strong>Unknown</strong></td>
<td>Importance cannot be ascertained</td>
<td>-</td>
</tr>
</tbody>
</table>

**Magnitude of Impact**

12.4.2 The determination of magnitude of change is based on the level of effect of the proposed development that may impact upon cultural heritage resources e.g. temporary or permanent land take or excavation, ground disturbance and compaction; and the current state of survival/condition of the receptor e.g. the nature of past development or management effects.
12.4.3 Development impacts can be characterised as to whether they would be:

- Direct or Indirect;
- Short, Medium or Long Term;
- Reversible or Irreversible; and/or
- Cumulative

12.4.4 The magnitude of impact is assessed by taking into consideration the extent/proportion of the site/feature affected, its type, its survival/condition, its fragility/vulnerability and its potential amenity value.

12.4.5 In considering the above factors the criteria for assessing the magnitude of predicted change on cultural heritage resources are given in Table 12.2.

Table 12.2 Criteria for assessing magnitude of change on receptors

<table>
<thead>
<tr>
<th>Magnitude of Impact</th>
<th>Criteria for assessing impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substantial</td>
<td>Total loss or major/substantial alteration to key elements/features of the baseline (pre-development) conditions such that the proposed development character/composition/attributes will be fundamentally changed.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed.</td>
</tr>
<tr>
<td>Slight</td>
<td>A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstances/situation.</td>
</tr>
<tr>
<td>Negligible</td>
<td>Very little change from the baseline conditions. Change barely distinguishable, approximating to a ‘no change’ situation.</td>
</tr>
</tbody>
</table>

**Significance of Effects**

12.4.6 The sensitivity of the receiving environment, together with the magnitude of change, defines the significance of the impact as set out in Table 12.3. The environmental effect outlined below represents the effect without mitigation. Impacts of ‘major or moderate’ significance are considered to equate to significant impacts highlighted in the context of EIA Regulations. Scheduled Ancient monuments, Listed Buildings and their settings are all of high sensitivity
and so even relatively low levels of predicted magnitude of change to these features can be significant in EIA terms. Assessment of the effect of development on the setting of heritage assets follows the guidance issued by English heritage in 2011.

Table 12.3 Criteria for assessing the significance of effect

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Magnitude</th>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substantial</td>
<td>High</td>
<td>Major Adverse/Beneficial</td>
<td>Major to Moderate Adverse/Beneficial</td>
<td>Moderate to Minor Adverse/Beneficial</td>
<td>Potentially Major Adverse/Beneficial</td>
</tr>
<tr>
<td>Moderate</td>
<td>High</td>
<td>Major to Moderate Adverse/Beneficial</td>
<td>Moderate to Minor Adverse/Beneficial</td>
<td>Minor Adverse/Beneficial</td>
<td>Potentially Major to Moderate Adverse/Beneficial</td>
</tr>
<tr>
<td>Slight</td>
<td>High</td>
<td>Moderate to Minor Adverse/Beneficial</td>
<td>Minor Adverse/Beneficial</td>
<td>Negligible to negligible</td>
<td>Potentially Moderate to Minor Adverse/Beneficial</td>
</tr>
</tbody>
</table>

12.5 Baseline Conditions

12.5.1 This section provides an analysis of relevant designations, considerations and sources of information to establish the baseline conditions of the application site.

12.6 Site Description and Context

12.6.1 The application site occupies an area of agricultural land situated to the north-west of Threemilestone and adjacent to West Langarth Farm, and bounded by the A390 trunk road to the south. It comprises all or part of five enclosed arable fields and a single field in rough pasture, that are bounded by further agricultural land to the north, east and west.

12.6.2 The application site occupies an elevated position along the ridge (Highertown Ridge) of the valley, its southern extents along the ridge lying at c.110m above Ordnance Datum (AOD). The internal ground level within the application site
falls sharply northwards from the ridge to the lower lying course of the Langarth Stream that bounds it to the north.

12.6.3 The underlying solid geology of the application site comprises mudstone and sandstone of the Porthtowan Formation. This is shown to be overlain by later superficial deposits of alluvium along its northern boundary in association with the Langarth Stream.

Heritage Assets

12.6.4 The Archaeological Desk-Based Assessment presented at Volume 3 – Technical Appendix 12.1 provides a detailed synthesis of the available archaeological, historic, topographic and land-use information relating to the application site. Accordingly, this section of the ES summarises those resources identified.

12.6.5 Examination of existing data held for the application site identifies it to contain a single designated heritage asset, this comprising a grade II listed milestone situated along the A390, and previously recorded potential non-designated buried archaeological remains represented by two cropmarks and discrete geophysical anomalies.

12.6.6 Beyond the application site and within the wider study area, a number of further designated heritage assets are noted, as are non-designated multi-period archaeological remains. The Gwennap Mining District (Area 6i), that forms part of the Cornwall and West Devon Mining Landscape WHS, is further noted to lie immediately adjacent and south of the application site.

Prehistoric/Roman (450,000 BC – AD410)

12.6.7 No certainly known heritage assets of this period are recorded on the application site itself, although a curvilinear cropmark feature (Figure 12.1; A1) is noted to lie within it to the east of West Langarth Farm. The form and situation of this cropmark on the crest of the valley ridge, coupled with the presence of several further recorded Prehistoric monuments occupying similarly elevated positions along the Highterton Ridge in the study area, may suggest
that it reflects evidence of activity of Prehistoric origin. Further potential activity of this period may also similarly be reflected by a number of discrete geophysical anomalies recorded by previous survey undertaken immediately to the east of the application site, elements of which can be seen to lie within the application sites eastern extents (Figure 12.1; A3). In consideration of this evidence, a moderate potential for the application site to contain previously unrecorded below ground remains of this period is identified.

**Saxon/Early Medieval (AD410 – AD1066)**

12.6.8 No heritage assets dating to this period are recorded on the application site or within its immediate proximity.

12.6.9 In the wider study area, a settlement at Bovisack, now represented only by a farm situated c.1.4km to the north-east, is recorded in the Domesday Survey of AD 1086 as ‘Beveshoc’. This is documented as having been held prior to the Norman Conquest by Leofric in AD 1066. Current evidence would indicate the application site to lie away from any major foci of settlement activity in this period, it possibly in part being used for agricultural purposes or to have remained as open downland as later identified. A low potential for the application site to contain any previously unrecorded below ground remains of this period is therefore identified.

**Medieval (AD 1066 – AD 1485)**

12.6.10 No certainly known heritage assets of this period are recorded on the application site itself, although a linear cropmark feature (Figure 11.1; A2) is noted to lie within its eastern extents. This has been interpreted as possible relating to remains of a former Medieval/Post Medieval trackway, although this interpretation is questionable, with later cartographic evidence suggesting that it more probably reflects the line of a former Post-Medieval field boundary following the enclosure of the downland.

12.6.11 Current evidence indicates that the application site occupied and remained an area of open downland that was peripheral to the foci of any settlement
throughout this period. A low potential for any buried archaeological remains of this period, other than those associated with former agricultural practices of limited significance, is identified.

12.7 Post Medieval and Modern (AD 1485 – Present)

12.7.1 Current evidence illustrates the application site as having remained an area of agricultural land throughout the Post-Medieval and Modern periods, and the linear cropmark (Figure 11.1; A3) noted within its eastern extents is thought likely to be reflective of such use. During World War II, a military camp was established as part of the American build up to the invasion of France along the northern side of the A390, this being shown from aerial photographs as comprising clusters of tents arranged along field boundaries. Where plotted, these are shown to extend up to the south eastern extents of the application site, but not to extend within it. Overall, a low potential for the application site to contain any previously unrecorded buried archaeological remains of this period, other than for former agricultural activity of limited significance only, is identified.

12.7.2 The cartographic evidence, coupled with site inspection further illustrate that the arrangement of field boundaries depicted in the 1788-1789 Estate Plan and the later 1840 Kenwyn Tithe map predominantly survive within the application site (Figure 11.1; H1 to H3). These existing hedgerows illustrate the form of field boundaries et out and planted at this time and as such are likely to be considered important in accordance with the criteria set out in the Hedgerow Regulations 1997 (revised 2002).

12.7.3 An existing historic farmstead forming West Langarth Farm is identified immediately to the west of the application site (Figure 11.1; B1). This can be identified to date from the late 19th century. Whilst the farm is not considered to be of a significance sufficient to warrant its formal designation, it can be considered to be of historic interest at a local level.
Designated Assets

12.7.4 The application site contains a grade II listed building, this comprising a milestone situated along the northern verge of the A390 trunk road (Figure 11.1; LB2). The milestone dates to the early 19th century and carries the inscription indicating ‘From Truro 5 Miles’. The milestone was formerly situated on the north side of the A390 south-east of West Langarth Farm, but has been subject to previous re-siting resulting from the widening of the A390 road.

12.7.5 Although two further grade II listed buildings, these being Croft west Farmhouse and a milestone east of Seveock Farm (Figure 11.1; LB1 and LB3), and three scheduled monuments, these comprising the Carbrittle Barrows, a bowl barrow north-west of Little Regarded Farm and Bovisack Round (Figure 11.1; SM1 to SM3) are identified within the study area, detailed assessment (Volume 3 – Technical Appendix 12.1) has identified that all of these assets would see no alteration either to their significance or to important elements of their setting from proposed development within the application site.

The Cornwall and West Devon Mining Landscape WHS

12.7.6 The Gwennap Mining District (Area 6i) forms one of the ten component areas that form the Cornwall and West Devon Mining Landscape WHS, so designated by UNESCO on the 13th July 2006. In the broad context of the guidance provided in ICOMOS’s 'Guidance on Heritage Impact Assessments for Cultural World Heritage Properties', the potential impact on development proposals to the setting of the WHS needs to first be considered from an understanding of the Outstanding Universal Value (OUV) of the property and that constituting the inclusion of the Gwennap Mining District area.

12.7.7 The full Statement of OUV of the WHS is set out in The Cornwall and West Devon Mining Landscape World Heritage Site Management Plan 2013-2018. In summary this is described as relating to the remains of mines, engines houses, smallholdings, ports, harbours, canals, railways, tramroads, and industries allied to mining, along with new towns and villages which reflect an extended
period of industrial expansion and prolific innovation. The sophistication and success of early, large-scale, industrialised non-ferrous hard-rock mining, and the technology and infrastructure developed at Cornish and West Devon mines enabled these to dominate copper, tin and later arsenic production worldwide, and to greatly influence nineteenth century mining practice internationally. The extensive WHS comprises the most authentic and historically important components of the Cornwall and West Devon mining landscape dating principally from 1700 to 1914, the period during which the most significant industrial and social impacts occurred. The ten areas of the WHS together form a unified, coherent cultural landscape and share a common identity as part of the overall exploitation of metalliferous minerals here from the 18th to 20th centuries. They are a prominent reminder of the contribution Cornwall and West Devon made to the Industrial Revolution in Britain and to the fundamental influence the area asserted on the development of mining globally. The WHS as a whole has high authenticity in terms of form, design and materials and, in general, the location and setting of the surviving features.

12.7.8 Those components forming the OUV in the Gwennap Mining District (Area 6i) itself are described at Appendix 8.1 of The Cornwall and West Devon Mining Landscape World Heritage Site Management Plan 2013-2018. This is described as the ‘western rural landscape, the Copper Kingdom of the Old World.’ The broad elements defining the area’s heritage value are further summarily identified as comprising:

- Historically significant mine sites
- Tramways- including two of Cornwall’s earliest and most important
- Ancillary industries
- Settlement
- Smallholdings
- Great Houses
- The mineralogical/ecological importance of the area

12.7.9 In relation to the setting of the WHS, given its extent and the intervisibility between character areas, no formal buffer zone to define the extent of its setting has been ascribed. In terms of what may constitute an adverse impact
to the WHS setting, this is described as requiring to focus on the effect on the OUV and the criteria under which it was inscribed, with those elements constituting setting described as including 'the area within which developments would have a visual influence upon the OUV, and existing physical assets that are linked to it, historically or spatially. The setting of the Site therefore includes those sites, monuments, buildings and landscape components which provide additional historic or visual context’.

12.7.10 No part of character area Area 6i of the WHS lies within the application site and as such proposed development would have no direct impact upon any of those elements described above that constitute its OUV.

12.7.11 In consideration of the setting of the WHS, no adverse visual influence from proposed development within the application site to its OUV is identified.

Significance/Sensitivity of Identified Receptors

12.7.12 Table 12.4 below sets out the identified significance/sensitivity of receptors identified by the baseline studies to change from the proposed development within the application site in accordance with the defined criteria for assessing sensitivity/significance as set out in Table 12.1 above.
Table 12.4 Summary of sensitivity of identified receptors

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Receptor as identified on Figure 11.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high</td>
<td>WHS1 - Gwennap Mining District WHS</td>
</tr>
<tr>
<td>High</td>
<td>SM1 - Bosvisack Round SAM</td>
</tr>
<tr>
<td></td>
<td>SM2 - Bowl barrows near Ashgrove Farm SAM</td>
</tr>
<tr>
<td></td>
<td>SM3 - Bowl barrow near Little Regarded Farm SAM</td>
</tr>
<tr>
<td></td>
<td>LB1 - Croft West Farmhouse LB Grade II</td>
</tr>
<tr>
<td></td>
<td>LB2 - Milestone along A390 LB Grade II</td>
</tr>
<tr>
<td></td>
<td>LB3 - Milestone east of Seveock Farm LB Grade II</td>
</tr>
<tr>
<td>Medium</td>
<td>H1 to H3 - Historic hedgerows</td>
</tr>
<tr>
<td>Low</td>
<td>B1 – non-designated late 19th century farmstead adjacent to application site</td>
</tr>
<tr>
<td>Unknown</td>
<td>A1 – Undated cropmark of possible prehistoric origin within application site (potential Medium sensitivity receptor)</td>
</tr>
<tr>
<td></td>
<td>A2 - Undated cropmark within the application site of a possible former field boundary (potential Low sensitivity receptor)</td>
</tr>
<tr>
<td></td>
<td>A3 – Undated below ground anomalies identified through geophysical survey (potential Low to Medium sensitivity receptor)</td>
</tr>
</tbody>
</table>

12.8 Identification and Evaluation of Key Likely Impacts

12.8.1 This section provides a description of the potential significant effects that could arise from the proposed development during construction and after its completion (i.e. once operational).

12.8.2 A full description and drawings detailing the proposed development are presented in Chapter 2 – Proposed Development of the ES.

12.8.3 On the basis of these, sources of impacts on cultural heritage receptors may include:

- Soil stripping and ground re-profiling;
- Cutting of new roads, foundations and associated services;
- General hard and soft landscaping of the site;
- Indirect visual, noise and olfactory setting impacts.
Construction

12.8.4 This section examines the effect of proposed development on heritage assets during construction. During the construction phase, the stripping of subsoil, mass excavations for foundations, landscaping and ancillary works will affect below ground levels and destroy any archaeological receptors and may also have an indirect effect on the setting of heritage assets. Accordingly, without appropriate mitigation, an adverse effect on heritage resources would result.

12.8.5 Baseline study indicates the application site to contain non-designated archaeological heritage assets of Unknown sensitivity, although assessment indicates that these are likely to be no more than Medium to Low sensitivity receptors.

12.8.6 The application site through both previous archaeological investigation and examination of aerial photographic data has been shown to contain the site of a curvilinear cropmark feature and two recorded discrete below ground anomaly features, the situation of which along the elevated ground of Hightown Ridge, could suggest are of potential Prehistoric origin (Figure 11.1; A1 and A3). Proposed construction of car parking, infrastructure works and associated landscaping and planting would result in a substantial to moderate magnitude of effect on these identified assets. Whilst the true presence or sensitivity of these potential buried receptors remains Unknown, it is considered on probability that they are likely to be no more than Low to Medium sensitivity receptors. Considered as such, the potential magnitude of effect and resulting significance of this effect from proposed development on these potential heritage assets is identified as Moderate Adverse.

12.8.7 A further undated cropmark feature (Figure 11.1; A2) identified within the application site would appear to reflect evidence of the potential presence of the buried remains of a former field enclosure boundary of Medieval or Post Medieval date. Proposed construction of housing and associated infrastructure works would result in a substantial magnitude of effect upon this identified asset. Whilst the true presence or sensitivity of this potential buried receptor
remains Unknown, it is considered on probability to be no more than a Low sensitivity receptor. Considered as such, the potential magnitude of effect and resulting significance of this effect from proposed development on this potential heritage asset is identified as Moderate Adverse.

12.8.8 A potential for the application site to contain further as yet unrecorded buried archaeological remains of Unknown sensitivity is identified, although given the present uncertainty as to the true presence or absence of any such receptors within the application site, the magnitude of effect and resulting significance of this effect from proposed development on any as yet potential unrecorded potential buried archaeological receptors remains Unknown.

12.8.9 The majority of hedgerows identified as important by baseline study are to be predominantly retained and reinforced by proposed development (Figure 11.1; H2 and H3). Proposed development will however require the full length of hedgerow H1 (Figure 11.1) to be removed. The proposed development would therefore result in a moderate magnitude of effect on these assets, which as medium sensitivity receptors would result in a Moderate to Minor Adverse environmental effect.

12.8.10 The application site contains a single nationally important high sensitivity receptor, this being a grade II listed milestone situated along the northern carriageway of the A390. Proposed new junction works and alterations to the existing A390 carriageway from development will require the listed milestone to be relocated from its existing position. Without appropriate mitigation, proposed development would result in a substantial magnitude of effect on a high sensitivity receptor resulting in a Major Adverse environmental effect.

12.8.11 With regards to further designated heritage receptors and the Gwennap Mining District of the Cornwall and West Devon WHS identified within the wider proximity of the application site, baseline study has confirmed that proposed development during construction would result in no alteration either to their significance or to important elements of their setting, and as such a Negligible environmental effect from proposed development is identified.
12.8.12 The application site lies immediately adjacent to the low sensitivity receptor of
the non-designated farmstead forming West Langarth Farm (Figure 11.1; B1). Proposed development would not result in a direct impact on the historic core of the farmstead, although would require the removal of an adjacent and associated modern barn structure of no importance, that lies immediately to the north of the farmhouse. The construction of the proposed development immediately adjacent to the farm will result in a substantial alteration of its wider setting due to the removal of associated farmland surrounding, and the role that this plays in the understanding of the significance of this asset. As a low sensitivity receptor, the resulting significance of this effect from proposed development is identified as **Minor Adverse**.

*Operational*

12.8.13 This section examines the effect of proposed development on heritage receptors during the operational phase.

12.8.14 A **Negligible** effect on buried heritage assets of archaeological interest is identified once the proposed development is completed (all potential effects will have occurred at the construction phase).

12.8.15 A similar **Negligible** effect is identified during operation on the listed milestone and its setting (with all potential effects having occurred at the construction phase). A further **Negligible** effect during operation is also identified on the settings and significance/OUV of the WHS and surrounding designated heritage assets following the completion of proposed development.

12.8.16 Operational effects from proposed development may be identified in relation to the low sensitivity receptor of West Langarth Farm (Figure 11.1; B1), these relating to the effects of urban development on its setting and increased light and noise effects from the completed development. However, mitigation within the existing scheme proposals include for the creation of a landscape buffer to the farm. Such in-built mitigation will serve to reduce the magnitude of effect of proposed development to an extent that will result in a **Negligible** environmental effect.
12.8.17 Table 12.5 below summarises the direct and indirect impacts of the proposed development on cultural heritage receptors without mitigation, the locations of which are illustrated on Figure 11.1, and identifies the resulting environmental effects on receptors.

**Table 12.5 Summary of Impacts**

<table>
<thead>
<tr>
<th>Impact</th>
<th>Receptor Sensitivity</th>
<th>Direct or Indirect</th>
<th>Positive/ Negative</th>
<th>Permanent/ Temporary</th>
<th>Magnitude</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>Unknown (probable Medium)</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Substantial to Moderate</td>
<td>Moderate Adverse</td>
</tr>
<tr>
<td>A2</td>
<td>Unknown (probable Low)</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Substantial</td>
<td>Moderate Adverse</td>
</tr>
<tr>
<td>A3</td>
<td>Unknown (probable Low to Medium)</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Substantial to Moderate</td>
<td>Moderate Adverse</td>
</tr>
<tr>
<td>LB1</td>
<td>High</td>
<td>Indirect</td>
<td>Negative</td>
<td>-</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>LB2</td>
<td>High</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Substantial</td>
<td>Major Adverse</td>
</tr>
<tr>
<td>LB3</td>
<td>High</td>
<td>Indirect</td>
<td>Negative</td>
<td>-</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>B1</td>
<td>Low</td>
<td>Indirect</td>
<td>Negative</td>
<td>Permanent</td>
<td>Substantial to Moderate</td>
<td>Minor Adverse</td>
</tr>
<tr>
<td>H1</td>
<td>Medium</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Substantial</td>
<td>Intermediate</td>
</tr>
<tr>
<td>SM1</td>
<td>High</td>
<td>Indirect</td>
<td>Negative</td>
<td>-</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>SM2</td>
<td>High</td>
<td>Indirect</td>
<td>Negative</td>
<td>-</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>SM3</td>
<td>High</td>
<td>Indirect</td>
<td>Negative</td>
<td>-</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>WHS1</td>
<td>High</td>
<td>Indirect</td>
<td>Negative</td>
<td>-</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td><strong>Potential for hitherto unrecorded buried archaeological remains to be present</strong></td>
<td>Unknown</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Operational</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>Low</td>
<td>Indirect</td>
<td>Negative</td>
<td>Permanent</td>
<td>Slight</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

12.9 Mitigation Measures

12.9.1 This section identifies any necessary mitigation measures in order to avoid, reduce or offset the potential for significant adverse effects.
**Construction**

12.9.2 In order to mitigate the identified direct adverse effects arising from proposed development on known buried heritage assets of potential Medium to Low sensitivity, and any as yet undetermined buried heritage assets of potential archaeological interest, it is proposed as a condition of planning permission to submit and agree a specification with the Local Planning Authority for the implementation of a phased programme of archaeological investigation and recording works that, as appropriate, will be undertaken in advance of, or during, construction. Such a mitigation approach will off-set the effect of proposed development and in line with NPPF and Development Plan policy provide for the further investigation and record of the archaeological remains of interest that may be disturbed by development.

12.9.3 In order to mitigate the potential Major Adverse environmental effect from proposed development on the high sensitivity receptor of the grade II listed milestone there would be a requirement for the submission of an application to the Local Planning Authority for the granting of listed building consent to enable its relocation. This listed building consent submission would detail the proposals for the works involved in moving the milestone, including agreement on its new location together with a detailed scheme for the proposed removal and reinstatement works. Such a mitigation approach would serve to reduce the identified environmental effect of proposed development to a Negligible level.

12.9.4 No suitable mitigation measures are identified that would serve to reduce or off-set the Minor Adverse environmental effect of proposed development on the low sensitivity receptor of West Langarth Farm, or the Moderate to Minor Adverse effect of proposed development on the single Medium sensitivity historic hedgerow.

**Operational**

12.9.5 It is anticipated that all necessary mitigation relating to heritage assets of archaeological significance will be undertaken prior to, or during, the
12.9.6 Proposed landscaping within the existing scheme proposals will serve to reduce the identified environmental effect of proposed development on the low sensitivity receptor of West Langarth Farm to a Negligible level.

12.10 Residual Impacts

12.10.1 Whilst development within the application site will have a negative effect on the cultural heritage resource due to the truncation/removal of archaeological remains, this negative effect would be off-set by undertaking an effective mitigation strategy that would produce a positive beneficial effect from the proposed development, in that further knowledge will be gained on the archaeology and historic landscape of this area.

12.10.2 Whilst proposed development within the application site could have resulted in a potential significant negative residual effect on the high sensitivity receptor of the grade II listed milestone, the adoption and implementation of an effective mitigation strategy will see the effects of proposed development on this heritage asset managed appropriately, resulting in a Negligible residual effect.

12.10.3 A single residual impact from the proposed development can be identified and this relates to the permanent Moderate to Minor Adverse environmental effect of the removal of an historic hedgerow.

12.11 Cumulative effects

12.11.1 The following considers the cumulative effects of proposed development on the application site on cultural heritage assets in relation to other proposed schemes within the Threemilestone area. Those identified comprise:

- Langarth Farm, Threemilestone, Truro (Application Ref: PA11/06124);
- Langarth Farm, Threemilestone, Truro (Application Ref: PA11/06125);
- Langarth Farm, Threemilestone, Truro (Application Ref: PA12/09036);
- Land at Maiden Green, Off A390, Kenwyn (Application Ref: PA14/00703);
- Willow Green Farm, Land North of the A390, Threemilestone, Truro (Application Ref: PA13/10454);
- Land Between The A390, The Park and Ride and Willow Green Farm, Threemilestone (Application Ref: PA12/11527);
- Land North of Silver Bow (Pollards Field), Greenbottom (Application Ref: PA14/03065);
- Former Richard Lander School, Tresawla Road, Truro (Application Ref: PA12/10941); and
- Taylor Wimpey UK, Former Richard Lander School, Tresawls Road, Truro (Application Ref: PA14/05421);

12.11.2 In respect of the above, the planning applications identified above as Taylor Wimpey UK, Former Richard Lander School, Tresawls Road, Truro (Application Ref: PA14/05421) and Langarth Farm, Threemilestone, Truro (Application Ref: PA12/09036) have no accompanying consideration of cultural heritage assets, although the latter forms a reserved matters application relating to Langarth Farm, Threemilestone, Truro (Application Ref: PA11/06125), wherein consideration of cultural heritage resources was provided.

12.11.3 Prior heritage assessments and programmes of archaeological field evaluation have been conducted in conjunction with planning applications submitted for Langarth Farm, Threemilestone, Truro (Application Ref: PA11/06124), Langarth Farm, Threemilestone, Truro (Application Ref: PA11/06125), Land at Maiden Green, Off A390, Kenwyn (Application Ref: PA14/00703), Willow Green Farm, Land North of the A390, Threemilestone, Truro (Application Ref: PA13/10454), Land Between The A390, The Park and Ride and Willow Green Farm, Threemilestone (Application Ref: PA12/11527), Land North of Silver Bow (Pollards Field), Greenbottom (Application Ref: PA14/03065) and Former Richard Lander School, Tresawla Road, Truro (Application Ref: PA12/10941).

12.11.4 In the case of that conducted at the Former Richard Lander School, Tresawla Road, Truro (Application Ref: PA12/10941), assessment and subsequent evaluation identified that development proposals would result in no impact on
any designated heritage assets or their settings or on any potential buried archaeological remains. A similarly limited potential was identified by archaeological investigations conducted in conjunction with Land Between The A390, The Park and Ride and Willow Green Farm, Threemilestone (Application Ref: PA12/11527), although a condition requiring an archaeological watching brief to be maintained during development was attached to planning permission granted.

12.11.5 Of the further assessment and evaluation works conducted in conjunction with Langarth Farm, Threemilestone, Truro (Application Ref: PA11/06124), Langarth Farm, Threemilestone, Truro (Application Ref: PA11/06125), Land at Maiden Green, Off A390, Kenwyn (Application Ref: PA14/00703), Willow Green Farm (Application Ref: PA13/10454) and Land North of Silver Bow (Pollards Field), Greenbottom (Application Ref: PA14/03065) potential for previously unrecorded below ground archaeological remains dating to the Prehistoric to Post Medieval periods was identified within all five proposal areas. Subsequent field evaluation on Land at Maiden Green, Off A390, Kenwyn identified areas of Bronze Age settlement and contemporary funerary and agricultural activity, along with landscape features of Iron Age to Post Medieval date. Consideration of the impact of the proposals on the setting of adjacent designated assets of two scheduled rounds, these being Bovisack round and Peventinnie round, was provided and consultation advice provided by English Heritage and the Local Planning Authority’s archaeological advisors raised no objection to proposals on these grounds.

12.11.6 Further evidence relating to remains of former Post Medieval landscape features was noted by the works conducted in conjunction with the Willow Green Farm (Application Ref: PA13/10454), as were moderate setting effects on the two adjacent scheduled rounds, these being Bovisack round and Peventinnie round. The potential for the presence of below ground archaeological remains dating to the Prehistoric to Post Medieval period was also noted from the works conducted in conjunction with Langarth Farm, Threemilestone, Truro (Application Refs: PA11/06124 and PA11/06125) and Land North of Silver Bow (Pollards Field) Greenbottom (Application Ref: PA14/03065). Consideration of the impact of the proposals on the setting of adjacent designated heritage
assets and the WHS was provided and consultation advice provided by English Heritage and the Local Planning Authority’s archaeological advisors raised no objection to proposals on these grounds.

12.11.7In relation to the planning applications submitted for Langarth Farm, Threemilestone, Truro (Application Refs: PA11/06124 and PA11/06125), Land North of Silver Bow (Pollards Field) Greenbottom (Application Ref: PA14/03065), Land at Maiden Green, Off A390, Kenwyn (Application Ref: PA14/00703) and Willow Green Farm (Application Ref: PA13/10454), recommendation for a programme of archaeological works condition to suitably mitigate the archaeological interest noted in each instance has either been advised or appended approval decision notices.

12.11.8Proposed development within the application site as assessed in consideration of potential for cumulative impact is identified to result in no magnitude of change on key elements of setting of any heritage assets and thus a Negligible cumulative environmental effect is identified.

12.11.9A similar potential exists within the application site for evidence of former Prehistoric to Post Medieval activity to be present, however, the cumulative impact of proposed development on the buried archaeological resource is considered Negligible where an effective mitigation strategy is similarly undertaken to off-set any negative impacts of development. The implementation of such a mitigation strategy would further enhance our understanding of the archaeological record of the region and that recorded elsewhere within the Threemilestone area.

12.12 Summary and Conclusions

12.12.1Examination of relevant data sources supplemented by site inspection and field study have identified the application site to contain a nationally important grade II listed milestone and potential below ground archaeological remains of possible local to regional importance. A number of further designated heritage assets and the site of the Gwennap Mining District of the Cornwall and West Devon Mining Landscape WHS are also noted within the wider search radius of
the application site, although proposed development would have no cause to harm their significance or associated important elements of their setting/OUV.

12.12.2 Proposed development during the construction and operational phases is identified to result in Major to Minor adverse environmental effects on identified cultural heritage receptors, however, these effects would be suitably off-set or reduced through the implementation of identified mitigation measures such that the resultant residual effect of proposed development on cultural heritage assets would be negligible with the exception of the loss of a single historic hedgerow. No cumulative effects of proposed development on cultural heritage resources from proposed development is identified.
### Table 12.6 Summary of Cultural Heritage Impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Impact Significance</th>
<th>Direct/Indirect</th>
<th>Positive/Negative</th>
<th>Temporary/Permanent</th>
<th>Summary of Mitigation/Enhancement</th>
<th>Residual Impact magnitude</th>
<th>Residual Impact significance</th>
<th>Residual Impact Positive/Negative</th>
<th>Residual Impact Temporary/Permanent</th>
<th>Confidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal/truncation of below ground archaeological remains</td>
<td>Unknown to Moderate Adverse</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Archaeological investigation and recording</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Positive</td>
<td>Permanent</td>
<td>Moderate</td>
</tr>
<tr>
<td>Re-siting of grade II listed milestone</td>
<td>Major Adverse</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Re-siting in accordance with approval of parameters agreed as part of listed building consent granted</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Positive</td>
<td>Permanent</td>
<td>High</td>
</tr>
<tr>
<td>Removal of historic hedgerow</td>
<td>Moderate Adverse</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>None identified</td>
<td>Moderate</td>
<td>Moderate to Minor Adverse</td>
<td>Negative</td>
<td>Permanent</td>
<td>High</td>
</tr>
<tr>
<td>Alteration of setting of West Langarth Farm</td>
<td>Minor Adverse</td>
<td>Indirect</td>
<td>Negative</td>
<td>Permanent</td>
<td>Landscaping</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Positive</td>
<td>Permanent</td>
<td>High</td>
</tr>
</tbody>
</table>
13.0 Socio-economic

13.0.1 This Chapter assesses the likely significant direct and indirect impacts of the development on the local and regional community and economy.

13.0.2 The policy context, assessment methodology, baseline conditions and potential impacts arising during the construction and operational phases is outlined. Specifically, this Chapter sets out the socio economic ‘baseline’ conditions of the settlement of Truro and Threemilstone area before considering the impact or change resulting from the proposed development on this existing or ‘baseline’ condition. The assessment considers methods, where necessary, of mitigating and enhancing the impacts identified before providing details of the residual impacts.

13.0.3 In preparing this chapter of the ES reference has been made to National Planning Practice Guidance and in particular the section 6 Preparing and Environmental Statement where it says “The Environmental Statement should be proportionate and not be any longer than is necessary to assess properly those effects”.

13.1 Policy Context


13.1.1 The National Planning Policy Framework (the Framework) sets out the Government’s planning principles and policies for England and how these are expected to be applied.

13.1.2 With regard to sustainable development, the Framework recognises that there are three dimensions to sustainable development; economic, social and environmental (paragraph 7) and that to achieve sustainable development, economic, social and environmental gains should be sought jointly and

23 National Planning Practice Guidance (March 2014)
simultaneously through the planning system (paragraphs 8 and 9). Paragraph 10 states further that:

“Plans and decisions need to take local circumstances into account, so that they respond to the different opportunities for achieving sustainable development in different areas”

13.1.3 The Framework is clear in its ambition to ensure the delivery of a wide choice of quality homes to meet local needs and to support economic growth.

13.1.4 The Framework aims to encourage social interaction and the creation of healthy communities. At paragraph 70 it is stated that with regard to delivering the social, recreational and cultural facilities and services the community needs, planning decisions should:

- “plan positively for the provision and use of shared space, community facilities (such as local shops, meeting places, sports venues, cultural buildings, public houses and places of worship) and other local services to enhance the sustainability of communities and residential environments;
- guard against the unnecessary loss of valued facilities and services, particularly where this would reduce the community’s ability to meet its day-to-day needs;
- ensure that established shops, facilities and services are able to develop and modernise in a way that is sustainable, and retained for the benefit of the community; and
- ensure an integrated approach to considering the location of housing, economic uses and community facilities and services.”

13.1.5 Paragraph 73 of the Framework, states in relation to open space specifically:

"Access to high quality open spaces and opportunities for sport and recreation can make an important contribution to the health and well-being of communities.”
Future Cornwall – Sustainable Community Strategy

13.1.6 This document establishes a framework for sustainable development, which will make improvements for local people, the economy and the environment in a way that is mutually reinforcing.

Emerging Local Planning Policy – Cornwall Local Plan

13.1.7 Whilst there is an adopted local plan which covers the area of the site this is significantly out of date having been adopted in 1998. It is therefore appropriate to focus on the emerging Cornwall Local Plan as this sets out the Council’s vision and spatial strategy for the development of Cornwall up to 2030. The key objectives of the plan are outlined under 4 main themes below the relevant themes and objectives are outlined:

- **Theme 1: To support the economy**
  - Objective 2 – Enhance the cultural and tourist offer in Cornwall and to continue to promote Cornwall as a year round destination for tourism and recreation
  - Objective 3 – Provide and enhance retail provision with a regional and sub-regional status that adds to economic growth and provide opportunities to improve existing facilities for better economic performance.

- **Theme 2: To enable self sufficient and resilient communities**
  - Objective 4 – Meet housing need by providing for new homes over the plan period that provide everyone in the community with the opportunity of living in an appropriate home, supported by local community facilities.
  - Objective 5 – Allow people and communities to provide for jobs and deliver homes locally to meet needs, where they can best support the role and function of local communities as well as allow for further change and adaptation.
Objective 6 – Ensure that infrastructure is provided that will enable development to benefit the local community.

**Theme 3: To promote good health and wellbeing for everybody**

- Meet a wide range of local needs including housing and for community, cultural, social, retail, health, education, religious, and recreational facilities, in order to improve quality of life and reduce social exclusion.

- Promote development that contributes to a healthy and safe population by providing for opportunities for walking and cycling and ensuring the appropriate levels of open space and the protection and improvement of air quality.

13.1.8 Key policies in the emerging Local Plan of relevance to socio economic factors pertinent to the proposed development include:

- Policy 1 - Presumption in favour of sustainable development
- Policy 3 - Role and function of Places – directs the provision of new large scale developments to Truro and Threemilestone amongst a number of other Key Settlements across Cornwall.
- Policy 4 – Shopping Services and Community Facilities
- Policy 6 – Housing Mix – encourages the provision of a mix of house sizes, types, prices and tenure to address identified needs and market demand.
- Policy 17 – Health and wellbeing
- Policy 25 – Green Infrastructure

**Land North of the A390, Truro/Threemilestone - Development Brief**

13.1.9 The Development Brief (DB)\(^{24}\) was prepared to assist in bringing forward a new community within the Threemilestone area and sets out the Council’s ambition

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\(^{24}\) Land north of the A390, Truro/Threemilestone Development Brief (2012)
to deliver a large scale mixed use development to meet the future social and economic needs of the area.

13.1.10 The DB identifies that the wider area is envisaged to be developed for a range of uses including the provision of 2,600 dwellings, circa 17,000 sq. m of employment floorspace, a stadium, hotels, retail, food and beverage, leisure and community facilities.

13.2 **Scope and Methodology**

13.2.1 The assessment detailed in this chapter has focused on the following key socio economic factors:

- Employment creation during the construction and operational phases
- Housing provision and associated factors including education and healthcare
- Health and wellbeing benefits associated with provision of sports facilities, community facilities and open space and indirectly the Stadium for Cornwall
- Increased local expenditure associated with construction and operational phases, including indirect effects associated with the Stadium for Cornwall.

**Study Area**

13.2.2 The study area for assessment has been defined on the following levels:

- Likely effects at ‘local’ scale - area covering Threemilestone, Treliske, Gloweth, Chacewater, Kenwyn, Penstraze and Truro; and
- Likely effects experienced beyond the local area represent the ‘sub-regional/county-wide’ scale – Cornwall as a whole.

13.2.3 The local area is defined by the boundaries of the following electoral wards:

- Threemilestone and Gloweth;
- Chacewater and Kenwyn
- Truro Boscawen
- Truro Moresk
- Truro Tregolls
- Truro Trehaverne

**Significance Criteria**

13.2.4 Due to the inherent difficulties in assessing the significance of socio economic effects, it is inevitable that there will be a degree of subjectivity. However, significance of likely significant socio-economic effects has been assessed using professional judgment according to significance criteria.

13.2.5 Socio-economic effect significance has been determined broadly by:

- The value of the resource (international, national, regional and local level importance);
- The magnitude of the effect;
- The duration of the effect;
- The reversibility of the effect; and
- The number of sensitive receptors.

13.2.6 As outlined in Chapter 2: EIA Methodology & Significance Criteria/Appendix 2.1, significance is assessed as either negligible for effects not considered to be significant, or minor, moderate or major where effects are considered to be adverse or beneficial.

13.2.7 All impacts are determined in a qualitative manner using professional judgement. Qualitative terminology specific to each potential type of effect is described below:

- **Major Adverse:** Considerable detrimental or negative effect on a socio economic factor;
- **Moderate Adverse:** Limited local scale detrimental effect upon a socio economic factor;
• **Minor Adverse:** Slight, short or highly localised changes in socio economic factors;
• **Negligible:** No appreciable effect on socio economic indicators;
• **Minor Beneficial:** Changes in socio economic factors which have small beneficial effects such as minor net employment creation effects, minor local-scale improvements and on other socio-economic and community indicators;
• **Moderate Beneficial:** Limited beneficial changes to socio-economic factors; and
• **Major Beneficial:** Considerable beneficial change to socio-economic factors. Significant local-scale/moderate significant sub regional scale improvement.

**Population Assessment**

13.2.8 Effects on population during the construction and operational phases have been assessed. The likely number of people working on the site during the construction phase has been calculated using a formula (discussed in the following section). The maximum number of new residents likely to live in the Development has been calculated using the average household size figure for Cornwall of 2.3 persons and applying this to the proposed maximum number of residential units (130 units).

13.2.9 Qualitative comment has then been made on the likely effects that the temporary and permanent population would have.

**Employment Assessment**

13.2.10 The construction of the mixed use scheme will result in a number of jobs being created and maintained during the construction phase. The provision of retail, food and beverage, day nursery and sports/community uses would result in job creation locally during the operational phase. Also due to knock-on effects in the local economy through multipliers further employment generation will result indirectly.
13.2.11 Construction effects have been assessed using standard ratios of construction employment to output, assuming an average output per employee of £83,500 per year\textsuperscript{25}.

13.2.12 To calculate operational phase jobs, the baseline situation has been compared with the number of jobs likely to be created by the development. The baseline employment situation has been established through reference to Census data. To calculate the jobs likely to be created by the development, employment densities\textsuperscript{26} have been applied to the proposed area schedule included on the Parameters Plan and within Chapter 4 of this ES, with the exception of the proposed day nursery. For clarity, the employment densities have been applied to the proposed food store, the retail units, food and drink floorspace and the sports and community facility. The figure generated only provides a general estimation of the number of Full Time Equivalent jobs that could be created and should not be taken as given. It should therefore be noted that the figure could be slightly lower or higher once the detailed proposal is brought forward and specific of running a business at the location start to define actual levels of employment.

13.2.13 Indirect employment comprises:

- That arising off-site in response to the demand generated by the development, in relation to construction materials and supplies;
- Jobs arising off-Site through the increased demand for goods and services by the future occupiers of the Development; and
- Jobs resulting from employees’ expenditure from the construction and operational phases on local goods and services.


\textsuperscript{26} Drivers Jonas Deloitte – Employment Densities Guide – 2\textsuperscript{nd} Edition (2010)
Additionality Guide\(^27\) states that projects with regional effects will have larger multipliers than projects with more local effects as there are more opportunities for economic linkages in terms of suppliers and local expenditure. In this instance, the project is considered to have more locally focused effects than regional.

13.2.15 The economic impact of a development is multiplied because of knock-on effects within the local economy. There are two types of multiplier:

- A supply linkage multiplier (indirect multiplier) due to purchases made as a result of the project and further purchases associated with linked firms along the supply chain; and
- An income multiplier (induced multiplier) associated with local expenditure as a result of those who derive incomes from the direct and supply linkage impacts of the project.

13.2.16 Composite multipliers, which include both of the above multipliers, for retailing have been taken from the English Partnerships guidance. Multipliers only apply to the retail element of the proposal. The retail use proposed is considered to have a local impact therefore a composite multiplier of 1.21 has been utilised in this chapter. The associated impact of leakage outside of the study area/Cornwall and displacement has also been considered in relation to identified employment impacts.

13.2.17 In addition to the assessment of general indirect employment effects, it is also appropriate in this ES to indicate the indirect job creation that would be created as a result of the delivery of the Stadium for Cornwall. The figures stated in this chapter have been taken from the committee report for the outline planning application for the stadium.

**Local Expenditure**

13.2.18 Current effects on local expenditure during the construction and operational phases have been assessed quantitatively by applying a lunchtime expenditure assumption to the number of estimated jobs generated in each phase. This only captures part of the increased local expenditure that would associated with the development however it at least provides an indication of the positive benefit the scheme would have in this regard.

13.2.19 Eurest Services is a company serving the food industry and business sectors and publishes reports on lunchtime expenditure. The Eurest Lunchtime Report 2008\(^{28}\) found that, on average, workers spend £2.10 on lunch per day. The annual effect can be calculated by multiplying this by the calculated number of employees by a 233 day working year (which assumes 4 weeks' holiday plus bank holidays).

13.2.20 Additionally, the indirect effect on local expenditure of approving the proposal which would be associated with the delivery of the Stadium for Cornwall is also considered in relation to the operational stage of the development. The figures relied upon for this assessment are taken from the committee report for the outline planning application for the stadium.

**Healthcare**

13.2.21 Residential units form part of the Development, which would increase demand on primary healthcare services in the local area. In order to determine the likely impact of the development, the forecast population of the development has been analysed against the general provision of primary healthcare within the local area. The assessment is based on the maximum of 130 residential units and an average occupancy of 2.3 persons.

**Education**

13.2.22 As residential is part of the proposed development, there is the potential for there to be an effect on demand for education services. It is not possible at this stage to accurately quantify the likely level of demand as the mix of housing provision is not defined. General commentary has therefore been provided on this matter with reference to existing and proposed education provision.

13.2.23 The likely number of children requiring school places has been calculated by applying the pupil yields detailed in the Council’s Planning Obligations Guidance for Education Contributions\(^{29}\) to the maximum of 130 residential units. The ratio applied is 1 pupil per 3.4 houses for both levels of school education. The number of pupils expected to be generated has then been discussed in the context of known capacity of primary and secondary schools within the immediate surrounding area (2.5km) and planned new schools. As information on school capacity is not readily available to the public some capacity information has been obtained from a live planning application (PA14/00703) which relates to a site within close proximity to the site subject of the ES. Where no data has been obtained it has been assumed that there is no capacity.

**Open space and sports provision**

13.2.24 The proposed development includes the provision of residential therefore there will be increased demand for open space and sports provision. The proposed development also includes the provision of open space and sports facilities. In order to assess the impact of the scheme existing areas of publicly accessible open space and sports provision has been identified.

**Limitations and Assumptions**

13.2.25 Various assumptions have been made during the preparation of this chapter. The assessment also has limitations. These are summarised below and referred to throughout the chapter, as appropriate:

---

\(^{29}\) Cornwall Council Planning Obligations Guidance for Education Contributions (April 2012)
Baseline conditions have been established using available published data/statistics at the time of writing;

Calculations are based on published formulae and guidance, where available and using qualitative methods based on professional judgment and experience;

Existing employment has been calculated from data on existing floorspace and tenancy provided by the Applicant, using employment density assumptions. This is an approximation only;

Published guidance has been used to estimate additionality and assumptions have been made, as necessary. Assumptions include the choice of study area, employment densities, multipliers, leakage and displacement. This is standard practice, for which direction is given in the guidance. Assumptions are justified in the assessment as necessary;

Cumulative assessment has been undertaken using publicly available data on the committed developments identified in Chapter 2; and

Estimated construction costs have been derived from the project Cost Consultants and will be subject to change during the detailed design process.

School capacity information is not readily available to the public therefore capacity information used in this chapter is limited and has been obtained from a live planning application (PA14/00703) which relates to a site within close proximity to the site subject of the ES. The position of ‘no capacity’ has therefore been applied to ensure ‘worst case’ assessment.

13.3 Baseline

13.3.1 This section details the baseline socio economic conditions within the study area. The socio economic factors covered include:

- Population and Housing
- Employment statistics
- Open Space and sports facilities
- Education
- Healthcare
**Population and Housing**

7.8.1 According to census data (2011) the local part of the study area has a total population of 26,911 people. The population of Cornwall (regional area) is identified as being 532,273 people.

13.3.2 The Cornwall Housing Land Availability Assessment 2012-2013 provides the most up to date information on the current housing position in Cornwall.

13.3.3 At present there is no adopted housing target for Cornwall. A figure is being progressed through the plan making process however this has not be subjected to Examination (at proposed submission stage) and has outstanding objections remaining particularly in relation to the housing target.

13.3.4 In the absence of an adopted target and with an emerging target that has not been sufficiently tested through the plan making process (pre-Examination stage) it is appropriate to rely on a figure which is the most up to date and has been subject to the most scrutiny. In this case it is appropriate at this point to rely on the figure being proposed for Cornwall in the Proposed Changes version (July 2008) of Draft Regional Spatial Strategy (RSS), which contains a figure that has been fully tested at an Examination in Public.

13.3.5 The draft RSS (Proposed Changes – July 2008) proposes 68,200 dwellings for the whole of Cornwall over the period 2006-2026. This equates to 3,410 dwellings per annum.

13.3.6 The SHLAA 2013 and Cornwall Monitoring Report confirms levels of past housing completions. It is clear from these documents that 17,854 dwellings have been provided since 2006 (over the last seven years). This is 6,016 dwellings short of the 23,870 dwellings that should have been provided.

13.3.7 Based on the Council’s information contained in the 2013 SHLAA and in the context of the Draft RSS housing requirement, the five year housing supply position outlined in Table 13.1 below is currently applicable to Cornwall.
Table 13.1 – Cornwall Housing Supply Position

<table>
<thead>
<tr>
<th></th>
<th>Number of Dwellings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing Requirement</td>
<td>68,200</td>
</tr>
<tr>
<td>Provision to date (06/07 to 12/13)</td>
<td>17,854</td>
</tr>
<tr>
<td>Shortfall to date</td>
<td>6,016</td>
</tr>
<tr>
<td>Five year requirement including shortfall</td>
<td>23,066</td>
</tr>
<tr>
<td>Five year requirement including shortfall plus 20%</td>
<td>27,679</td>
</tr>
<tr>
<td>Five year supply (2013 SHLAA)</td>
<td>14,692</td>
</tr>
<tr>
<td>Number of years supply</td>
<td>2.7</td>
</tr>
</tbody>
</table>

13.3.8 The figures in the above table show that there is currently a significant undersupply. It is also important to note that the five year supply figures used are taken directly from the 2013 SHLAA, which includes delivery on sites without planning permission (allocations and resolution to grant subject to S106). It is therefore possible that the five year supply is actually lower than that envisaged in the 2013 SHLAA.

13.3.9 The emerging Local Plan proposes a new housing requirement for Cornwall however this has yet to be formally adopted. Regardless of this position it is clear that there is a need to deliver housing across the whole of Cornwall up to 2030.

**Employment**

13.3.10 Table 13.2 provides an overview of the employment position with regard to the economically active population within the local area and across Cornwall as a whole.
Table 13.2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Local area</th>
<th>Cornwall (sub-regional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed Part-time</td>
<td>3,222 (23%)</td>
<td>59,778 (23%)</td>
</tr>
<tr>
<td>Employed Full-time</td>
<td>7,390 (53%)</td>
<td>123,195 (48%)</td>
</tr>
<tr>
<td>Self-employed</td>
<td>2,055 (15%)</td>
<td>53,013 (20%)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>592 (4%)</td>
<td>12,694 (5%)</td>
</tr>
<tr>
<td>Student Full-time</td>
<td>625 (5%)</td>
<td>10,804 (4%)</td>
</tr>
</tbody>
</table>

Source: Economic Activity datasets for local area wards - Census 2011

**Education**

13.3.11 Within the immediate surrounding area (2.5km) there are two primary schools and one secondary school. These are:

- Threemilestone Community Primary School
- Chacewater Community Primary School
- Richard Lander Secondary School

13.3.12 Threemilestone School is a standard 2 form entry school with an overall capacity of 420. It is understood that there is currently 352 pupils attending this school, which means there is capacity for an additional 68 pupils.

13.3.13 It has not been possible to obtain freely information from Cornwall Council regarding the capacity and current number of pupils attending Chacewater School. On this basis it has been assumed that there is no available capacity (i.e. ‘worst case’).

13.3.14 Richard Lander School is a 9 form entry secondary school which has capacity for 1,350 pupils and an annual intake of 270 pupils. It is understood that there is no capacity at this school.

13.3.15 In terms of planned provision a further primary school is proposed to be constructed as part of the consented Langarth scheme (PA11/06124). This school is expected to have a minimum capacity of 120 pupils. The exact level
of provision will however be determined at point at which the detailed proposals are advanced and will respond to local circumstances at that time.

**Health and well-being**

13.3.16 According to the NHS website there are seven GPs and four Dentists within approximately four miles of the site.

13.3.17 With regard to GP surgeries specifically, of the seven identified all are currently accepting new patients. In relation to Dentists, three of the four identified are currently accepting new patients.

13.3.18 The consented Langarth scheme (PA11/01624) has permission for floorspace that could accommodate a new GP surgery once constructed if this use of the space is pursued at that point time.

**Open Space and Sports Provision**

13.3.19 In respect of leisure centres, Truro Leisure Centre is located approximately 2.5 km east of the site. In terms of facilities the leisure centre provides:

- Fitness suites;
- Fitness studio;
- Swimming pool (25 metre);
- Learner pool; and
- Sports hall (6 court)

13.3.20 In terms of general public open space provision within close proximity of the site there is an existing recreation ground within Threemilestone.

13.3.21 The consented Langarth scheme (PA11/01624) includes the provision of a range of public open space, which once constructed will be accessible to residents of the development subject of this ES.
13.4 Identification and Evaluation of Key Likely Impacts

Construction

Employment

13.4.1 The number of construction jobs created has been estimated by establishing the total estimated build cost (£36,000,000) and dividing this by the ONS average output per construction employee of £83,500 per year.

13.4.2 Using this approach it is forecast that 216 (Full Time Equivalent) construction jobs would be created over the two year construction period. It is expected that there will be medium level of leakage outside of the study area, therefore 25% (54) of these jobs are expected to benefit people outside of Cornwall. This would result in a residual level of job creation within the study area of 162. This is considered to represent a minor beneficial impact at the local and sub-regional scale.

Local Expenditure

13.4.3 Construction workers are likely to make use of a range of local facilities within close proximity of the site during the construction phase, including hotels and retail. It is not possible to quantify the increased local expenditure in its totality or accurately over the entire construction period but below an indication of the potential associated increase in local expenditure related to the lunchtime spend of construction workers is outlined to at least give an indication and capture some of the increased local expenditure that would be brought to the study area.

13.4.4 It is important to note that the number of workers on-site would vary throughout and many may remain on-site for lunch breaks. It is therefore assumed that 100 construction workers would be on-site over the entire two year construction period for the purpose of this assessment.
13.4.5 Applying the formula outlined in the methodology section of this chapter it is estimated that £97,860 would be spent locally by construction employees over the two year construction period. This is considered to represent a **minor beneficial** effect at the local level.

**Operational**

**Population and Housing**

13.4.6 The development will deliver 130 residential units. If the average household size for Cornwall (2.3) is applied to this level of provision then this equates to an increase in population of approximately 299 people. This is a negligible/slight increase in the local population (assuming all residents are from outside of the defined local study area). Any specific impacts related to this increase in population are dealt with under the individual topic areas below.

13.4.7 The provision of new retail and food and drink uses would improve provision of these uses within the locality which would be **minor beneficial** for the local population generally.

13.4.8 The baseline information on housing has identified an acute need to deliver new housing locally and Cornwall-wide. The provision of 130 residential units is therefore considered to have a **minor beneficial** impact within the local area.

13.4.9 The development is proposed so that it can enable the delivery of the stadium for Cornwall, this would deliver a broad range of socio-economic benefits (some of which are dealt with separately as well below) for the local population and the wider population of Cornwall. It is therefore considered that the proposed development would have an indirect **moderate beneficial** effect on the population generally.
**Employment**

13.4.10 The range of uses proposed by the development will create a number of jobs within the local. Table 13.3 below shows the estimated number of FTE jobs created in relation to the majority of employment generating uses proposed. The provision of a day nursery of the proposed elements of the scheme.

**Table 13.3**

<table>
<thead>
<tr>
<th>Use</th>
<th>Floor area</th>
<th>Area per FTE (sq. m)</th>
<th>Number of FTE Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foodstore</td>
<td>3,623 (NIA)</td>
<td>17</td>
<td>213</td>
</tr>
<tr>
<td>Retail units</td>
<td>3,716 (NIA)</td>
<td>90</td>
<td>41</td>
</tr>
<tr>
<td>Food and drink floorspace</td>
<td>743 (NIA)</td>
<td>18</td>
<td>41</td>
</tr>
<tr>
<td>Sports and Community Facility</td>
<td>500 (GIA)</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>300</strong></td>
</tr>
</tbody>
</table>

13.4.11 It is therefore estimated that the development has the potential to generate approximately 300 FTE jobs within the study area as a whole. It is however necessary to consider any leakage and displacement that may occur, beyond and within the study area respectively.

13.4.12 With regard to leakage of jobs, it is considered that this is a development that in terms of job creation generally has a local level impact up to county-wide level of impact. On this basis it is assumed that the level of leakage would be low (10%). This would result in the total estimated FTE jobs created by the development that would benefit the study area being reduced to 270.

13.4.13 In relation to displacement of people from other jobs within the study area, it is assumed that at worst there will be a low level (25%) of displacement. Applying this assumption would result in the total number of estimated FTE jobs falling to circa 203.

13.4.14 In terms of indirect job creation, new retail provision also creates a multiplier effect within the supply chain as businesses purchase goods and services from
other businesses. Using English Partnerships Multiplier effects for A1, a local impact multiplier of 1.21 can be applied to the total direct estimated retail jobs figure to provide an indication of the indirect jobs that could be created locally. If above multiplier is applied to the 254 direct FTE jobs estimated then it is further estimated that approximately 53 FTE jobs will be indirectly created. If the same leakage and displacement figures are applied then this would reduce the figure to approximately 36 FTE jobs.

13.4.15 Taking the above figures together it is estimated that the development could create in total 239 (direct and indirect) FTE jobs.

13.4.16 Additionally, the job creation that could be created through the enabling of the Stadium for Cornwall would be, according to the committee report at the time, between 114 and 448 FTE jobs. It is therefore reasonable to assume that the development subject of this ES has the potential to deliver in the region of 343 FTE jobs (direct and indirect).

13.4.17 In conclusion it is considered that the potential creation of 343 jobs within the study area is a **minor beneficial** impact.

**Local Expenditure**

13.4.18 If the total number of estimated jobs created (both direct and indirect) of 343 is applied to the lunchtime spend calculation detailed in the methodology section of this chapter, then it is estimated that there would be an increase in local expenditure of approximately £167,830 per annum. This is considered to represent a **minor beneficial** effect within the local study area.

13.4.19 In addition to this, the committee report for the outline planning application for the stadium indicated that the annual gross direct effects of the stadium on local expenditure within the study area would be between £2.8 million and 5.4m. This is considered to represent a **moderate beneficial** effect within the study area as a whole.
13.4.20 When the above effects on local expenditure are combined it is clear that the proposed development has the potential to deliver a **moderate beneficial** effect on local expenditure within the study area.

**Healthcare**

13.4.21 It is estimated that the proposed housing will result in an increase of population of approximately 299 people. This is a negligible/slight increase in the local population. Baseline data indicates that the majority of doctor and dentist practices within the locality are accepting patients therefore it is considered that there is capacity to accommodate the additional demand generated by the proposed development. However, it is likely and appropriate to assume that this additional demand will absorb much of the existing capacity. The proposed development is therefore likely to have a **minor adverse** impact with respect to health care provision locally.

**Education**

13.4.22 By applying the pupil generation ratio outlined in the methodology section for this chapter to the proposed residential, it is established that approximately 38 primary school pupils and 38 secondary school pupils would be generated.

13.4.23 In terms of primary school capacity, it is apparent from baseline data that there is capacity at the Threemilestone Community Primary School to accommodate this level of primary school pupils (understood to be 68 places available).

13.4.24 Notwithstanding this position there is a new primary school proposed as part of the consented Langarth scheme, which would provide further primary school capacity (at least 120 places) in the future (once constructed).

13.4.25 With regard to secondary school capacity it is understood that there is no capacity at the Richard Lander School to accommodate additional pupils.

13.4.26 The impact of the proposed development (without mitigation) in terms of education is therefore considered to be **minor adverse**.
Open Space and Sports Provision

13.4.27 The proposed scheme will result in a slight increase in the population of the local study area thereby increasing demand for open space and sports provision.

13.4.28 The baseline data shows that there is limited public open space within the locality however there is good provision of sports facilities associated with the Truro Leisure Centre at Treliske.

13.4.29 The proposed development incorporates a range of open space provision designed to meet the needs of the prospective residents and proposes sports provision (which includes formal playing pitches and a sports facility/building) that will meet/contribute to meeting the demands of the prospective residents as well as existing residents and prospective residents of the consented Langarth scheme.

13.4.30 The proposed development is therefore on balance likely to have a minor beneficial impact with respect to open space and sports provision.

13.5 Mitigation Measures

13.5.1 The identification and assessment of likely impacts section has established that the majority of socio economic impacts associated with the development are beneficial to some extent. On this basis they do not require mitigation. The identification and assessment of did however identify to likely minor adverse effects in relation to healthcare and education.

13.5.2 With regard to healthcare, it is assumed that the increased population associated with the development will absorb existing capacity within the local area. No direct mitigation is proposed as increased healthcare provision locally is likely to be brought forward in response to un-met demand. Provision is also made for the delivery of a healthcare uses as part of the consented Langarth
scheme and there are other live applications (considered in the cumulative effects assessment) which also propose floorspace for healthcare provision.

13.5.3 It has been assessed that there would be minor adverse impact on education provision locally due to the identified limits to capacity and assumed lack of capacity. To mitigate this a financial contribution should be secured by way of a section 106 agreement to enable the expansion of existing schools to occur and for new planned schools to be delivered. In relation to secondary school provision specifically, a contribution to the expansion of Richard Lander School would be appropriate and in line with the Council’s Infrastructure Needs Assessment – Truro and Roseland Schedule\textsuperscript{30}.

13.6 Residual Impacts

13.6.1 The residual impacts remain unchanged for the majority of impacts identified because these were beneficial and did not require mitigation.

13.6.2 For the two impacts adverse impacts identified Table 13.4 provides details of the residual impacts.

**Table 13.4 Residual Impacts**

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation</th>
<th>Residual Impact Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased demand on healthcare provision within locality – Minor Adverse</td>
<td>None proposed</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>Increase demand for education – Minor adverse</td>
<td>Financial contribution to expansion of existing schools and delivery of new schools</td>
<td>Negligible to minor positive</td>
</tr>
</tbody>
</table>

13.7 Cumulative Effects

13.7.1 Once the full spectrum of the cumulative developments identified in Chapter 2 of the ES are constructed there will be a number of cumulative socio economic

\textsuperscript{30} Future Cornwall – Cornwall Infrastructure Needs Assessment – Truro and Roseland Schedule (March 2014)
impacts, both negative and positive, during the construction and operational phases.

13.7.2 It is clear, based on the assessment of the scheme subject to this ES, that the range of developments proposed in this location will have a beneficial impact in relation to local expenditure and employment during the construction and operational phases. This is particularly the case with regard to the proposed Stadium for Cornwall which has significant associated economic benefits in this regard for the local area and Cornwall as a whole.

13.7.3 The large scale of new housing proposed across the cumulative scheme will have a beneficial impact in terms of housing provision and meeting local needs. There will of course though be an associated increase in demand for local education and healthcare provision. However, it is apparent and can be assumed that the range of committed developments identified will all either directly or indirectly (by way of on-site provision or by way of financial payment) contribute to improving the provision of required education and healthcare services and facilities. It is therefore considered that the cumulative effect of the schemes on healthcare and education will ultimately, in the long term, be beneficial as expansion of existing facilities and the construction of new ones takes place.

13.7.4 The Stadium for Cornwall scheme specifically has the potential to deliver a wide range of socio economic benefits locally and for Cornwall. In addition to the benefits it will deliver in terms of local expenditure and employment referred to above, there will be beneficial impacts related to sport, health and wellbeing, leisure/recreation and tourism.

13.7.5 It summary the cumulative schemes assessed provide the opportunity to deliver substantial socio economic benefits within the study area and provided the Council ensure that each scheme delivers, either by way of financial contribution or through on-site provision, the required physical social infrastructure will be provided.
13.8 Summary

13.8.1 This Chapter has analysed the socio-economic impact of the proposed development compared to baseline conditions, identified and considered the positive impact and increased demand for social infrastructure arising from the proposed development. A summary of the impacts identified and their residual status is outlined in Table 13.5.
### Table 13.5: Summary of socio-economic impacts assessment

<table>
<thead>
<tr>
<th>Impact</th>
<th>Impact Significance</th>
<th>Direct/Indirect</th>
<th>Positive/Negative</th>
<th>Temporary/Permanent</th>
<th>Summary of Mitigation</th>
<th>Residual Impact Significance</th>
<th>Positive/Negative</th>
<th>Temporary/Permanent</th>
<th>Confidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased employment in construction</td>
<td>Minor beneficial</td>
<td>Direct</td>
<td>Positive</td>
<td>Temporary</td>
<td>n/a</td>
<td>Minor beneficial</td>
<td>Positive</td>
<td>Temporary</td>
<td>Moderate</td>
</tr>
<tr>
<td>Increased local expenditure</td>
<td>Minor beneficial</td>
<td>Direct</td>
<td>Positive</td>
<td>Temporary</td>
<td>n/a</td>
<td>Minor beneficial</td>
<td>Positive</td>
<td>Temporary</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Operational</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New provision of retail, food and drink, day</td>
<td>Minor beneficial</td>
<td>Direct</td>
<td>Positive</td>
<td>Permanent</td>
<td>n/a</td>
<td>Minor beneficial</td>
<td>Positive</td>
<td>Permanent</td>
<td>Low</td>
</tr>
<tr>
<td>nursery, and community uses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provision of housing</td>
<td>Minor beneficial</td>
<td>Direct</td>
<td>Positive</td>
<td>Permanent</td>
<td>n/a</td>
<td>Minor beneficial</td>
<td>Positive</td>
<td>Permanent</td>
<td>Moderate</td>
</tr>
<tr>
<td>Delivery of Stadium for Cornwall</td>
<td>Moderate beneficial</td>
<td>Indirect</td>
<td>Positive</td>
<td>Permanent</td>
<td>n/a</td>
<td>Moderate beneficial</td>
<td>Positive</td>
<td>Permanent</td>
<td>Moderate</td>
</tr>
<tr>
<td>Increased employment in study area</td>
<td>Minor beneficial</td>
<td>Direct and indirect</td>
<td>Positive</td>
<td>Permanent</td>
<td>n/a</td>
<td>Minor beneficial</td>
<td>Positive</td>
<td>Permanent</td>
<td>Moderate</td>
</tr>
<tr>
<td>Increased local expenditure</td>
<td>Minor beneficial</td>
<td>Direct and indirect</td>
<td>Positive</td>
<td>Permanent</td>
<td>n/a</td>
<td>Minor beneficial</td>
<td>Positive</td>
<td>Permanent</td>
<td>Moderate</td>
</tr>
<tr>
<td>Increased local expenditure related to Stadium for Cornwall</td>
<td>Moderate beneficial</td>
<td>Indirect</td>
<td>Positive</td>
<td>Permanent</td>
<td>n/a</td>
<td>Minor beneficial</td>
<td>Positive</td>
<td>Permanent</td>
<td>Moderate</td>
</tr>
<tr>
<td>Impact on available healthcare provision</td>
<td>Minor adverse</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>None proposed or required as additional provision is consented and proposed within identified cumulative schemes assessed and healthcare providers are expected to respond as appropriate to unmet demand and provide additional capacity.</td>
<td>Minor adverse</td>
<td>Negative</td>
<td>Permanent</td>
<td>Moderate</td>
</tr>
<tr>
<td>Increased demand for education / school places</td>
<td>Minor adverse</td>
<td>Direct</td>
<td>Negative</td>
<td>Permanent</td>
<td>Financial contributions to expansion of existing schools and provision of new planned/consented schools within the local area.</td>
<td>Negligible / minor beneficial</td>
<td>Positive</td>
<td>Permanent</td>
<td>Moderate</td>
</tr>
<tr>
<td>Open Space and Sports provision</td>
<td>Minor beneficial</td>
<td>Direct</td>
<td>Positive</td>
<td>Permanent</td>
<td>n/a</td>
<td>Minor beneficial</td>
<td>Positive</td>
<td>Permanent</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
14.0 Cumulative Effects

14.0.1 The schemes included (unless specifically stated otherwise in a technical chapter) for the assessment of cumulative effects are identified in Chapter 2, Table 2.1.

14.0.2 In relation to cumulative effects, this ES contains an assessment of two types of effect:

1. The combination of individual effects (e.g. noise, dust, traffic, visual) from the development on a particular receptor; and
2. Effects from several developments, which individually might be insignificant, but when considered together would create a significant cumulative effect

14.0.3 The first type of cumulative effects are dealt with solely in this Chapter. In terms of second type of effects these are dealt within each of the technical chapters (Chapters 6 to 13).

14.0.4 The receptors which are expected to experience an impact that is created by way of a combination of individual effects are the existing residential properties that are within close proximity of the site and front onto the A390.

14.0.5 For these receptors it is predicated that they will be exposed to a range of individual impacts from the construction of the proposed scheme which relate to noise, dust, and HGV traffic. Whilst individually these construction related impacts were assessed as being negligible or slight/minor adverse, in combination they have the potential to have a greater impact on these receptors.

14.0.6 It is expected that a worst the receptors would experience a temporary minor adverse cumulative impact during the construction however in order to reduce this impact the mitigation proposed/embedded in each of the topic specific
chapters will need to be implemented. In essence this mitigation relates the agreement and implementation of a CEMP and adherence to best/good practice in terms of construction methods, to ensure impacts are effectively controlled to ensure no significant adverse impacts result.

14.0.7 For these receptors it is also predicted that they will be subject to a range of individual impacts once the scheme is operational that include increased traffic, reduced air quality, visual impact and increased noise. The assessment of these within individual chapters established the following:

- Impact of increased traffic on local roads – negligible impact
- Reduced air quality/changes in emissions associated with increases in traffic and plant – slight adverse to negligible
- Visual impact as a result of development as a whole – moderate adverse
- Increased noise related to traffic, car park, fixed plant and sports pitches – negligible to minor adverse

14.0.8 These impacts are either achieved with no mitigation or with mitigation proposed/embedded. The mitigation identified in relation to these impacts includes:

- Diversion of Number 88 bus to provide attractive alternative
- Implementation of Travel Plan with targeted mode switch
- Plant design and specification to reduce emissions
- Detailed design of landscaping - Appropriate structural planting along boundaries to reduce visual impact
- Imposition of operational controls/barriers to remove potential for adverse impact.