EDIGROUP


# new brunstane

Proposed residential development (including class 8 residential institutions, class 9 houses and sui generis flats), primary school (class 10 non-residential institutions), local centre (including class 1 retail, class 2 financial and professional services, class 3 food and drink, class 10 non-residential institutions and class 11 assembly and leisure), green network, means of access and transport links, infrastructure, and associated ancillary works at land north of Newcraighall Road and south of Milton Road East, Edinburgh.

## environmental statement
## volume 1 – environmental statement

AREA
URBAN DESIGN
ARCHITECTURE

AWM
ENVIRONMENT Ltd

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The Environmental Statement was completed in August 2016 to accompany the PPP Application

**PREFACE**

This Environmental Statement presents the results of an Environmental Impact Assessment (EIA) undertaken in relation to a proposed residential-led mixed-use development at land north of Newcraighall Road and south of Milton Road East, Edinburgh. It was prepared on behalf of EDI Group Ltd. to accompany an application for planning permission in principle to City of Edinburgh Council.

The suite of documents comprising the Environmental Statement are:

- Volume 1: Environmental Statement;
- Volume 2: Technical Appendices;
- Non-Technical Summary (NTS).

Printed copies can be viewed free of charge during normal business hours at:

- City of Edinburgh Council, Waverley Court, 4 East Market Street, Edinburgh, EH8 8BG.

Electronic versions of the above documents will be published online via City of Edinburgh Council's public access service for planning applications, and also on the project website at www.edigroup.co.uk/brunstane. Printed copies of the full Environmental Statement can be purchased at a cost of £120. Alternatively, a CD copy of the complete files in pdf format can be purchased at a cost of £10. Printed copies of the NTS can be purchased at a cost of £5. Electronic copies of the NTS will be provided free of charge on request.

All requests to obtain copies of documents should be submitted in writing to:

- IKM Consulting Ltd, Park House, 39 Bo'ness Road, Grangemouth, FK3 8AN;
- Or email: info@ikmconsulting.co.uk.

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**ABBREVIATIONS**

| | |
|---|---|
| AADT | Annual Average Daily Traffic |
| AMSC | Approval of Matters Specified in Conditions |
| AOD | Above Ordnance Datum |
| AQAP | Air Quality Action Plan |
| AQMA | Air Quality Management Area |
| AQS | Air Quality Strategy |
| ATC | Automatic Traffic Count |
| AVR | Accurate Visual Representation |
| BAP | Biodiversity Action Plan |
| BCT | Bat Conservation Trust |
| BTO | British Trust for Ornithology |
| bgl | Below Ground Level |
| BGS | British Geological Survey |
| BPM | Best Practicable Means |
| BRP | Bat Roost Potential |
| BSI | British Standards Institute |
| CA | Coal Authority |
| CAR | Controlled Activities Regulations |
| CBC | Common Bird Census |
| CEC | City of Edinburgh Council |

**ABBREVIATIONS**

| | |
|---|---|
| CEMP | Construction Environmental Management Plan |
| CHP | Community Health Partnership |
| CIEEM | Chartered Institute of Ecology and Environmental Management |
| CIRIA | (formerly) Construction Industry Research and Information Association |
| COPA | Control of Pollution Act 1974 (as amended) |
| CTMP | Construction Traffic Management Plan |
| CPP | Core Paths Plan |
| CRN | Calculation of Railway Noise |
| CRTN | Calculation of Road Traffic Noise |
| CSM | Conceptual Site Model |
| dB | Decibel |
| DfT | Department for Transport |
| DMP | Dust Management Plan |
| DMRB | Design Manual for Roads and Bridges |
| DTM | Digital Terrain Model |
| DWS | District Wildlife Site |
| EcIA | Ecological Impact Assessment |
| ECML | East Coast Main Line |
| EFT | Emissions Factors Toolkit |
| EIA | Environmental Impact Assessment |

**ABBREVIATIONS**

| | |
|---|---|
| ELC | East Lothian Council |
| ELDP | Edinburgh Local Development Plan |
| EPUK | Environmental Protection UK |
| EPS | European Protected Species |
| EU | European Union |
| FFL | Finished Floor Levels |
| FRA | Flood Risk Assessment |
| GCN | Great Crested Newt |
| GDL | Gardens and Designed Landscapes |
| GENIA | Guidelines for Environmental Noise Impact Assessment |
| GLVIA | Guidelines for Landscape and Visual Impact Assessment |
| GPS | Global Positioning Satellite |
| GVA | Gross Value Added |
| GWDTE | Groundwater Dependent Terrestrial Ecosystems |
| HAP | Habitat Action Plan |
| HES | Historic Environment Scotland |
| HGV | Heavy Goods Vehicle |
| HNDA | Housing Need and Demand Assessment |
| HRA | Habitat Regulations Appraisal |
| HSA | Habitat Suitability Assessment |

**ABBREVIATIONS**

| | |
|---|---|
| HSE | Health and Safety Executive |
| HSI | Habitat Suitability Index |
| IAQM | Institute of Air Quality Management |
| IEMA | Institute of Environmental Management and Assessment (formerly IEA) |
| IEA | Institute of Environmental Assessment (now IEMA) |
| IDS | Incomes Data Services |
| IHT | Institution of Highways and Transportation |
| IUCN | International Union for Conservation of Nature |
| JNCC | Joint Nature Conservation Committee |
| km | Kilometres |
| LAQM | Local Air Quality Management |
| LBAP | Local Biodiversity Action Plan |
| LBS | Local Biodiversity Site |
| LCA | Land Capability for Agriculture [or] Landscape Character Assessment |
| LDP | Local Development Plan |
| LGV | Light Goods Vehicle |
| LiDAR | Light Detection and Ranging |
| LNCS | Local Nature Conservation Site |
| LNR | Local Nature Reserve |
| LVIA | Landscape and Visual Impact Assessment |

**ABBREVIATIONS**

| | |
|---|---|
| m | Metres |
| MYE | Man Years of Employment |
| NAEI | National Atmospheric Emissions Inventory |
| NAS | National Archives of Scotland |
| NCR | National Cycle Route |
| NCSA | Nature Conservation (Scotland) Act 2004 |
| NGR | National Grid Reference |
| NLEF | National Low Emission Framework |
| NMF | National Modelling Framework |
| NMRS | National Monuments Record of Scotland |
| NNIS | Non-Native Invasive Species |
| NNR | National Nature Reserve |
| NPF3 | National Planning Framework 3 |
| NRTF | National Road Traffic Forecasts |
| NSR | Noise Sensitive Receptor |
| NTS | National Trust for Scotland |
| OS | Ordnance Survey |
| PAC | Pre Application Consultation |
| PAdj | Primary Adjustment Factor |
| PAN | Planning Advice Note |

**ABBREVIATIONS**

PBA Protection of Badgers Act 1992

PEA Preliminary Ecological Assessment

PFI Private Finance Initiative

PPP Planning Permission in Principle

PPV Peak Particle Velocity

PWS Private Water Supply

RCC Roads Construction Consent

RIGS Regionally Important Geological and Geomorphological Sites

RMSE Root Mean Square Error

RPE Respiratory Protective Equipment

RSPB Royal Society for the Protection of Birds

SAA Scottish Assessors Association

SAC Special Area of Conservation

SAP Species Action Plan

SBL Scottish Biodiversity List

SCI Site of Community Importance

SDA Strategic Development Area

SEA Strategic Environmental Assessment

SEPA Scottish Environment Protection Agency

SHEP Scottish Historic Environment Policy

**ABBREVIATIONS**

| | |
|---|---|
| SINC | Site of Interest for Nature Conservation |
| SLM | Sound Level Meter |
| SM | Scheduled Monument |
| SNH | Scottish Natural Heritage |
| SOC | Scottish Ornithologists' Club |
| SPA | Special Protection Area |
| SPAD | Scottish Palaeoecological Archive Database |
| SPEN | Scottish Power Energy Networks |
| SPP | Scottish Planning Policy |
| SSSI | Site of Special Scientific Interest |
| SuDS | Sustainable Drainage Systems |
| TA | Transport Assessment |
| TS | Transport Scotland |
| UKBAP | United Kingdom Biodiversity Action Plan |
| VDV | Vibration Dose Value |
| VP | Vantage Point |
| WANE | Wildlife and Natural Environment (Scotland) Act 2011 |
| WCA | Wildlife and Countryside Act 1981 |
| WEWS | Water Environment and Water Services (Scotland) Act 2003 |
| WFD | Water Framework Directive |

**ABBREVIATIONS**

WHO World Health Organisation

WSI Written Scheme of Investigation

ZTV Zone of Theoretical Visibility

# 1. INTRODUCTION

## 1.1 Overview

EDI Group Ltd (the applicant) is seeking planning permission in principle for a proposed development at Brunstane, south-east Edinburgh comprising an urban extension of residential development, new primary school, new local centre including retail and other ancillary commercial uses and community facilities, parkland, and associated infrastructure. The location of the site is shown on Figure 2.1. The proposal has been the subject of an emerging masterplan which has sought to develop a cohesive overall strategy for the site, introducing high quality built development, planting and open space in a way that is sensitive to its particular characteristics and constraints.

IKM Consulting Ltd (IKM) was appointed by the applicant to undertake an Environmental Impact Assessment (EIA) of the proposed development in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 (the EIA Regulations). This Environmental Statement (ES) reports the findings of the EIA and has been prepared as part of a suite of documents to accompany the application for planning permission in principle.

## 1.2 The Site

The site is located within the urban area to the south-east of Edinburgh, in the administrative boundary of the City of Edinburgh Council (CEC). The eastern edge of the site is on the boundary with the East Lothian Council (ELC) area. The total area of the site enclosed by the planning redline is 54.6 hectares.

The location and proposed site boundary is identified on Figure 2.1. The eastern edge of the site is bordered by the designed landscape of Newhailes House and mature woodland, marked by a brick wall enclosing the grounds. The Brunstane Burn defines the northern edge of the site, and its northern bank is populated by housing at Daiches Braes, Edinburgh College: Milton Road Campus, the Milton Road Cemetery and Milton Glen Golf Course. The John Muir Way footpath runs parallel to the Brunstane Burn, crossing to the south bank at the East Coast Main Line (ECML) railway line and adjoining the northern edge of the eastern field. National Cycle Network (NCR 1) runs along part of the south-western boundary of the site.

Although allocated green belt within the adopted Edinburgh City Local Plan (ECLP), the site is identified in the emerging Edinburgh Local Development Plan (ELDP) for removal from the green belt and allocation for housing-led development with a notional capacity of 950 to 1,330 units.

## 1.3 The Proposed Development

The residential-led mixed-use masterplan incorporates a range of land uses and related development, including:

- Up to 1,330 residential units in a mix of housing types and sizes, with 25% of the units being affordable;
- A new primary school;
- A new local centre including retail, commercial and community uses;
- The formation of three new site accesses, one from the north and two from the south, as well as a network of internal roads and paths, a replacement bridge over the East Coast Main Line (ECML) railway and other associated infrastructure;
- A green network, including open space, parkland, planting buffers to the railway and existing services within the site, and protection for the setting of listed buildings and the on-site Scheduled Monuments;
- Other structural and amenity landscaping and planting.

## 1.4 Requirement and Legal Basis for the Environmental Impact Assessment

The EIA Regulations require applications for permission to undertake certain developments to be accompanied by an assessment of its likely significant environmental effects. Projects falling in Schedule 1 of the EIA Regulations must be the subject of an EIA, and projects falling under Schedule 2 may require EIA depending on their scale, nature, and the sensitivity of the receiving environment. The local authority must determine if a Schedule 2 development requires EIA by screening it against the criteria presented in Schedule 3 of the EIA Regulations. Under Regulation 6 of the EIA Regulations, the applicant can request a formal screening opinion from the local authority to determine if EIA is required.

The applicant took a view that the proposed development falls within the EIA Regulations, Schedule 2 Class 10(b), and would be considered to require EIA when screened. For this reason, it was decided not to request a formal screening opinion from CEC and to proceed directly to EIA scoping and undertake the EIA.

## 1.5 Environmental Impact Assessment and the Environmental Statement

EIA is the systematic process of assessing, predicting, mitigating and evaluating the potential significant environmental effects of the construction and operation of a proposed development. The ES reports on the methodologies used and, where appropriate, sets out the mitigation measures proposed to prevent, reduce or offset significant adverse environmental impacts and maximise the positive outcome of potentially beneficial impacts.

An assessment of significant residual effects, which are the effects predicted to occur as a result of those impacts once mitigation has been taken into account, is then presented.

The main findings and conclusions of the EIA are summarised in non-technical language for the benefit of all readers in an accompanying Non-Technical Summary (NTS). This is a requirement of the EIA Regulations. The main purpose of the NTS is to ensure that all interested parties have access to relevant information on the likely significant environmental effects of the proposed development without a need to understand the technical methods and language employed in the detailed assessments.

The EIA has played a significant role in the process of developing a detailed understanding of the site and its potential environmental and other sensitivities, and has been integral to informing the evolution of the masterplan with a view to avoiding significant effects by changing the proposals or building in mitigation to become part of the scheme. The site, the proposed development, and the process of design evolution is discussed further in Chapter 2 and Chapter 3 of this ES.

The ES and NTS form part of the application for planning permission in principle and provide information to CEC, consultees and the public on the proposed development and its predicted environmental effects.

## 1.6 Structure of the Environmental Statement

This ES comprises the following chapters written by the respective professional organisations named in brackets:

- Preface and Contents (IKM Consulting / AWM Environment);
- Chapter 1 Introduction (IKM Consulting / AWM Environment);
- Chapter 2 Site Description and Proposed Development (IKM Consulting / AWM Environment / AREA);
- Chapter 3 Site Selection, Alternatives and Design Evolution (IKM Consulting / AWM Environment / GVA James Barr / AREA);
- Chapter 4 EIA Process and Methodology (AWM Environment);
- Chapter 5 Planning Policy (GVA James Barr);
- Chapter 6 Ecology, Biodiversity and Nature Conservation (IKM Consulting);
- Chapter 7 Landscape, Townscape and Visual Impacts (WSP Parsons Brinckerhoff);
- Chapter 8 Historic Environment (CFA Archaeology);
- Chapter 9 Water Resources, Hydrology, Flood Risk and Drainage (Kaya Consulting / IKM Consulting);
- Chapter 10 Ground Conditions, Hydrogeology, Geology and Soils (IKM Consulting);
- Chapter 11 Traffic, Transportation and Access (Transport Planning);
- Chapter 12 Air Quality (Ricardo);
- Chapter 13 Noise and Vibration (IKM Consulting);
- Chapter 14 Socioeconomic (GVA James Barr);
- Chapter 15 Cumulative Effects Assessment (IKM Consulting / AWM Environment);
- Chapter 16 Schedule of Mitigation (IKM Consulting / AWM Environment).

Supporting graphics to each of the above assessments are presented at the end of each relevant chapter, and relevant technical appendices are presented in Volume 2 of the ES.

## 1.7 Management of the Environmental Impact Assessment

The EIA process was coordinated by IKM Consulting Ltd. and AWM Environment Ltd. supported by a technical team selected on the basis of their qualifications, previous experience and understanding of the issues. The full EIA team is identified in Table 1.1.

**Table 1.1: Environmental Impact Assessment Team**

| Role / Chapter | Technical Consultant | Discipline Lead |
|---|---|---|
| EIA Project Management<br>ES Coordination, Drafting and Editing<br>Preface and Contents<br>01. Introduction<br>04. EIA Process and Methodology<br>15. Cumulative Effects Assessment<br>16. Schedule of Mitigation<br>NTS | ikm<br>AWM ENVIRONMENT Ltd | **Gillian Gow**<br>BSc (Hons) MSc CGeol FGS<br>Principal Geologist<br><br>**Andy Mitchell**<br>BA (Hons) MSc CEnv MIEMA MRTPI<br>Principal |
| 02. Project Description<br>03. Design Evolution | AREA URBAN DESIGN ARCHITECTURE | **Karen Cadell**<br>BA (Hons) Dip Arch MAUD<br>Partner |
| 05. Planning Policy | BiLFINGER GVA | **Rob Newton**<br>BSc (Hons) MRICS<br>Director |
| 06. Ecology, Biodiversity and Nature Conservation | ikm | **Jackie Hay**<br>BSc (Hons) PhD MCIEEM<br>Principal Ecologist |

| Role / Chapter | Technical Consultant | Discipline Lead |
|---|---|---|
| 07. Landscape, Townscape and Visual | WSP PARSONS BRINCKERHOFF | **Andy Follis**<br>BSc MPhil CMLI<br>Technical Director |
| 08. Historic Environment | CFA ARCHAEOLOGY LTD | **Hannah Tweedie**<br>BA MPhil MCIfA FSA Scot<br>Consultant Archaeologist |
| 09. Water Resources, Hydrology, Flood Risk and Drainage | Kaya Consulting Limited | **Dr Sally Stewart**<br>BA (Hons) MSc PhD<br>Senior Environmental Consultant |
| 10. Ground Conditions, Hydrogeology, Geology and Soils | ikm | **Gillian Gow**<br>BSc (Hons) MSc CGeol FGS<br>Principal Geologist |
| 11. Traffic, Transportation and Access | TRANSPORT PLANNING | **Alex Sneddon**<br>BEng (Hons) CMILT<br>Director |
| 12. Air Quality | RICARDO | **Dr Mark Broomfield**<br>BA (Hons) PhD<br>Specialist Consultant |

| Role / Chapter | Technical Consultant | Discipline Lead |
|---|---|---|
| 13. Noise and Vibration | ikm | **Caroline Low**<br>BSc MSc FGeol<br>Senior Consultant |
| 14. Socioeconomic | BiLFINGER GVA | **Rob Newton**<br>BSc (Hons) MRICS<br>Director |

# 2. DESCRIPTION OF THE SITE AND PROPOSED DEVELOPMENT

## 2.1 List of Figures

- Figure 2.1 Site Location;
- Figure 2.2 Site Boundary;
- Figure 2.3 Technical and Environmental Constraints;
- Figure 2.4 Strategic Landscape Framework;
- Figure 2.5 Strategic Movement Framework;
- Figure 2.6 Strategic Masterplan;
- Figure 2.7 Indicative Development Phasing.

## 2.2 Introduction

This chapter presents a detailed description of the existing conditions at the site, its key characteristics and constraints, and describes all of the components of the masterplan as proposed. It should be read in conjunction with Chapter 3 of this ES, which explains the evolution of the masterplan from its initial concept through the planning process to how it reached the form as proposed. Chapter 2 and Chapter 3 of this ES therefore work together to tell the story of the proposed development and how it evolved, and should not be read in isolation from each other.

The information presented in Chapter 2 and Chapter 3 forms the basis for each of the technical assessments presented in the remainder of the ES, including identifying any assumptions that have been made in order to ensure that a robust assessment of the reasonable worst case environmental effects is presented.

## 2.3 Site Description

### 2.3.1 Overview

The site is located within the urban area to the south-east of Edinburgh (see Figure 2.1 Site Location), and comprises approximately 54.6 hectares (ha) of mostly undeveloped agricultural land in Brunstane which slopes gently north-east down towards Joppa and the Firth of Forth beyond. It is surrounded on three sides by existing built development, including new housing at Newcraighall North, which is currently under construction.

The eastern edge of the site is bordered by the designed landscape of Newhailes House and mature woodland, marked by a brick wall enclosing the grounds. The Brunstane Burn defines the northern edge of the site, and its northern bank is populated by housing at Daiches Braes, Edinburgh College: Milton Road Campus, the Milton Road Cemetery and Milton Glen Golf Course. The John Muir Way footpath runs parallel to the Brunstane Burn, crossing to the south bank at the East Coast Main Line (ECML) railway line and adjoining the northern edge of the eastern field. National Cycle Network (NCR 1) runs along part of the south western boundary of the site.

From within the site there are long views out to the Firth of Forth, Berwick Law, the Pentland Hills and to Arthur's Seat, but there are limited views into the site from the surrounding urban areas. The site is bisected by the ECML railway line in a cutting running from north-west to south-east, and an existing bridge for agricultural use forms the only vehicle crossing into the eastern fields of the site. Pylons and overhead lines also traverse the site.

An aerial photograph of the proposed site and the redline boundary of the application for planning permission in principle is shown in Figure 2.2 Site Boundary.

### 2.3.2 Existing Site Levels and Topography

A topographical survey of the site was completed in November 2015. For the survey works, GPS and total station equipment were used to collect data on site and relate it to Ordnance Survey (OS) National Grid Reference (NGR) (position) and OS Datum Newlyn (Level). The levels recorded are shown in metres Above Ordnance Datum (mAOD). The text below summarises the topography across the site, with all levels quoted as mAOD.

Most of the western field is gently undulating, and is bisected by a farm track running approximately south-west to north-east from Brunstane House in the west to the ECML in the east. The level of the track decreases from 32.98m AOD in the west to 28.06m AOD at the railway line. Levels in the western field are highest next to the farm track. The topography to the south of the track undulates gently, with a general decrease in level from approx. 32.00m AOD at the track, towards the south eastern corner of the field at the rear of Wanton Walls Farm (24.79m AOD) and at the intersection of the south eastern corner of the field with the ECML (23.99m AOD). On the north side of the track, levels within the western field undulate gently, and decrease generally from south-west (32.15m AOD) to north-east (27.11m AOD) before dropping steeply towards the northern boundary (24.53m AOD), and in particular the north-east corner of the existing field (17.88m AOD).

The eastern field is also gently undulating. The topographical survey showed a general decrease in levels from the position of the existing bridge over the ECML towards the north-east corner (27.08m AOD to 19.55m AOD). The site levels then fall away towards the northern boundary (14.91m AOD) and the north eastern corner of the field (13.39m AOD). The drop in topography is less towards the north western corner of the eastern field, with a topographical low of approximately 21.35m AOD at the site boundary. The John Muir Way is undulating along the northern boundary of the site.

The proposed access corridor from Milton Road East in the north has also been surveyed. Levels along this corridor fall from 25.40m AOD in the north to 9.37m AOD at the Brunstane Burn, before rising steeply to a level of 17.24m AOD at the John Muir Way, and 17.64m AOD at the northern boundary of the eastern field.

### 2.3.3 Statutory and Non-Statutory Designations

There are a number of relevant designations within or immediately adjacent to the site which are illustrated in Figure 2.4 Technical and Environmental Constraints, in particular:

- Historic Environment:
    - Brunstane Moated Site Scheduled Monument within the site boundary at the western edge of the site;
    - Brunstane Enclosure Scheduled Monument within the site boundary in the western field;
    - Category A listed Brunstane House and walled garden and Category B listed steading and farm cottages to the south of Brunstane House, on the western boundary of the site;
    - Category C listed Newhailes Policies, Wanton Walls Farmhouse and Steading on the southern boundary of the site;
    - Various Category A, B and C listed buildings associated with Newhailes House on the eastern boundary of the site;
    - Newhailes Garden and Designed Landscape on the eastern boundary of the site.
- Nature Conservation:
    - The Brunstane Burn and its banks are identified as a Local Nature Conservation Site (LNCS) in the Edinburgh City Local Plan (ECLP) and Edinburgh Local Development Plan (ELDP);
    - The line of the former railway and adjacent areas along the south western boundary of the site are identified as a Local Nature Conservation Site (LNCS) in the ECLP and ELDP.

- Access and Recreation:

    - Part of Core Path CEC5 Innocent Railway runs adjacent to the Brunstane Burn Core Path to the north of the site. This section of the Core Path also reflects part of the route of the John Muir Way, a long distance route from Helensburgh on the west coast of Scotland to Dunbar on the east coast;

    - Part of Core Path CEC5 Innocent Railway also forms the south western boundary of the site with the adjacent Newcraighall North housing site. This section of the Core Path also reflects part of the route of National Cycle Network (NCN) 1.

### 2.3.4 Utilities and Services

There are a number of existing buried and overhead utilities within or close to the boundaries of the site. The position of these is shown on Figure 2.4 Technical and Environmental Constraints.

***Scottish Power***

Approximately parallel to the ECML on the north-east side is a 33kV overhead distribution line. Three steel towers within the site, approximately 22m in height, support the conductor lines.

Recent discussion with Scottish Power Energy Networks (SPEN) has identified that these towers and associated conductors (overhead distribution lines) are no longer in use and are to be removed. The demolition programme is not yet known, but indications to date suggest removal during 2016/2017. For the purposes of the masterplan, these towers and associated conductors are assumed to have been removed.

New underground cables to replace the 33kV distribution line are located parallel to the embankment to the south of the site. One line of underground cable is positioned at the base of the northern slope of the embankment and another line of underground cable is positioned towards the top of the embankment.

Ongoing consultation with Scottish Power Energy Networks (SPEN) has established that a wayleave width up to 2.5m would be applied to the 33kV underground cable. A new main access road from Newcraighall Road and a new secondary access road from the Newcraighall North development to the south of the site are proposed. These access roads would cross above the cables. Cable ducting and suitable protection would therefore be required in order to fully protect the cables from future vehicle loading.

A diversion to the NCR1 cycle path is proposed. As shown on the masterplan drawing, the realigned cycle path would follow the same line as the 33kV underground cable located at the base of the northern slope of the embankment. If this diverted cycle path were to conflict with the underground cable, cable ducting and suitable protection may be required or alternatively a re-alignment of the cable to suit.

A 275kV transmission line is located close to the southern site boundary, running parallel with the existing cycle path, which forms the boundary between the New Brunstane and Newcraighall North development sites.

Following recent discussions and a site visit with SPEN, minimum horizontal and vertical clearances to the conductor lines were calculated based on information provided within Scottish Power technical guidance for overhead lines. Finished ground levels for the proposed access roads are not known at this stage however these will be established during the detailed design stage with consideration to minimum clearances required to the overhead lines. Ongoing consultation with SPEN will be carried out to ensure all standards are met and guidelines followed as the development progresses.

***Scottish Water***

A 450mm diameter combined surface and foul water sewer, owned and operated by Scottish Water, is shown to enter the site on the southern boundary, continuing along the southern and eastern site boundaries, with a combined sewer overflow discharge into the Magdalene Burn.

A series of manholes are present along the length of the combined sewer. Where it enters the site, the top of the pipe appears to be approximately 4.62m below ground level (bgl). Along the eastern boundary, the depth to the top of the pipe, is shown to shallow from south to north from approximately 5.6m bgl to 1.1m bgl.

A 1.83m diameter culverted watercourse (the Magdalene Burn) is shown to run parallel to the combined sewer, adjacent to the sewer on the south. The culverted watercourse runs parallel with the sewer until it reaches the eastern side of the ECML, at which point it diverts to the south, before entering the land belonging to Newhailes House, diverting north again and ultimately discharging to the Brunstane Burn close to the north-east corner of the site.

A 700mm foul sewer rising main is shown to run parallel to the ECML on the eastern side. The rising main, owned and operated on behalf of Scottish Water by their PFI partner Veolia, is a live, pressurised wastewater pipeline which carries flows from Wallyford wastewater pumping station. Towards the northern boundary of the eastern field, the rising main diverts to the north-east cutting across the corner of the field before continuing in a northerly direction towards Milton Road East. The path of the rising main continues approximately along the western boundary of the proposed access corridor from Milton Road East, and will require to be diverted prior to construction of the permanent access. The depth of the rising main is still to be confirmed however consultation with Scottish Water Asset Impact Team is ongoing regarding the potential diversion works.

Scottish Water will require a wayleave of around 5-6m for the 450mm combined sewer and a minimum wayleave of 5m for the 700mm foul sewer rising main which have been considered within the masterplan drawing. Ongoing consultation with Scottish Water will be carried out to ensure all standards are met and guidelines followed as the development progresses.

***Milton Road East***

A number of existing utility services (electricity and gas) are present within the depth, or adjacent to, the existing footpath on the southern edge of Milton Road East, crossing the location of the proposed junction. It is envisaged that these services are at a relatively shallow depth, possibly less than 1.20m. The location, depth and exact nature of these services will be identified prior to the detailed design of the proposed junction being progressed.

***East Coast Main Line***

Network Rail owned land adjacent to the East Coast Main Line (ECML) electrified railway bisects the site. Network Rail has advised that a wayleave of 3m be considered from the Network Rail boundary fence. This has therefore been taken into account when developing the masterplan.

As part of the development works, a new bridge across the ECML is proposed. The new bridge will accommodate a two lane carriageway, a footpath and cycle path. The masterplan concept is currently being considered by Network Rail through an internal review process. During the detailed design of the proposed overbridge, all vertical clearances will also be taken into account to ensure that minimum clearances required are achieved to the underside of the bridge deck and the overhead electrified lines.

Ongoing consultation with Network Rail will be carried out to ensure all standards are met and guidelines followed as the development progresses.

### 2.3.5 Other Site Technical Information

***Mining Legacy***

The possibility of instability of the ground overlying old, shallow mine workings is well understood in the area. Mineral investigations in the area have been undertaken, and further investigations will be undertaken to assist with development phasing. IKM has completed detailed assessments of the existing information, together with Coal Authority mine abandonment plans dating back to the early 19th century and older.

All of the mining data has been collated and used to produce a detailed, 3-D computer model of the ground beneath the site which clearly illustrates the position of coal seams and their relationship to other known geological features that make shallow coal workings less likely.

The findings of the investigations undertaken to date have concluded that most of the site is safe to build on. A small portion of the site may require stabilisation by grouting. The details of any remedial works that may be required will be confirmed during further phases of intrusive investigation.

***Contaminated Land***

The site has largely been agricultural land, but site uses have included railway lines and mining and as a result it is possible some form of contamination is present. Any made ground, associated with mining or railways, may contain waste products and chemical contaminants. In addition, minor depressions appear to have been infilled and contaminated fill may be present. Other potentially contaminative historical land uses in the wider area include refuse tips, electrical sub-stations, fuel stations and vehicle repair facilities.

## 2.4 Description of the Proposed Development

The residential-led mixed-use masterplan incorporates a range of land uses and related development, including:

- Up to 1,330 residential units in a mix of housing types and sizes, with 25% of the units being affordable;
- A new primary school;
- A new local centre including retail, commercial and community uses;
- The formation of three new site accesses, one from the north and two from the south, as well as a network of internal roads and paths, a replacement bridge over the East Coast Main Line (ECML) railway and other associated infrastructure;

- A green network, including open space, parkland, planting buffers to the railway and existing services within the site, and protection for the setting of listed buildings and the on-site Scheduled Monuments;

- Other structural and amenity landscaping and planting.

The EIA is based on a site area of 54.6ha as identified in the Pre-Application Notice (PAN) and 1,330 residential units as identified in the ELDP site allocation. Whilst the final details will be the subject of detailed design development at a later stage, the above set of assumptions provide comfort that the EIA has considered and assessed the reasonable worst-case environmental effects of the overall development.

The final layout and configuration of residential and other land uses will be the subject of detailed design at the appropriate time, and any illustrations provided at this stage are only to indicate a reasonable set of worst-case assumptions for the purposes of assessment.

### 2.4.1 Site Access and Movement

In order to facilitate access to the site, a number of engineering upgrades will be required. This will include establishment of new accesses into the site from Milton Road East in the north, and primary and secondary accesses into the site from Newcraighall Road in the south. Consideration will also have to be given to construction of a new bridge over the ECML. This will be required to accommodate, two-way traffic, cyclists and pedestrians. The emerging infrastructure will be required to ensure that existing cycle ways and walkways, such as the John Muir Way, are retained, as well as creating opportunities to improve the local cycle network.

Access into the north of the site from Milton Road East will require a new crossing over the Brunstane Burn. This will be designed as part of the detailed design phase, along with more detailed modelling and calculations in consultation with Scottish Environment Protection Agency (SEPA) and City of Edinburgh Council (CEC). The opportunity to use bridging solutions, or bottomless or arched culverts, that minimise any effects on the bed and banks of the watercourse will be explored for the construction of the new crossing. The precise nature of the structure will be determined during the detailed design phase.

Preliminary discussions with public transport operators has also indicated that it would be feasible to operate bus services within the site once the through road link was completed.

### 2.4.2 Parking

The residential elements of the proposed development will include parking in-curtilage, within courtyards or on-street depending on the density and location within the masterplan. Visitor parking will be provided on-street and will be designed as an integral part of the streetscape.

Vehicle parking will be provided generally in accordance with CEC's Parking Standards for Development Management. The exact levels and locations of parking provision will be the subject of consultation with CEC and will be determined during detailed design.

### 2.4.3 Drainage and SUDS

For the proposed development, the means of draining the surface water from the developed site will be carefully considered to ensure that site surface water closely reflects the behaviour of the existing site run-off and flow pathways.

It is intended that all post development surface water will be drained using a combination of traditional piped methods and sustainable drainage systems (SUDS). Once collected and treated, this will flow into the existing nearby watercourses at an allowed discharge rate. Flow in excess of the discharge rate will be attenuated within the SUDS such as attenuation ponds and basins.

Some of the development surface water may also be discharged to the existing Scottish Water combined sewer network. Scottish Water has indicated that sufficient capacity exists within the network to accommodate the scale of development proposed, subject to completion of a Water Impact Assessment at the appropriate time.

Areas of the site have been designated as attenuation areas. The design of the SUDS proposals has also been developed in consultation with the project ecologists in order to maximise the secondary benefits of SUDS features for wildlife and biodiversity.

The final SUDS strategy and design will be dependent on the finalised impermeable area, the findings of ground Investigations, and consultations with Scottish Water, SEPA and CEC. However, as a general principle treatment at source will be prioritised over other measures

It is proposed that all foul water discharge from the development shall be discharged to the existing foul sewerage network. Scottish Water has indicated that sufficient capacity exists within the network to accommodate the scale of development proposed, subject to completion of a Drainage Impact Assessment at the appropriate time. The proposed sewerage system will connect to the existing network at locations agreed with Scottish Water. The network will be designed such that all connections are gravity fed and pumped sewerage is not required.

### 2.4.4 Other Proposed Utilities and Services

Electricity, gas and telecoms will be required to service each of the new residential, educational and commercial properties constructed at the site. The design and specification of proposed utilities and services will be developed in consultation with the individual service providers and CEC, during the detailed design process, with a view to minimising impact on the surrounding area.

Street lighting will be required to the relevant specification, as well as an element of external lighting associated with primary school and other non-residential land uses to enable safe operation beyond the hours of daylight. The design and specification of all external lighting will be developed in consultation with CEC through the detailed design process, and will be designed to be as discrete as possible to minimise its impact on the surrounding area.

## 2.5 Development Implementation

### 2.5.1 Securing Key Infrastructure Delivery

A development strategy will be developed and managed to deliver the site-wide key infrastructure and strategic open spaces in line with the masterplan intent and at the appropriate time to suit the phasing of development.

These include the main access connections, the bridge over ECML, Brunstane Park, Brunstane Circus and Firthview Park as illustrated in the Design Code that accompanies the application for planning permission in principle (PPP).

A detailed landscape framework will be prepared following PPP approval to inform the delivery of strategic open spaces and their long-term maintenance. Unless adopted by CEC, it is likely that these open spaces will eventually be maintained by the future community of this development in accordance with the terms of a Deed of Conditions to be drawn up in due course.

Detailed design of each key element will be fully developed and consulted upon throughout the Approvals of Matters Specified in Conditions (AMSCs) and any necessary technical approvals such as Road Construction Consent (RCC) will be secured as and when appropriate prior to implementation.

Continuing dialogue with CEC to agree the timing of the appropriate education contribution required will ensure the necessary education infrastructure is delivered at the right time to serve the new community at the site.

### 2.5.2 Development Thresholds

As the site is divided by the ECML, a replacement railway overbridge will be required to connect the east and west parts of the site at the appropriate time. In the eastern part of the site, development is unlikely to exceed 200 dwellings (from a single access off Milton Road East) before this new bridge is constructed. Development can more readily occur in the western part of the site, but in either case the new primary school is likely to be required at around the point 425 dwellings have been built. In relation to accessibility, dwellings can be provided within 400m of existing bus routes and 800m of existing railway stations and remain within normally applied walking thresholds, prior to bridge provision which would help open up a through public transport route. The number of units that can be built to this requirement s that can be built in this fashion (setting aside the 200 limit east of the ECML) will depend on the final density of development that would lie within these walking thresholds.

In any event, the two known thresholds that are likely to apply are 200 in the east part and 425 overall prior to the school provision. It is possible that 425 units could be developed in the western part (thereby necessitating the school), or more likely some mix of dwellings in the east and west parts provided a safe route to school is provided from both sides.

### 2.5.3 Development Phasing

Following the planning and consenting process, it is assumed that physical development will commence on the site around 2018 and proceed in four phases over approximately nine years to completion in 2027. Figure 2.7 illustrates an indicative phased implementation of the proposed development.

Although the actual timing, length, and precise nature of development in each phase is subject to change and the approval of AMSC's, for the purposes of the EIA the following has been assumed:

- Phase 1 – enabling works, infrastructure and residential units. It is anticipated that Phase 1 will commence in 2018 and be completed by 2022. The latter part of the Phase 1 works may be concurrent with the start of Phase 2 works;
- Phase 2 – enabling works, key infrastructure (including the new crossing over the ECML and new primary school), and residential units. It is anticipated that all Phase 2 works will commence in 2021 and be completed by 2023;
- Phase 3 – residential units and new local centre. It is anticipated that Phase 3 will commence in 2023 and be completed by 2025;
- Phase 4 – residential units. It is anticipated that Phase 4 will commence in 2024 with all works completed by 2027.

### 2.5.4 Additional Construction Assumptions

For each of the construction phases, earthworks activities are anticipated involving cut and fill of material across the site to achieve required finished ground levels. It is intended, where possible, to re-use cut material for areas requiring fill in order to limit the amount of material being taken off site and imported onto site.

There may also be a requirement for ground stabilisation works depending on the outcome of detailed ground investigations.

As the proposed development will be implemented in phases, it is not possible at this stage to provide an accurate number of vehicle movements during construction. However, based on the assumed construction phasing presented in Section 2.4.3 above it is considered appropriate for the purposes of the EIA to assume that construction vehicle movements will peak during the early stages of each phase when key infrastructure such as roads, drainage and utilities will be installed. It is considered likely that the peak would not exceed 70 single vehicle movements in any one day within the site and 20 single movements off site, and will typically be fewer than this.

# 3. SITE SELECTION, ALTERNATIVES AND DESIGN EVOLUTION

## 3.1 List of Figures:

- Figure 3.1 Urban Design Parameters.

## 3.2 Overview

The site has been allocated as a new housing proposal, 'Brunstane HSG29,' within the Edinburgh Local Development Plan Second Proposed Plan (ELDP). Following an examination of the above plan by the Planning and Environmental Appeals Division (DPEA) of the Scottish Government in 2015 and 2016, Reporters concluded that the site should remain designated in the plan for housing development and consequently removed from the green belt, as shown on the proposals map. Associated development principles and a site brief for the site are also included to guide development proposals. In line with the principles and site brief set out in the ELDP, as modified by the examination Reporters, a strategic masterplan for the site has been developed to respond to the specific features, characteristics and constraints of the site and in response to the design concept, the likely operational requirements of eventual users and occupiers of the site, and all of the constraints and opportunities identified. The strategic masterplan as proposed has evolved to reach an appropriate compromise between achieving the maximum development potential from the site, protecting sensitive features from harm, and maximising opportunities to improve the environmental context of the site.

This chapter provides a summary of how the strategic masterplan has evolved in response to the environmental constraints and opportunities. It should be read in close conjunction with Chapter 2 of this ES, which presents a detailed statement of the characteristics of the site and the key components of the development as proposed. A fuller description of the strategic masterplan is provided in the Strategic Masterplan document which accompanies the application for planning permission in principle.

This chapter was written by IKM Consulting with support from GVA James Barr and AREA.

## 3.3 Need for the Project

All Local Authorities in Scotland are required to adopt a Local Development Plan (LDP) to cover a variety of issues within their region. One of the largest parts of the LDP relates to housing and the amount each local authority is required to deliver over their LDP's plan period of ten years.

For Edinburgh this supply target is set by the South East Edinburgh Strategic Development Plan (SESPlan), which requires Edinburgh to deliver 29,510 homes between 2009 and 2024. Consideration also needs to be taken from strategic policies and guidance which cover Scotland including Scottish Planning Policy (SPP).

To ensure that a generous supply of housing land is maintained at all times, SPP states that the housing land supply target should be increased by a margin of 10 to 20%. In the case of the ELDP, a figure of 10% was applied, resulting in a housing land supply target of 32,460 homes across the plan period.

The approach taken by City of Edinburgh Council (CEC) to meeting the housing land requirement has been to first allocate brownfield sites, then land within Strategic Development Areas and finally locations elsewhere in the city. The site at Brunstane is located within the South East Edinburgh Strategic Development Area. The full details of this assessment, including sites promoted for development through the ELDP process, are contained within the ELDP Environmental Report.

As part of this process and assessment, the site at Brunstane has been allocated for between 950 and 1330 new homes within Edinburgh's Local Development Plan Second Proposed Plan (ELDP), which was published in June 2014.

In the introductory section to the ELDP (p64), it is stated that, in respect of Brunstane and Newcraighall, "these sites provide the opportunity for new housing together with new and improved school and local facilities on the eastern side of the Council area. The sites are well served by bus and rail connections with the opportunity for these to be further enhanced. Existing and enhanced footpath and cycle links and green corridor proposals will ensure development is well connected between sites and to existing communities".

An objective of the proposed development is therefore to contribute to delivering much needed housing within Edinburgh to assist CEC in achieving housing requirements across the plan period.

Following an examination of the above plan by the Planning and Environmental Appeals Division (DPEA) of the Scottish Government in 2015 and 2016, Reporters concluded that the site should remain designated in the plan for housing development and consequently removed from the green belt, as shown on the proposals map.

Reporters have also recommended that the ELDP is modified in the form of revisions to the development principles for the site. These revisions are considered at section 3.5 below, insofar as it relates to the masterplan response to the ELDP HSG 29 Brunstane allocation.

### 3.4 Site Selection and Alternatives Considered

As part of CEC's site allocation process to inform the ELDP, an assessment of all potential sites was undertaken and the most appropriate sites allocated for housing, in the manner already described above. The assessment of sites is required to follow a consistent process of consideration by CEC against a variety of criteria in order to come to a view as which sites are most appropriate to allocate for housing. That assessment was undertaken by CEC in accordance with the Environmental Assessment (Scotland) Act 2005. Various Strategic Environmental Assessment (SEA) guidance was also used, including Office of the Deputy Prime Minister (ODPM) (2005) '*A Practical Guide to the Strategic Environmental Assessment Directive*'.

For this reason, no specific alternative sites were considered by the applicant. The site at Brunstane has been allocated to meet a recognised and required need for housing in a separate process undertaken by an independent organisation. The proposed development therefore shadows the site consideration process for the ELDP with an application to bring forward residential development on the site. The ELDP process completed the required assessment to determine that the site is suitable for residential development.

### 3.5 Masterplan Response to ELDP Allocation

On behalf of EDI, GVA has made representations at various stages of the ELDP process promoting the site for housing development and removal from the green belt:

- Edinburgh Local Development Plan, Main Issues Report, January 2012;
- Edinburgh Local Development Plan, Proposed Plan, June 2013;
- Edinburgh Local Development Plan, Second Proposed Plan, October 2014;
- Edinburgh Local Development Plan Examination 2016.

### 3.5.1 Main Issues Report, 2012

In the MIR representation, the site was referred to as 'Brunstane East', and comprised only the land to the west of the East Coast Main Line (ECML). 'Brunstane East' was identified as being distinct from the wider 'Brunstane Farmland' Assessment Area, "*which CEC have assessed in respect of housing in the course of the LDP MIR. For clarity, Brunstane Farmland includes Brunstane East and also the open land to the east of the East Coast mainline railway up to the Newhailes boundary*."

The report set out the context of urban expansion, the increasing SESPlan (South East Scotland Strategic Development Planning Authority) housing land requirement for South East Edinburgh Strategic Development Area (SDA), the case for urban expansion and the viability of the Brunstane East site as an, "*effective and deliverable housing proposal*".

Consideration was given to suitability, accessibility and the release of the site from the green belt.

The report concluded that:

*"Brunstane East can reasonably be considered the next logical step in the development strategy for Newcraighall, taking the recent planning permissions forwards. As a sustainable pattern of growth, the proposals can make best use of existing resources whilst creating an attractive and well connected new environment for future residents.*

*In particular, Newcraighall's inherent sustainability credentials remain at the heart of the planning case, as before, to expand the settlement. This is a place which benefits from numerous rail, road and cycle connections (existing and committed), as well as being located in such close proximity to the capital city and also countryside. Newcraighall's solid sustainability foundations should rightly be taken forward, through green belt release, to a managed, planned urban expansion at Brunstane East*."

### 3.5.2 Proposed Plan, 2013

The 2013 representation to the Edinburgh Local Development Plan Proposed Plan was made in respect of land being promoted by EDI at Brunstane both to the west and east of the ECML, appearing as it is today.

At the time, EDI firmly believed that there was a compelling case for an urban extension in the area and removal of the site from the green belt, and led by an urban development framework which outlined a clear case for phased development for, "*up to 1,200 houses*" at that time. Suggested 'development principles' were also put forward as part of the representation, to guide future development of the site.

The aim of the framework was, "*to successfully integrate the site's development within its surrounding context, by co-ordinating existing and new movement routes and access arrangements, identifying and respecting key views, addressing landscaping opportunities and open space requirements throughout the site.*"

A brief summary of the representation was presented:

"*EDI's representation establishes that the site is located within the Edinburgh urban area, that it no longer serves a green belt purpose, and is a highly accessible location which can deliver a major housing development of up to 1,200 houses. Specifically, the site is located within the defined South East Edinburgh Strategic Development Area of the Proposed Strategic Development Plan (SESPlan) and is able to accommodate the housing requirement of SESPlan for this SDA, as well as further growth anticipated as likely at LDP modification stage following the SESPlan Reporter's Report.*

*The site's relative proximity to Edinburgh with a high level of accessibility by existing cycle, pedestrian, public transport (bus and rail) and vehicular routes and its potential for enhanced connectivity both within the site and to its surrounding area is evidenced in this submission…A Landscape and Visual Appraisal…confirms the site can only be seen from a limited number of viewpoints, has a negligible role in providing landscape setting to Edinburgh and neighbouring towns, and in providing visual separation between Musselburgh and Joppa, Brunstane and Newcraighall. The proposed new housing proposal would make the site accessible to the public for the first time (in contrast with the existing private agricultural use), create a significant new greenspace proposal and make a valuable addition to the Edinburgh Green Network. A local centre, care home, day nursery, school and live/work units would all potentially support the high quality sustainable urban extension, as well as a significant level of family housing provision.*"

The report stated that, "*The representation conclusively demonstrates the case for an outstanding new housing development site which positively aligns with the 'statutory duty on development plans to contribute to sustainable development.' (SPP para 11)*."

EDI proposed that the ELDP Proposed Plan spatial strategy, Proposals Map, Tables and Figures be amended to add the Brunstane site.

In terms of the feasibility of the development, consideration was given to a number of potential technical constraints, including historical mining, contaminated land, archaeology, air quality, noise, ecology, power lines and flooding. Detailed consideration was also given to accessibility and proposed movement, and a detailed landscape and visual appraisal was undertaken. The main findings of these assessments are considered as part of Section 3.6 of this report.

Principally, representations to the Proposed Plan sought the following:

- Removal of the entire site from the green belt;
- Allocation as a housing site, HSG X Brunstane, within the South East Edinburgh SDA and with an estimated total capacity to deliver up to 1,200 homes and associated land uses.

### 3.5.3 Second Proposed Plan, 2014

The 2013 Proposed LDP was prepared on the basis of the Proposed South East Scotland Strategic Development Plan (SDP), including housing land requirements set out within that plan. Shortly after the period for representations to the Proposed LDP closed, Scottish Ministers approved the SDP and required SESPlan to prepare Supplementary Guidance to distribute an increased overall housing requirement amongst the six Council areas, including CEC.

In response to this increased overall housing requirement, as well as ensuring that the growth requirements of the SDP could be accommodated on sites which best meet assessment criteria including landscape impact, green belt boundaries and accessibility to public transport and infrastructure capacity, the site at Brunstane was removed from the green belt and allocated as a new housing proposal (HSG 29 Brunstane) in the ELDP Second Proposed Plan. Further details of this in the form of a housing site assessment, is set out in the ELDP Environmental Report Second Revision (Volume 2).

Representations by EDI to ELDP Second Proposed Plan fully endorsed the site's allocation as a new housing proposal, HSG 29 Brunstane and its removal from the green belt. To give effect to this endorsement and the fact that CEC were seeking representations to a Second Proposed Plan, EDI also submitted a full copy of their representations to the 2013 Proposed Plan. This was attached at appendix 1 of the representations to the 2014 Second Proposed Plan.

An updated development framework for the development of the Brunstane site was included within the representations and focussed on accessibility, feasibility and deliverability. An initial framework diagram was produced to identify the preferred infrastructure and movement solution, potential layout, and phased programme for delivery of new housing and other uses at the site.

The aim of the framework was to, "*successfully integrate the site's development within its surrounding context, by co-ordinating existing and new movement routes and access arrangements, identifying and respecting key views, addressing landscaping opportunities and open space requirements throughout the site. The framework brings together a range of uses including residential, local centre, education, care home and nursery, using the framework diagram to help indicate potential densities and development content, and lastly examine the challenges and solutions for delivery*."

With the exception of transport, the content and conclusions of "*Appendix 1*" remained unchanged. In addition, the publication of the National Planning Framework 3 (NPF3) and Scottish Planning Policy (SPP) in June 2014 represented a significant change to the relevant national planning policy context, which was then addressed as part of the 2014 representation.

Additional transport information in relation to accessibility and transport concluded:

- These documents raise several key transport considerations not only for the Brunstane site but sites across the City. Brunstane is not alone in facing transport challenges, but is better placed than some to address them;

- Of particular interest are other site designations at Brunstane (SCH9 and S5) that would see a new primary school and new centre being located within the site. Developing these facilities would help 'internalise' trips by providing key facilities within the site area – this is not mentioned in any concerns raised by others;

- The site is accessible – uniquely in Edinburgh – to two heavy rail stations (Brunstane and Newcraighall) with further options to get to a third (Musselburgh);

- The potential vehicular access onto Milton Road East has already been capacity tested, the results submitted to CEC and those accepted as having capacity to accommodate development;

- Lothian Buses have been consulted in relation to services within the site area and a through route that would link Milton Road East with QMU through Brunstane, Newcraighall North and Newcraighall East represents an attractive route option for them and they have indicated that they look forward to servicing this new corner of the City;

- Taken together, there are positive transport and accessibility reasons why Brunstane should be developed.

NPF3 made particular reference to Scottish Ministers' desire to see, *"a greater and more concerted effort to deliver a generous supply of housing land in Edinburgh and the South East."* EDI submitted that, *"the new housing proposal 'HSG 29 Brunstane' in the ELDP 2nd PP will directly contribute towards meeting Scottish Ministers' above stated priority as regards growth and housing land supply delivery in Edinburgh and the South East, and fully complies with the NPF3."*

EDI considered the new housing proposal 'HSG 29 Brunstane' in the ELDP 2nd proposed plan to provide, *"a strong opportunity to deliver the four planning outcomes within SPP, which are sourced from the Scottish Government's 16 National Outcomes. These are as follows:*

- *Outcome 1: A successful, sustainable place – supporting sustainable economic growth and regeneration, and the creation of well-designed, sustainable places;*

- *Outcome 2: A low carbon place – reducing our carbon emissions and adapting to climate change;*

- *Outcome 3: A natural, resilient place – helping to protect and enhance our natural and cultural assets, and facilitating their sustainable use;*

- *Outcome 4: A more connected place – supporting better transport and digital connectivity.' (SPP, pages 6-7)".*

The representations continued to state that, *"The site presents an excellent opportunity to create a new mixed community within the capital city where a high quality of life can be enjoyed, satisfying the provisions of SPP on many fronts, in particular its sustainability and placemaking objectives. A significant level of family housing would be included at Brunstane, reflecting the known shortage for this type of housing in the city. An element of live / work housing, affordable housing, a potential care home and day nursery would combine with private housing provision. EDI is committed to a design-led approach which ensures the efficient use of land and high quality buildings, infrastructure and spaces. These include a new local centre and potential primary school sited amongst a new network of routes which prioritise pedestrians and cyclists. The provision of public and private open spaces, including a major new area of greenspace, will enhance public accessibility of the site (in contrast with the little accessible existing agricultural use), improve biodiversity, also expand and enhance the city's existing Green Network."*

Finally, as set out within the site brief, Development Principles and Appendix 1 of the 2014 representations, *"a holistic, design-led approach to placemaking at Brunstane, within its surroundings, has been comprehensively applied."* Through this, EDI consider the 'six qualities of successful places' set out within the Placemaking policy of the SPP ('distinctive,' 'safe and pleasant,' 'welcoming,' 'adaptable' 'resource efficient' and 'easy to move around') will be achieved (SPP paragraphs 41-46).

EDI submitted that 'HSG 29 Brunstane' should remain within the Edinburgh Local Development Plan as a new housing proposal.

### 3.5.4 Second Proposed Plan, Reporters Report, July 2016

An examination of the ELDP Second Proposed Plan was undertaken by the DPEA in 2015 and 2016, with the Reporters Report released in July 2016.

In respect of the Brunstane site, the Reporters' concluded that it should remain designated in the plan for housing development as shown on the proposals map and that in overall terms, it would make a significant contribution to the housing land requirement.

This was subject to modifications to the development principles and site brief for the housing allocation (HSG 29 Brunstane). The masterplan response to the ELDP allocation addresses these modified principles. This is more fully articulated in other material submitted with the application for PPP, in particular the Planning Statement (by GVA James Barr), Transport Assessment (by Transport Planning), Masterplan (by AREA) and other supporting technical reports. The substance of the modified development principles remain largely as they were in the Second Proposed ELDP. One particular exception relates to vehicular access and the requirement that an investigation is undertaken to establish whether or not a second vehicular crossing of the East Coast railway line should be provided in the interests of safety, as identified within the ELDP Transport Appraisal.

The Transport Assessment (by Transport Planning) addresses the question of whether or not a second crossing should be provided in the interests of safety. Table 8.1 of the Transport Assessment concludes that it isn't, on the basis that, "*The eastern part of HSG29 can be accessed from two vehicular points (Milton Road East and the new bridge internal to the site) and two points of access are appropriate for the level of dwellings likely to be developed in the eastern part of the site.*"

## 3.6 Strategic Masterplan Response

The design has evolved to respond to a number of key site constraints:

### 3.6.1 Topography

The western half of the site is generally flat, very slightly undulating and overall sloping gently from the southwest towards the north-east. There is a drop of approximately 5m over the 400m or so width of the site. The eastern half of the site continues the gentle fall, becoming slightly steeper and more pronounced towards the northern edge as the ground drops down to the Brunstane Burn. The overall level change is a little over 10m in 600m.

In conclusion topography provides little or no constraint to development, except for a narrow strip along the edge of the Brunstane Burn.

### 3.6.2 Mining Legacy

The site lies over coal bearing measures on the western side of the Midlothian coalfield. These coal seams strike approximately north south and dip to the east. Extensive research has identified that there have been some shallow workings in a number of these seams.

There are also a number of shafts on the site which require to be investigated, located and treated. It is possible that some areas to be built upon may require ground treatment.

### 3.6.3 Contaminated Land

At present, there is no indication that contamination presents a significant constraint to development of the site. Almost all of the site is under intensive arable cultivation. The exceptions are a small area of worked or potentially infilled ground adjacent to Wanton Walls, which is covered in rough grass with some scrub, and the steep bank down to the Brunstane Burn to the west of the railway line which is covered in well-established woodland.

In the main part, the site has had an agricultural history. Some areas of the site are likely to have had some form of coal mining, as it is known that various shafts were located within the development area. An initial review of information available suggests that there were no mine head works, processing plants or stockpiles actually located on the site, and activity is likely to be restricted to the construction of isolated shafts or other minor works.

There is a small area of worked or potentially infilled ground to the west of Wanton Walls in the southeast corner of the site. This takes the form of a rectangular area which is fenced off from the rest of the field. In due course this will require a site investigation to determine what lies in the ground. In the same area, a pre-existing drainage channel has been backfilled with a culvert and other materials. Again, this will form a part of any future site investigation to determine the nature of the soils in this area.

### 3.6.4 Existing Movement

There is an established network of paths and cycle ways in the vicinity, and the masterplan has sought to improve these by providing attractive and convenient links from north to south, creating opportunities for further connection between Milton Road East and Newcraighall. The development will also extend the existing recreational walking and cycling routes through the site and importantly provide direct and convenient links from the site to the surrounding public transport infrastructure.

Local bus routes already operate on the main roads around the site to the north and south serving a variety of key destinations. The creation of a north to south vehicular route between Milton Road East and Newcraighall Road presents an opportunity for a new or diverted bus route to directly serve the site, and supports wider aspirations to provide additional links to Queen Margaret University. The site is also located within close proximity to three railway stations.

In order to facilitate access to the site, a number of engineering upgrades are proposed. A new access into the site will be required from Milton Road East in the north, as well as development/alteration to primary and secondary accesses into the site from Newcraighall Road in the south, and construction of a replacement bridge crossing over the ECML.

It has been incumbent on the emerging infrastructure for the site to ensure that existing cycle ways and walkways, such as the John Muir Way, are retained, as well as creating opportunities to improve the local cycle network. The presence of a designated NCR1 cycle route along the southern boundary and others in the wider area have influence the approach to providing non-motorised access, by linking routes to and through the site within the existing network.

### 3.6.5 Existing Services and Utilities

Existing wayleaves, zones where no new structure can be built, are associated with Scottish Water and Scottish Power infrastructure and have been protected and maintained, and new wayleaves formed where necessary.

The initial layout for the site included a wayleave for the pylon corridor through the eastern field. However, during the design process it was identified that the electricity towers and overhead conductors crossing the eastern development site have been replaced by an underground cable, and that the towers are programmed to be demolished by Scottish Power Energy Networks (SPEN) within the development programme. This allowed the layout to evolve and for the open space to be redistributed to create the view corridor from Newhailes Shell Grotto and an increased buffer to the Newhailes boundary.

Network Rail has indicated a 3m wayleave either side of the ECML should be allowed for. Noise assessments indicated the requirement for an acoustic barrier to the ECML. This is included in the masterplan and identified in Chapter 13 of this ES.

### 3.6.6 Historic Environment

Extensive historic analysis has been carried out to determine the significance of the historic buildings and designed landscape within the area. This has informed the design of the emerging masterplan and a strategy of protection and enhancement. The historic environment context of the site is described in detail in Chapter 8 of this ES.

Brunstane House (Category A Listed Building LB28034) sits within a small area of two adjoining walled gardens. The masterplan proposes a park to the east of Brunstane House to enhance its setting and safeguard the Scheduled Monument (SM10580) located adjacent to the garden wall.

Archaeological research (CFA, 2015) has identified the importance of a view valued by the Duke of Lauderdale, who owned Brunstane House in the late C17th. Originally, views to the sea and Fife were afforded from the 'great chamber', on the north-east elevation. This is now considerably altered and impaired by modern development to the north of Brunstane Burn, Joppa, and mature planting along the burn. However, a view corridor has been identified and the masterplan proposed to retain this vista for the new community as a whole.

Brunstane Enclosure (Scheduled Monument SM4112), a circular feature and the second SM within the site, has been part of the worked agricultural land. Though not perceptible on site, it is visible as a crop mark on aerial photographs. An open space of c100m diameter, 'Brunstane Green' has been incorporated into the masterplan to safeguard this SM.

To the east, the site shares a boundary with Newhailes. Newhailes includes an Inventory Garden and Designed Landscape, Newhailes House (Category A Listed Building LB10911) and Shell Grotto (Category B Listed Building LB10915). Views to Arthur's Seat from both Newhailes House and the Shell Grotto were considered important and have been retained through the inclusion of view corridors within the strategic masterplan.

In response to feedback from Historic Environment Scotland (HES), Scottish Natural Heritage (SNH) and CEC, a landscape buffer alongside the boundary wall to Newhailes has also been included within the strategic masterplan.

### 3.6.7 Landscape, Open Space and Views

Arthur's Seat can be seen from various locations on the site. There are also views to the sea, North Berwick Law and the Pentlands. An aim of the masterplan design is to retain these views where possible through strategic locations of open space or street alignments.

However, despite its notable size the site itself is screened from view from many of the principal surrounding routes. There is a significant amount of existing planting and trees around the site boundary which contributes to this. There are also some Category A (high quality and value) and Category B (medium quality and value) trees bordering the site and within the boundaries of Newhailes Estate, which the masterplan has sought to protect.

The site cannot currently be described as accessible 'open space' as it is in private arable farming use. However, there are elements of the Green Space Network within the site boundary which the masterplan has sought to protect and enhance where possible, linked with the green corridor to be enhanced along the John Muir Way and Brunstane Burn. A series of landscape buffers, parkland and swales create habitat corridors and enhance biodiversity. These areas include the burnside edge along the northern boundary, the landscape buffer to Newhailes, the south-western edge boundary with Newcraighall North and the edge to the north of Wanton Walls.

## 3.7 Urban Design Response to Site Context

As a response to the technical constraints and the landscape and historic context described above, the team developed a set of urban design parameters to guide the design of the strategic masterplan.

These are set out in the Urban Design Parameters diagram (Figure 3.1) and can be summarised as:

- To provide designated areas of open space to safeguard Scheduled Monuments and protect the setting of Brunstane House;

- To respect and retain views to the sea from Brunstane House and views to Brunstane House from the SM;
- To respect the view to Arthur's Seat from the Shell Grotto and Newhailes House;
- To frame views including those to Arthur's Seat, the Pentland Hills, North Berwick Law and the sea to the north-east from locations within the site;
- To create a landscape buffer along the boundary to Newhailes;
- To prioritise pedestrian and cycle movement throughout the site and connect into the wider foot and cycle networks, including integration of NCR1 and the Brunstane Burn path/John Muir Way.

## 3.8 Strategic Masterplan

The Strategic Masterplan for New Brunstane has been designed in line with Scottish Planning Policy 2014. It follows the six qualities of place, as set out in Creating Places and Designing Streets: Distinctive, Safe and pleasant, Welcoming, Adaptable, Resource Efficient, and Easy to Move Around and Beyond.

It is designed to create a strong and legible framework of parks, open spaces and streets. The structure of New Brunstane is described in three principal drawings:

- Strategic Landscape Framework (Figure 2.4);
- Strategic Movement Framework (Figure 2.5);
- Strategic Masterplan (Figure 2.6).

### 3.8.1 Strategic Landscape Framework (Figure 2.4)

The strategic landscape framework (Figure 2.4) is a response to the form and topography of the existing landscape, the historic environment and views to the wider landscape. Inspired by the unique qualities of the place, the landscape, its history, a green network of interconnected parks, view corridors, community gardens and avenues are proposed that frame a spectrum of choreographed views, spaces and routes and integrate the new development into its context.

The aim of the framework is to create a structure of usable open spaces such as parks, green corridors, play areas, orchards, and allotments that integrate with the existing landscape. The key aspects of the landscape strategy are:

- New streets and parks create opportunity to make the landscape accessible for a range of activities, play and recreation both for residents and visitors to the area. The linking of footpaths to the wider network encourages walking, running and cycling;

- A 2ha park, Brunstane Park, to the east of Brunstane House, its boundary reflecting the form of the avenues of trees identified on historic maps. Landscape corridors link north to the burn and south to the existing remnant tree belt adjacent to the site;

- A circular green space approximately 1ha, Brunstane Green, around the SM (SM4112). Brunstane Walk links the Green with the Park;

- Lauderdale View, a linear public space on the axial view to the sea from Brunstane House. This space is continued across the ECML;

- A burnside landscape of swales, SUDS ponds, informal play areas and paths which knit New Brunstane into the wider pedestrian and cycle movement network. This landscape character continues along the burn and beside the John Muir Way in the eastern field. Similarly to the south alongside the existing rail embankment a series of green spaces, swales, paths and allotments interface with the NCR1;

- Within the eastern field a landscape buffer separates the development from the designed landscape of Newhailes House, which wraps the southern and eastern boundaries. This linear space contains meadow grassland, fruiting hedges, orchards, swales and planting. It provides new pedestrian linkages and a north-south wildlife corridor. Allotments parallel the boundary to the ECML;

- A kin to the Lauderdale View, a second view corridor from the Newhailes Shell Grotto is aligned with the view to Arthur's Seat. This linear space widens to integrate play areas and orchards;

- Further South a circular park is formed at the meeting point of two vistas. A street aligned with the view to North Berwick Law and the tree lined street which follows the line of the view from Newhailes House to Arthur's Seat;

- To maximise use of natural topography and natural gravity systems in order to create a sustainable urban drainage system, with SUDS ponds and swales integrated with the landscape and streetscape design to encourage biodiversity and enhance open spaces;

- To further encourage local wildlife by protecting and enhancing local biodiversity through the retention, protection and integration of existing wildlife and habitat corridors and through the creation of new habitats;

- To provide access to nature for local residents and visitors to the area by creating connections to the surrounding informal countryside paths network and by providing a variety of open spaces.

### 3.8.2 Strategic Movement Framework (Figure 2.5)

A principal street connects the access to the south on Newcraighall Road across a new pedestrian, cycle and vehicular bridge over the ECML to the north onto Milton Road East. A secondary access connects into the Newcraighall North development. Within New Brunstane a network of interconnected shared space residential streets are proposed.

The movement has been designed follow national place making and street design policy with the following aims:

- To provide a variety of routes which prioritise non-vehicular modes of travel, which create interest through variety and character and which encourages choice by local residents and visitors to the area;

- To create a well-connected network of streets and lanes which is both logical and permeable by structuring the urban blocks in a way which is commensurate in scale with a walkable community;

- To consider enclosure of the street, to encourage active lifestyles and create space for community activity whilst reducing vehicle speeds;

- To create an environment which is secure by design by constructing a movement framework and block structure which prioritises public fronts of buildings to public streets, lanes and open spaces with windows maximising passive surveillance to public space;

- Building frontages to overlook public footpaths and spaces, and the careful integration of lighting to enhance the feeling of safety.

### 3.8.3 Strategic Masterplan (Figure 2.6)

The vision for New Brunstane is to create a new and distinct neighbourhood of Edinburgh, with a focus on the creation of new public spaces, enhancement of the landscape, development of pleasant and habitable streets, and the creation of a renewed sense of local identity.

The strategic masterplan was designed with the following aims:

- An urban design response that learns both from the important built heritage and landscape qualities around Brunstane, Newhailes, Newcraighall and Joppa, and from the celebrated urban forms of Edinburgh;

- To respond to the existing views from the site out to the wider landscape;

- To create a lively and active setting for community life; a place where quality of life, health and wellbeing are at the forefront;

- To provide up to 1,330 new homes of various sizes, types and tenure. Similarly, there will be a range of densities and building heights to create richness of character and variety in the streetscape. Building heights range from 1.75 storeys adjacent to Newhailes to 3-4 storeys around Brunstane Green. Densities generally range between 30 and 40 units per hectare with potentially some higher densities around Brunstane Green and the local centre. Lower densities, around 20-25 units per hectare, are located beside Newhailes;

- To provide a new primary school and opportunities for community facilities and a local centre at the heart of the new neighbourhood.

# 4. EIA PROCESS AND METHODOLOGY

## 4.1 Introduction

This chapter presents an overview of the process that has been followed to undertake the EIA and specifically the key steps and methodology used. It summarises the relevant legislation, policy and guidance that applies in general to the assessment process, and identifies all of the required information included within this ES.

Many of the technical disciplines assessed as part of the EIA follow their own professional standards, guidelines and requirements. Nothing in this chapter is intended to negate the effect of any such discipline specific guidance. However, there are a number of overarching principles and common approaches across the EIA, and these are identified where relevant in this chapter.

## 4.2 Relevant Legislation, Policy and Guidance

The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 (the EIA Regulations) implement Directive 2011/92/EU of the European Parliament and of the Council on assessment of the effects of certain public and private projects on the environment (codification), as amended by Directive 2014/52/EU of 16 April 2014. The EIA Regulations are the key piece of Scottish legislation which govern the need or otherwise to undertake EIA and the minimum information that must be presented in an ES.

There are a number of key policy documents, guidance and best practice that have informed completion of the EIA and preparation of this ES, in particular:

- Planning Advice Note (PAN) 1/2013 Environmental Impact Assessment, Scottish Government, 2013;
- Circular 3/2011 The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011, Scottish Government, 2011;
- A Handbook on Environmental Impact Assessment (4th Ed), Scottish Natural Heritage, 2013;
- Institute of Environmental Management and Assessment 'Guidelines for Environmental Impact Assessment' 2004 (as amended).

## 4.3 Information to be Included in an Environmental Statement

The minimum information to be included in an ES is specified in Schedule 4, Part II of the EIA Regulations, along with any of the information in Part I *"as is reasonably required to assess the effects of the project and which the applicant can reasonably be required to compile"* (Circular 3/2011, para 94). All of these requirements are identified in Table 4.1 below along with a cross-reference to the relevant part of this ES that contains the required information.

**Table 4.1: Schedule 4 Information to be Included in ES**

| Schedule 4 Requirement | Reference in this ES |
|---|---|
| **Part I** | |
| 1. Description of the development, including in particular— | |
| (a) A description of the physical characteristics of the whole development and the land-use requirements during the construction and operational phases; | Chapter 2 |
| (b) A description of the main characteristics of the production processes, for instance, nature and quantity of the materials used; | Chapter 2 |
| (c) An estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc.) resulting from the operation of the development. | Chapters 6 to 15 |
| 2. An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for the choice made, taking into account the environmental effects. | Chapter 3 |
| 3. A description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the interrelationship between the above factors. | Chapters 6 to 15 |

| Schedule 4 Requirement | Reference in this ES |
|---|---|
| 4. A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from:<br>(a) The existence of the development;<br>(b) The use of natural resources;<br>(c) The emission of pollutants, the creation of nuisances and the elimination of waste, and the description by the applicant or appellant of the forecasting methods used to assess the effects on the environment. | Chapters 6 to 15 |
| 5. A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment. | Chapters 6 to 15 |
| 6. A non-technical summary of the information provided under paragraphs 1 to 5 of this Part. | Non-Technical Summary (NTS) |
| 7. An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the applicant or appellant in compiling the required information. | Chapters 6 to 15 (where applicable) |
| **Part II** | |
| 1. A description of the development comprising information on the site, design and size of the development. | Chapter 2 |
| 2. A description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects. | Chapters 6 to 15 |
| 3. The data required to identify and assess the main effects which the development is likely to have on the environment. | Chapters 6 to 15 |
| 4. An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for the choice made, taking into account the environmental effects. | Chapter 3 |
| 5. A non-technical summary of the information provided under paragraphs 1 to 4 of this Part. | Non-Technical Summary (NTS) |

## 4.4 EIA and Multi-Stage Consents

This ES is submitted as part of an application for planning permission in principle to establish the overall acceptability of the principle of the development as proposed prior to finalising matters of detail through the submission of further applications for approval of matters specified in conditions. As such, the proposed development will be the subject of a multi-stage consent, i.e. a principle decision followed by other implementing decisions *"which cannot extend beyond the parameters set by the principle decision"* (Circular 3/2011, para 144). In such circumstances case law has established that any significant environmental effects of the proposed development must be identified and assessed at the time of the principle decision unless it is not possible to do so, in which case future additional assessment may be required.

In order to maximise the likelihood that this EIA relating to the principle permission takes account of all significant environmental effects likely to follow as the detail of the individual development plots emerges, the descriptive information presented in Chapter 2 includes a full explanation of the rationale and components of the masterplan, with supporting drawings and explanatory information which establish a set of parameters within which the detail of individual plots will be developed. Whilst it is impossible to indemnify against future previously unknown significant environmental effects coming to light, this ES has sought to be as specific as possible in identifying the parameters of the masterplan and the criteria within which components of it will be brought forward.

In this way, all parties can be clear that the proposed development assessed in this ES represents a reasonable worst-case in terms of identifying significant environmental effects such that as future detail emerges, provided that it complies with the requirements and assumptions upon which the conclusions of this ES are based, it is unlikely to result in materially different environmental effects or the need for further assessment.

## 4.5 Overview of the EIA Process

EIA is the systematic process of surveying, identifying, compiling, assessing and presenting all of the potential significant environmental effects of a proposed development. The results of the assessment are intended to inform the planning process on the magnitude and significance of residual environmental effects, and to demonstrate how design decisions and proposed positive actions have sought to avoid, reduce or offset potentially significant effects to within acceptable limits where this is possible and demonstrable.

The EIA has followed a number of key steps which are common to all of the technical assessments presented in this ES, namely:

- Baseline surveys, to determine that nature, extent and sensitivity of existing conditions on the site and its environs;
- Assessment of the potential interactions between the development as proposed and the baseline conditions identified, using the relevant criteria for the technical discipline being assessed;
- Using the design freeze information to assess the environmental impacts likely to result from the interactions identified, including direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary positive and negative effects;
- Presenting mitigation measures to avoid, reduce or offset adverse effects and enhance positive benefits, including the reassessment of any alterations to the design to determine the effectiveness of the change proposed;
- Assessing the significance of any residual impacts remaining after proposed mitigation has been taken into account, as a function of the sensitivity of the receptor and the magnitude of change using appropriate criteria to the technical discipline being assessed;
- Presenting the findings of the technical assessment in a consistent format and chapter structure to form part of this overall ES.

### 4.6 Impact versus Effect

The terms “impact” and “effect” are often used interchangeably in EIA. However, these terms have specific meanings. Whilst EIA points towards the assessment of impacts, the EIA Regulations actually require the reporting of significant effects.

Impacts are predicted changes in the baseline environment that would occur as a result of a given action, and effects are the consequences of those changes for the environment. An assessment which only reports significant environmental impacts and not significant environmental effects is likely to fall short of the requirements of the EIA Regulations. To illustrate the distinction, a proposed development might result in the permanent loss of ancient woodland trees (impact), the result of which will be the loss of bat foraging habitat and opening up views into that development from a sensitive residential property (effects).

In reality both impacts and effects are likely to be relevant to assessing significance, however it is important to understand and express the distinction between the two. To this end, the EIA identifies both the potential environmental impacts of the proposed development and assesses the predicted significant residual effects of those impacts taking into account the mitigation.

## 4.7 Scope of the EIA

### 4.7.1 Technical Scope

The structure of this ES is consistent with the information requirements in Schedule 4 of the EIA Regulations as illustrated in Table 4.1 and all of the policy and guidance identified in Section 4.2 above. Regarding the technical content presented in the ES, Schedule 4 Part 1(3) requires:

*"A description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the interrelationship between the above factors."*

Taking into account the above matters, an EIA Scoping Report was prepared by IKM Consulting Ltd with contributions from the technical specialists and was submitted to CEC in February 2016 (15105-REP-002) along with a request for a formal EIA Scoping Opinion. CEC returned a Scoping Opinion dated 27th April2016 (Ref: 15/05835/PAN, see Appendix 4.A).

The detailed comments and ongoing consultation throughout the scoping and EIA process have informed development of the proposals and are addressed directly in the technical chapters of this ES alongside any additional consultation undertaken by technical specialists. Additionally, a summary table of the key Scoping Opinion comments raised and either a response or appropriate cross-reference to where in the ES each is addressed has been prepared and is presented as Appendix 4.B.

In parallel with the formal EIA process, where appropriate individual technical specialists made direct contact with council officers, statutory and other consultees as required to inform their assessment, discuss the site and the proposed methodology to be adopted, and obtain any background information or data that may be available. Through adopting this approach the team has sought to identify the likely significant issues early in the process and address these through design evolution where applicable.

### 4.7.2 Temporal Scope

The baseline year used for the assessments is 2016 being the year of submission of the application for planning permission in principle. The working assumption to form the basis of the assessments is that construction of the first phases of development would commence around 2018 following the granting of all necessary consents. The assumed year of completion of all components of the masterplan is 2027. Further detail on the assumed construction programme and phasing is presented in Chapter 2, Section 2.4 and illustrated on Figure 2.7.

Wherever the time-lag between completion of assessments and commencement of construction is considered to result in the need for checks or updated surveys, such as for protected species, these are identified as proposed mitigation measures in the relevant chapters of this ES.

### 4.7.3 Spatial Scope

The spatial scope of the EIA takes into account a number of factors which are specific to the technical discipline being assessed, in particular:

- The extent of the physical works required, as contained with the planning redline boundary;

- The nature and sensitivity of the existing environment;
- The distance over which predicted impacts are likely to remain significant or the existence of pathways with the potential to transfer impacts across a wider geographical area than that otherwise being assessed.

Where relevant, each of the EIA disciplines defines the spatial scope covered by their assessment.

### 4.8 Consultee Workshop

On 1st March 2016, a Consultee Workshop was held with the intention of bringing together a range of interested parties. The workshop commenced with an overview of the proposed development and the extensive design evolution to date, and then broke into focus groups to discuss particular aspects of the project. The discussions points from the workshop were summarised in a note and used to inform the emerging design proposals and the EIA.

### 4.9 Assessment of Impacts

The EIA Regulations stipulate that an ES should, where possible, identify, describe and assess the likely significant impacts of the development on the environment, including a consideration of:

- Positive and negative impacts;
- Short, medium and long-term impacts;
- Direct and indirect impacts;
- Permanent and temporary impacts;
- Cumulative impacts and impact interactions.

This ES identifies and assesses the likely significant impacts of the proposed development in relation to the construction and operational phases.

Each potential impact identified is categorised as either adverse or beneficial using a pre-defined set of criteria by experienced specialists in each environmental discipline, and where necessary professional judgement is applied to identify and categorise potential impacts.

The significance of impacts is determined by reference to impact criteria for each assessment topic. These criteria have been applied using a common EIA approach of classifying impacts according to whether they are negligible, major, moderate or minor impacts and whether they are considered to be adverse or beneficial.

Specific criteria for each issue are specified in the respective technical chapters of the ES having due regard to the following:

- Extent and magnitude of the impact;
- Impact duration (whether short, medium or long-term);
- Impact nature (whether direct, indirect, reversible or irreversible);
- Whether the impact occurs in isolation, is cumulative or interactive (see Section 4.11 below);
- Performance against environmental quality standards or other relevant pollution control thresholds;
- Sensitivity of the receptor;
- Compatibility with environmental policies.

In order to provide a consistent approach to expressing the outcomes of the various studies undertaken as part of the EIA, and thereby enable comparison between impacts upon different environmental components, a consistent terminology has also been adopted throughout the ES wherever possible. Impacts are expressed as:

- Adverse – detrimental or negative impacts to an environmental resource or receptor;
- Beneficial – advantageous or positive impact to an environmental resource or receptor.

## 4.10 Definition of Significance

Where adverse or beneficial impacts are identified, their significance is then determined using the Significance of Impact Matrix in Table 4.2 where:

- Negligible – no significant impacts to an environmental resource or receptor;
- 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;
- Major – considerable impact (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

**Table 4.2: Significance of Impact Matrix**

| Sensitivity of Receptor | Magnitude of Impact | | | |
|---|---|---|---|---|
| | **Major** | **Moderate** | **Minor** | **Negligible** |
| **High** | Major | Major | Moderate | Minor |
| **Medium** | Major | Moderate | Minor | Negligible |
| **Low** | Moderate | Minor | Negligible | Negligible |
| **Negligible** | Minor | Negligible | Negligible | Negligible |

Each of the technical chapters specifies the criteria, including sources and justifications, for quantifying the different levels of impact. Where possible, this has been based upon quantitative and accepted criteria together with the use of value judgements and expert interpretations where necessary to establish the extent to which an impact is significant.

There is a tendency in EIA to assert that impacts/effects considered to be moderate or above are significant in terms of the EIA Regulations. However, this is not necessarily the case, and it is for individual disciplines to define the criteria they have used to determine what is significant, and to apply it consistently. Various professional bodies including the Chartered Institute of Ecology and Environmental Management (CIEEM) and the Institute of Environmental Management and Assessment (IEMA) have provided best practice guidance in respect of what is considered to be significant in terms of the EIA Regulations.

## 4.11 Cumulative Effects Assessment

The EIA Regulations require consideration of cumulative impacts, which are those impacts resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed development.

Where relevant, individual technical chapters consider the potential for:

- Type 1 cumulative effects (also called "synergistic effects") which can arise as a result of a combination of effects from different disciplines affecting a given receptor (e.g. noise + dust + traffic on a residential property, siltation + bank erosion + fish mortality on the ecological value of a watercourse, etc.);

- Type 2 cumulative effects (also called "additive effects") which can arise as a result of a proposed development in combination with other development proposals in an area. A separate Cumulative Effects Assessment (Chapter 15 of this ES) has also been presented which explains the detailed process that was followed to identify relevant development proposals to be considered.

## 4.12 Mitigation and Residual Effects

One of the main aims of the EIA is to develop and integrate mitigation measures to avoid, reduce or offset the significant adverse effects of the proposed development and to maximise the potentially beneficial effects. These measures can relate to any of the three key phases of the project, namely:

- Design – this can include e.g. the location and size of buildings, road routing, etc.;

- Construction – e.g. pollution prevention measures with a commitment to undertake the construction works in a specific way (such as phasing and management of the works);

- Completed development – inclusion of specific features e.g. particular construction materials, structural landscaping, tree planting etc.

Where significant adverse environmental impacts are predicted, appropriate measures have been identified to mitigate these impacts where possible (at all phases of the project).

Each assessment presented in this ES concludes with the identification of residual effects, which are the remaining environmental effects of the proposed development assuming that all of the proposed mitigation measures are implemented.

A Schedule of Mitigation (Chapter 16 of this ES) is presented to collate all mitigation proposals into a single comprehensive list which can be used for the purposes of monitoring implementation.

## 4.13 EIA Summary Tables

In line with current best practice, EIA summary tables are presented at the end of each technical chapter to provide a concise overview of the potential impacts, proposed mitigation and residual effects.

## 4.14 References


- Directive 2011/92/EU of the European Parliament and of the Council on assessment of the effects of certain public and private projects on the environment (codification). The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011;
- Planning Advice Note (PAN) 1/2013 Environmental Impact Assessment, Scottish Government, 2013;
- Circular 3/2011 The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011, Scottish Government, 2011;
- A Handbook on Environmental Impact Assessment (4th Ed), Scottish Natural Heritage, 2013;
- Institute of Environmental Management and Assessment 'Guidelines for Environmental Impact Assessment' 2004 (as amended).

# 5. PLANNING POLICY REVIEW

## 5.1 Introduction

This chapter of the ES presents a factual review of national, regional and local policy. This chapter was written by GVA James Barr Ltd. A separate planning statement has also been produced by GVA James Barr which provides a more detailed analysis and appraisal of the policies identified within this chapter.

## 5.2 National Planning Policy

### 5.2.1 National Planning Framework 3 (NPF 3)

NPF 3 was approved on 23rd June 2014 and is a long-term strategy for Scotland and the spatial expression of the Scottish Government's Economic Strategy and plans for development and investment in infrastructure.

*"The document's vision for Scotland over the next 20 – 30 years, is to establish:*

- *A successful, sustainable place;*
- *A low carbon place;*
- *A natural, resilient place;*
- *A connected place".*

In particular, NPF3 notes:

*"…more ambitious and imaginative planning will be needed to meet requirements for a generous and effective supply of land for housing in a sustainable way…"*

The requirement for affordable housing is also noted by NPF3. This states that the government will work with housing providers to support housing development.

### 5.2.2 Scottish Planning Policy (SPP)

SPP was published on 23rd June 2014 and sets out national planning policies which reflect Scottish Ministers' priorities for the operation of the planning system and for the development and use of land.

SPP contains 4 outcomes that support the vision taken from National Planning Framework 3 these are:

- Outcome 1: A successful, sustainable place – these proposals for a mixed-use development are the right proposals in the right place. They will be sustainable in terms of the building method used and the proximity to public transport. The Council are supportive of a Masterplan led development at this location. The proposals will contribute to the regeneration of Clydebank and will act as a catalyst for further investment;

- Outcome 2: A low carbon place – the proposals will aim to contribute to a low carbon place and will be built to achieve building regulations and standards for low carbon development;

- Outcome 3: A natural resilient place – this outcome is potentially not as applicable to these proposals however we are providing a substantial amount of useable green space which will enhance existing green corridors;

- Outcome 4: A more connected place – The proposals are sustainable in terms of the proximity of the site to public transport facilities and more detail on this is provided in Chapter 14 of this ES and the Transport Assessment submitted in support of the application. The proposals will open up pedestrian linkages to the town increasing accessibility to the waterfront which is a strategic objective set out by the SDP."

These are followed by 'Principal Policies' and 'Subject Policies'.

Principal Policies relate to matters such as sustainability and place making. Under these principal policies, SPP introduces a presumption in favour of development that contributes to sustainable development. Decisions should be guided by the following principles which are applicable to these proposals:

- *Giving due weight to net economic benefit;*

- *Responding to economic issues, challenges and opportunities, as outlined in local economic strategies;*

- *Supporting good design and the six qualities of successful places;*

- *Making efficient use of capacities of land, buildings and infrastructure including supporting town centre and regeneration priorities.*

The place making policy carries forward the aims of the NPF3 in creating an agenda for place making reflecting Creating Places - A policy statement on architecture and place for Scotland. SPP promotes the idea that good buildings and places promote healthy, sustainable lifestyles; supporting the prevention agenda and efficiency in public services; promoting Scotland's distinctive identity; attracting visitors, talent and investment; delivering environmental ambitions; and providing a sense of belonging, a sense of identity and community.

*"The three main policy principles are:*

- *Planning should take every opportunity to create high quality places by taking a design-led approach;*

- *Planning should direct the right development to the right place;*

- *Planning should support development that is designed to a high-quality, which demonstrates the six qualities of successful place".*

These policies have been duly recognised and considered in the formation of a masterplan for the site. The following chapters of this ES address the principal policies.

As noted above, SPP contains 'subject policies' and these are noted below, per SPP subject heading:

- A Successful, Sustainable Place

    - Promoting town centres;
    - Promoting rural development;
    - Supporting business and employment;
    - Enabling delivery of new homes;
    - Valuing the historic environment.

- A Low Carbon Place
    - Delivering heat and electricity;
    - Planning for zero waste.
- A Natural Resilient Place
    - Valuing the natural environment;
    - Maximising the benefits of green infrastructure;
    - Promoting extraction of resources;
    - Supporting aquaculture;
    - Managing flood risk and drainage.
- A Connected Place
    - Promoting sustainable transport and active travel;
    - Supporting digital connectivity.

There is no requirement to provide a design or design and access statement with an application for Planning Permission in Principle. In this instance, a masterplan, associated parameter drawings and a design code has been prepared.

The masterplan and associated design code identifies matters such as densities, principal elevations, a landscape framework and key movement routes into and through the site.

This has been prepared with due cognisance of the principal and subject policies of SPP which have also informed the requisite technical chapters, studies and assessments.

## 5.3 Development Plan Policy

### 5.3.1 South East Scotland Strategic Development Plan (SESPlan)

The South East Scotland Strategic Development Plan (SESPlan) was approved in June 2013. Supplementary Guidance on housing land was approved in November 2014 (SESPlan SG).

SESPlan is a high-level spatial plan setting out a land use vision for the next 20 years for the city-region centred on Edinburgh and the Lothians.

This includes providing a policy framework to help deliver sustainable economic growth, shape good quality places and enhance the quality of life in the City of Edinburgh and the surrounding area.

The main aims of SESPlan are as follows:

- *"Enable growth in the economy by developing key economic sectors, acting as the national hub for development and supporting local and rural development;*
- *Set out a strategy to enable delivery of housing requirements to support growth and meet housing need and demand in the most sustainable locations;*
- *Integrate land use and sustainable modes of transport, reduce the need to travel and cut carbon emissions by steering new development to the most sustainable locations;*
- *Conserve and enhance the natural and built environment;*
- *Promote green networks including through increasing woodland planting to increase competitiveness, enhance biodiversity and create more attractive, healthy places to live;*
- *Promote the development of urban brownfield land for appropriate uses;*
- *Promote the provision of improved infrastructure to enhance connectivity within the area, between the area and other parts of the UK and elsewhere to support economic growth and meet the needs of communities;*
- *Contribute to the response to climate change through mitigation and adaptation and promote high quality design / development".*

Policy 1A The Spatial Strategy: Development Locations, builds on existing committed developments and identifies five Sub-Regional Areas, including the Regional Core, which relates to Edinburgh.

It continues to state that Local Development Plans will direct further strategic development to thirteen Strategic Development Areas (SDA's) within the five sub-regional areas. The boundaries of these SDA's are identified in the SESPlan Strategic Spatial Assessment Technical Note (November 2011). It shows the site forming part of the South East Edinburgh SDA.

After brownfield sites, the preamble to Policy 5 Housing Land states that any additional land which is required to meet the housing land requirement, should first be sought within the 13 identified SDA's, to assist in implementing SESPlan's locational strategy.

The 'Framework for Delivery' contains a number of relevant policies:

- Policy 5: Housing land;
- Policy 6: Housing land flexibility;
- Policy 7: Maintaining a five-year housing land supply;
- Policy 8: Transportation;
- Policy 9: Infrastructure;
- Policy 11: Delivering the green network;
- Policy 12: Greenbelts;
- Policy 15: Water and Flooding;

These policies have been considered in the preparation of the application, ES and other supporting documentation. A more detailed appraisal is contained within the planning statement.

In meeting the housing land requirement, the SESPlan SG policy context notes that further development will be focussed in the thirteen SDA's (including South East Edinburgh), acting as the primary locations for growth and investment.

It continues to state that it must be consistent with the approved strategic development plan and in particular the spatial strategy, by prioritising brownfield land and locating additional development within the identified SDA's in the first instance.

Where additional land is required (to meet the housing land requirement), it states that sites should first be sought within the identified SDA's and allocated within respective LDP's accordingly.

Against this context, the SG indicates the potential contribution that each SDA could make towards meeting the housing land requirement, including an additional allowance of 2,950 units within the South East Edinburgh SDA, of which 2,500 should be within City of Edinburgh.

### 5.3.2 Edinburgh City Local Plan

The Edinburgh City Local Plan was adopted by Edinburgh Council on the 28th January 2010 and is now out of date. Within this plan the proposed development site forms part of Edinburgh's green belt. It pre-dates the SESPlan and is therefore not in accord with regional objectives and policy guidance for the South East Scotland region.

Notwithstanding that the ECLP pre-dates SESPlan and is out of date (with reference to paragraph 33 of SPP), it remains the adopted local plan and is considered accordingly.

In land use terms, the site is identified as 'green belt' (policy ENV10 applies).

### 5.3.3 Environmental Policies

***Policy ENV10 Green Belt***

The site is currently allocated under ENV10: Greenbelt which states that:

*"Within the Green Belt as shown on the Proposals Map development will only be permitted:*

a. *Where necessary for the purposes of agriculture, woodland and forestry, horticulture or for a countryside recreational use compatible with an agricultural or natural setting, and provided also that any necessary buildings, structures or hard standing areas are ancillary to the main use, small scale and of high design quality;*

*b. Where the proposal is for the change of use or small scale extension of an existing building, particularly a building of architectural or historic merit, provided that any proposed extension or ancillary development would not be detrimental to the character or appearance of the Green Belt;*

*c. Where related to an existing non-conforming use or building in the Green Belt and provided the proposal is appropriate in type, scale and design to the existing building and not detrimental to the character or appearance of the Green Belt".*

There is therefore a presumption against development that would adversely affect the function of the greenbelt, however on the basis that the local plan is out of date, there is a significant housing shortfall within Edinburgh and the ELDP allocates the site as housing, limited weight can be attributed to this policy.

### 5.3.4 Other Relevant Policies

Table 5.1 below table identifies all policies which have been considered within the environmental statement.

**Table 5.1: Other Relevant Policies**

| Policy Ref | Overall objectives |
|---|---|
| **Design Principles for New Development** | |
| DES1, DES2, DES3, DES4, DES5, DES6, DES8, | To ensure that:<br>- new development is of the highest design and quality which respects and enhances the character of the city<br>- the city develops in an integrated and sustainable manner<br>- any new places are distinctive and enhance the special character of the city whilst meeting the needs of the community |

| Policy Ref | Overall objectives |
|---|---|
| **Caring for the Environment** | |
| ENV3, ENV7, ENV8, ENV9, ENV10, ENV11, ENV12, ENV16, ENV17, ENV18 | To protect<br>- the unique qualities of the city, its built heritage and the character of the urban areas<br>- important landscapes and natural features<br>- and enhance the nature conservation and biodiversity of the city |
| **Open Space and Provision for Sport** | |
| OS3 | To allow<br>- the protection of open spaces for amenity, leisure and recreation<br>- a comprehensive network of provision for sport and outdoor activities |
| **Housing and Community Facilities** | |
| HOU1, HOU2, HOU3, HOU4, HOU7, COM1, COM2, COM3 | To deliver<br>- the housing requirements within the city whilst protecting the environmental quality<br>- sustainable communities<br>- the necessary social infrastructure |
| **Employment and Economic Development** | |
| n/a | n/a – no employment proposed. note spin off benefits from new development and refer to socio economic chapter |
| **Shopping, Entertainment and other Town Centre Uses** | |
| RET5, | Currently out of centre in ECLP; small scale retail only to serve and support new Brunstane development |

| Policy Ref | Overall objectives |
|---|---|
| **Transport and other Network Services** | |
| TRA1, TRA2, TRA3, TRA4, TRA5, TRA6, TRA7, TRA12, TRA13, INF6 | - To minimise the distances people need to travel<br>- To maximise the accessibility to jobs and services<br>- To minimise the effects of traffic on communities and the environment<br>- To support the provision of necessary network infrastructure |

## 5.4 Other Material Considerations

### 5.4.1 Edinburgh Local Development Plan Second Proposed Plan

As noted above, in June 2013, Scottish Ministers approved the strategic development plan (SESPlan) and required the strategic development planning authority to prepare Supplementary Guidance (already covered above) to distribute an increased overall housing requirement amongst the six council areas, including the City of Edinburgh Council.

In response to this, the Edinburgh Local Development Plan Second Proposed Plan (ELDP) removed the site from the green belt and allocated it as a new housing proposal HSG 29 Brunstane. Additional sites (including the subject site) which best met assessment criteria, including landscape impact, green belt boundaries and accessibility to public transport and infrastructure capacity, were allocated within the SDA's. Further details of this in the form of a housing site assessment, is set out in the ELDP Environmental Report Second Revision (Volume 2).

Table 4 of the ELDP identifies an estimated site capacity for housing development at HSG 29 Brunstane of 950-1,330 units.

The Newcraighall and Brunstane site brief in the ELDP states that *'These sites provide the opportunity for new housing together with new and improved school and local facilities on the eastern side of the Council area. The sites are well served by bus and rail connections with the opportunity for these to be further enhanced. Existing and enhanced footpath and cycle links and green corridor proposals will ensure development is well connected between sites and to existing communities.'*

A series of development principles is set out to guide proposals at the site and these have been duly considered and reflected in the masterplan.

### 5.4.2 Other Relevant Policies and Considerations

A large number of the policies from the adopted Local Plan are similar to those within the ELDP. In general, the majority of the retained policies are unchanged, although in a number of cases, the policy reference number has changed. It is also considered that as part of the assessment undertaken by CEC to allocate the site, they have fully considered all of their policies in the determination of New Brunstane as a residential development site. As such it is therefore demonstrated that the proposal meets or can meet with the vast majority of the policies.

Similarly to the LDP, a number of the policies contained with the ELDP are a matter for detailed design rather than subject to the details contained within this PPP application.

Furthermore, the site benefits from a residential development allocation of HSG 29 which allocates the site at Brunstane for a residential development of between 950 and 1,330 homes. This removes the greenbelt allocation from the adopted Local Plan.

Table 5.2 below identifies all policies and documents associated with the ELDP which have been considered within the environmental statement.

**Table 5.2: ELDP Policies and Documents**

| Policy Ref | Overall objectives |
|---|---|
| **Delivering the strategy** | |
| DEL1 | To allow<br>- The council to implement their approach on infrastructure provision<br>- The council to ensure that developers make a fair and reasonable contribution to the delivery of necessary infrastructure provision |
| **Design Principles for New Development** | |
| DES1, DES3, DES4, DES5, DES6, DES7, DES8, DES9, DES11 | To ensure that:<br>- new development is of the highest design and quality which respects and enhances the character of the city<br>- the city develops in an integrated and sustainable manner<br>- any new places are distinctive and enhance the special character of the city whilst meeting the needs of the community |
| **Caring for the Environment** | |
| ENV3, ENV7, ENV8, ENV9, ENV12, ENV16, ENV18, ENV20, ENV21, ENV 22 | To protect<br>- the unique qualities of the city, its built heritage and the character of the urban areas<br>- important landscapes and natural features<br>- and enhance the nature conservation and biodiversity of the city |
| **Employment and Economic Development** | |
| n/a | n/a – no employment proposed. note spin off benefits from new development and refer to socio economic chapter |

| Policy Ref | Overall objectives |
|---|---|
| **Housing and Community Facilities** | |
| HOU1, HOU2, HOU3, HOU4, HOU6, HOU10 | To deliver<br>- the housing requirements within the city whilst protecting the environmental quality<br>- sustainable communities<br>- the necessary social infrastructure |
| **Shopping and Leisure** | |
| RET4, | Currently out of centre in ECLP; small scale retail only to serve and support new Brunstane development |
| **Transport and other Network Services** | |
| TRA1, TRA2, TRA3, TRA4, TRA5, TRA8, TRA9, INF6 | - To minimise the distances people need to travel<br>- To maximise the accessibility to jobs and services<br>- To minimise the effects of traffic on communities and the environment<br>- To support the provision of necessary network infrastructure |
| **Resources and Services** | |
| n/a | It is not proposed to delivery any items which are relevant under these policies (e.g. wind turbines, telecommunications etc.) |
| **Education Appraisal** | |
| We have taken account of the education appraisal and the contents within the allocation of the site as HSG29. This requires land and funding for a new primary school to be delivered on site and contributions to the relevant catchment high school. | |
| **Transport Appraisal** | |
| Any recommendations or requirements within the Transport Appraisal have been considered and included where possible within our proposals. | |
| **Action Programme** | |
| The action proposal endorses both the education and transport appraisals. As discussed these have both been considered. | |

### 5.4.3 Edinburgh Local Development Plan Report of Examination June 2016

An examination of the ELDP Second Proposed Plan was undertaken by the DPEA in 2015 and 2016, with the Reporters Report released in July 2016.

In respect of the Brunstane site, the Reporters' concluded that it should remain designated in the plan for housing development as shown on the proposals map and that in overall terms, it would make a significant contribution to the housing land requirement.

This was subject to modifications to the development principles and site brief for the housing allocation (HSG 29 Brunstane), which have been duly considered and reflected in the masterplan. The same applies in respect of modifications to other relevant policies and considerations in the ELDP.

## 5.5 References


- The Scottish Government, *Scottish Planning Policy* (June 2014);
- The Scottish Government, *National Planning Framework 3* (January 2014);
- City of Edinburgh Council, *Edinburgh City Local Plan Written Statement* (January 2010);
- City of Edinburgh Council, *Edinburgh Local Development Plan, Second Proposed Plan* (June 2014); Scottish Government, *Scotland's Economic Strategy* (March 2015) ;
- SESPlan*, South East Scotland Strategic Development Plan Housing Need and Demand Assessment* (March 2015);
- SESPlan, Strategic Development Plan (June 2013) and Supplementary Guidance Housing Land (November 2014);
- Directorate of Planning & Environmental Appeals, Report of Examination into the Proposed Edinburgh Local Development Plan (June 2016);
- City of Edinburgh Council; *CEC Strategic Environmental Assessment* (June 2014);
- The Ancient Monuments and Archaeological Areas Act 1979.

# 6. ECOLOGY, BIODIVERSITY AND NATURE CONSERVATION

## 6.1 List of Figures

- Figure 6.1 Site Location;
- Figure 6.2 Designated Sites;
- Figure 6.3 Phase 1 Habitat Survey;
- Figure 6.4 Invasive and Non-native Plant Species;
- Figure 6.5.1a Breeding Bird Survey – North 14.04.16;
- Figure 6.5.1b Breeding Bird Survey – South 14.04.16;
- Figure 6.5.2a Breeding Bird Survey – North 11.05.16;
- Figure 6.5.2b Breeding Bird Survey – South 11.05.16;
- Figure 6.5.3a Breeding Bird Survey – North 23.06.16;
- Figure 6.5.3b Breeding Bird Survey – South 23.06.16;
- Figure 6.5.4a Breeding Bird Survey – Territories – North;
- Figure 6.5.4b Breeding Bird Survey – Territories – South;
- Figure 6.6 Bat Roost Potential;
- Figure 6.7 Otter Activity.

## 6.2 List of Appendices

- Appendix 6.A Preliminary Ecological Appraisal, December 2015;
- Appendix 6.B Legislation and Conservation Status;
- Appendix 6.C Detailed Ecological Survey Methods.

## 6.3 Introduction

This chapter assesses the potential impacts of the proposed development on ecology, biodiversity and nature conservation. Ecology is defined as the scientific study of the processes that influence the distribution and abundance of organisms, and the interactions between those organisms and their environment. Nature conservation is the maintenance of viable populations of fauna and flora and the habitats in which they are found.

The objectives of nature conservation are:

- Maintenance of biodiversity and landscape character, including wildlife habitats and important geological and geomorphological features;
- Maintenance of viable populations of native species throughout their natural distribution, and the enhancement of rare or endangered species populations.

This chapter was written by IKM Consulting Ltd.

### 6.3.1 Overview of Approach

The assessment of terrestrial and freshwater ecology was undertaken in accordance with the requirements of the Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland (CIEEM, 2016).

CIEEM (2016) provides a framework for identifying which ecological features within the study area are of sufficient value to be included in the assessment, and are vulnerable to significant impacts arising from the proposed development. The framework requires:

- Identification of important ecological features in the study area through consultation, desk-based research and field surveys;
- Identification and description of all potentially significant ecological effects associated with the proposed development;
- Setting out mitigation measures required to ensure compliance with nature conservation legislation, and address any potentially significant ecological effects;

- Identification of how mitigation measures could/will be secured;
- An assessment of the significance of any residual effects;
- Identification of appropriate enhancement measures;
- Setting out requirements for post construction monitoring.

### 6.3.2 Overview of Site

The site is located to the south-east of Edinburgh (see Figure 6.1), and comprises 54.6 hectares (ha) of mostly arable land at Brunstane. The site slopes gently north-east down towards Joppa and the Firth of Forth beyond. It is surrounded on three sides by existing built development, including new housing at Newcraighall North, which is currently under construction.

The eastern edge of the site is bordered by the designed landscape of Newhailes House and mature woodland. The Brunstane Burn runs along the northern edge of the site; on its northern bank lie housing at Daiches Braes, Edinburgh College: Milton Road Campus, Portobello Cemetery and Milton Glen Golf Course.

The site is bisected by the East Coast Main Line (ECML) railway line in a cutting running from north-west to south-east, and a small existing bridge for agricultural use forms the only vehicle crossing into the eastern fields of the site. Pylons and overhead lines also traverse the site.

The John Muir Way footpath runs parallel to the Brunstane Burn, crossing to the south bank at the ECML railway line and adjoining the northern edge of the eastern field. National Cycle Route (NCR 1) runs along part of the south western boundary of the site.

### 6.3.3 Overview of Development

The residential-led mixed-use masterplan incorporates a range of land uses and related development, including:

- Up to 1,330 residential units in a mix of housing types and sizes, with 25% of the units being affordable;

- A new primary school;
- A new local centre including retail, commercial and community uses;
- The formation of three new site accesses, one from the north and two from the south, as well as a network of internal roads and paths, a replacement bridge over the East Coast Main Line (ECML) railway and other associated infrastructure;
- A green network, including open space, parkland, planting buffers to the railway and existing services within the site, and protection for the setting of listed buildings and the on-site Scheduled Monuments;
- Other structural and amenity landscaping and planting.

### 6.3.4 Previous Reports

An ecological constraints survey of the site was undertaken in 2012 by Heritage Environmental Limited (HEL, 2012), while a Preliminary Ecological Appraisal for the development was prepared by IKM Consulting Limited in December 2015 (IKM, 2015). This report is presented in Appendix 6.A. An EIA Scoping Report was submitted to The City of Edinburgh Council (CEC) and other consultees in March 2016 and formal Scoping Opinion received in response.

## 6.4 Legislation, Policy and Guidance

The general methodology of the EIA takes account of Scottish Planning Circular 3/2011 (Guidance on The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011). Full details of the legislative context for protected habitats and species are provided in Appendix 6.B.

This chapter is guided by the following legislation, policy and guidance:

- Council Directive 92/43/EEC on the Conservation of natural habitats and of wild flora and fauna ("Habitats Directive");
- Council Directive 2009/147/EC on the conservation of wild birds (codified version) ("Birds Directive");

- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended);
- Wildlife and Countryside Act 1981 (as amended);
- The Protection of Badgers Act 1992;
- The Wildlife and Natural Environment (Scotland) Act 2011;
- Nature Conservation (Scotland) Act 2004;
- National Planning Framework 3 2014;
- Scottish Planning Policy 2014;
- Planning Advice Note 60: Planning for Natural Heritage;
- Scottish Executive Guidance on European Protected Species, Development Sites and the Planning System;
- Edinburgh Local Development Plan: Second Proposed Plan: June 2014 (ELDP);
- Edinburgh City Local Plan 2010;
- UK Biodiversity Action Plan;
- Scottish Biodiversity List;
- Edinburgh Local Biodiversity Action Plan.

## 6.5 Consultation

The proposed scope of the ecology surveys and assessment was detailed in a Scoping Report submitted to CEC in March 2016. Scottish Natural Heritage (SNH) and the Scottish Environment Protection Agency (SEPA) provided opinions on the proposed methodology, the programme of proposed ecological surveys and the proposed development in their responses. Scottish Badgers provided badger records for within 2km of the site.

Although requested, no consultation responses were received from Lothians Bat Group, Scottish Ornithologists Club and Lothian Amphibian and Reptile Group.

In summary, SNH included the following key comments in their response dated 23rd March 2016:

- Due to the proximity of the Firth of Forth Special Protection Area (SPA), further consideration is required;
- Drainage of SUDS ponds into the Brunstane Burn and treatment of surface water run-off into both the Brunstane and Magdalene Burns will require to be assessed further;
- Localised impacts on commuting otter (*Lutra lutra*) during construction should be assessed;
- Badger (*Meles meles*) surveys should be undertaken;
- Bat activity surveys should be undertaken to help inform how bats are using the site and to inform mitigation;
- An assessment of how barn owl (*Tyto alba*) are using the site will be required to inform mitigation.

SEPA noted the following additional requirements in their response dated 18th March 2016:

- Groundwater Dependant Terrestrial Ecosystems (GWDTE) are unlikely to be present on the site, though this should be confirmed in the EIA;
- SEPA wish to review the survey for Non Native Invasive Species (NNIS) and associated management plan undertaken for the EIA.

A meeting was held with representatives of the National Trust for Scotland (NTS) on 5th April 2016 to review the ecological records for Newhailes Estate, which bounds the development to the east.

## 6.6 Assessment Methodology

### 6.6.1 Assessment Scope

The 'zone of influence' for a project is the area over which ecological features may be subject to significant effects as a result of the proposed development and associated activities. This can extend beyond the site boundary where there are ecological or hydrological links, and the zone of influence can vary for different ecological features depending upon their sensitivity to environmental change.

The zone of influence for this development is the site and a buffer of 50m, with the exception of over-wintering bird populations, which are a qualifying feature of the Firth of Forth SPA, and badgers. For these ecological features, the zone of influence is extended to 1km.

Biodiversity information on and within the zones of influence of the site was gathered from a combination of desk-based research and site surveys. This included the following ecological features:

- Designated sites;
- Protected species;
- Species and habitats which are considered to be of principal importance in relation to conservation of biodiversity (listed on The Scottish Biodiversity List (SBL);
- Non-native invasive species.

Baseline data on ecological features present within the zones of influence were sought from a variety of sources, initially in November 2015 to inform the PEA and again in April 2016 as part of the preparation of this chapter.

### 6.6.2 Desk Study

Baseline data on the nature conservation interest of the site and a search area around the site extending to 2km, including information on designated nature conservation sites and protected species records, were sought from the following sources:

- The Wildlife Information Centre (TWIC);
- Lothians Bat Group;
- Scottish Badgers;
- Scottish Ornithologists Club;
- Lothian Amphibian and Reptile Group;
- NTS.

TWIC was asked to provide records of notable and protected species for a search area of 2km around the site. Notable and protected species were defined as:

- All European and UK protected species listed in legislation schedules;
- All animals classified as Nationally Notable (1-100 ten kilometre squares in Britain) and plants classified as Nationally Rare (1-15 ten kilometre squares in Britain) or Nationally Scarce (16-100 ten kilometre squares in Britain);
- All species classified as Priority Species in the revised 2007 UKBAP List;
- All species that are included on the SBL. Many of the species listed in the SBL are widespread and common but are listed for their cultural significance (e.g. thistles, robin), rather than their nature conservation value;
- Species listed for action within the Edinburgh Local Biodiversity Action Plan (LBAP) (Edinburgh Biodiversity Partnership, 2010);
- Any non-native invasive plant and animal species.

In addition, the ecological constraints survey of the site undertaken in 2012 by Heritage Environmental Limited was reviewed for relevant records (HEL, 2012).

### 6.6.3 Field Survey

The area surveyed for each ecological feature typically extended to 50m around the proposed site. The exceptions were for badger and otter where the survey areas extended to 1km around the proposed site and 200m upstream and downstream along the Brunstane Burn, respectively. Full survey methods used to establish the baseline used to inform a subsequent evaluation and ecological impact assessment, are presented in Appendix 6.C.

An extended Phase 1 Habitat Survey was undertaken on 9th November 2015 which, in addition to mapping habitats, also identified the bat roost potential (BRP) of buildings and trees within the zone of influence.

Detailed ecological surveys were undertaken for the following habitats and species (see Table 6.1):

- Invasive species – an invasive species survey of the Brunstane Burn Local Biodiversity Site (LBS) was undertaken on 30th March 2016, with incidental records made during other surveys;
- Amphibians – a Habitat Suitability Index (HSI) assessment was undertaken of Milton Glen Golf Course pond on 30th March 2016;
- Birds – breeding bird surveys were undertaken on 13th April 2016, 11th May 2016 and 23rd June 2016;
- Bats (*Chiroptera* spp.) – to be undertaken between Mid-May and September 2016;
- Badger – undertaken on 30th March 2016 and 5th April 2016;
- Otter – undertaken on 30th March 2016;
- Water vole (*Arvicola amphibius*) – undertaken on 30th March 2016.

The additional bat surveys scheduled for summer and autumn 2016 will be reported in an addendum to this ES.

**Table 6.1: Ecological Surveys Undertaken at New Brunstane**

| Ecological Survey | Date(s) | Methodology |
|---|---|---|
| Extended Phase 1 Habitat Survey | 9th November 2015 | The Extended Phase 1 survey followed standard guidance (JNCC, 2010) and covered the site and a buffer of 50m. |
| Non-native Invasive Species (NNIS) Surveys | 9th November 2015 – 23rd June 2016 | Where NNIS (e.g. Japanese knotweed (*Fallopia japonica*), giant hogweed (*Heracleum mantegazzianum*), Indian balsam (*Impatiens glandulifera*) and few-flowered garlic (*Allium paradoxum*) were located, grid reference and size of stand were recorded. |
| Great Crested Newt (GCN) Habitat Suitability Index (HSI) Survey | 30th March 2016 | HSI was calculated in accordance with standard guidance (Oldham et al., 2000) |
| Breeding Bird Surveys | 13th April 2016,11th May 2016 and 23rd June 2016 | Three visits were made following an adapted version of the Common Bird Census (CBC) standard mapping technique as developed by the British Trust for Ornithology (Marchant, 1983, Bibby et al. 2000 and Gilbert et al. 1998). On completion of the breeding bird surveys, maps for each species recorded on the site were compiled, by copying all registrations for each species on to an individual map. Rings were drawn around each cluster of registrations which appeared to represent the activities of a distinct pair of birds (a territory). Each cluster had to include registrations from at least two survey visits. A separate territory map was then produced showing territory locations for all breeding species.<br>Barn owl surveys followed standard guidance (Gilbert et al., 1998), focussing on vacant buildings, structures and hollow trees within 50m of the site boundary. Dusk vantage point (VP) surveys were undertaken from the eastern side of the ECML bridge, to assess barn owl activity along the southern boundary of the site and from inside the walled garden at Newhailes to assess activity around the known nest site. |

| Ecological Survey | Date(s) | Methodology |
|---|---|---|
| Bat Surveys | Bat Roost Potential (BRP) Survey – 9th November 2015 and 30th March 2016 | The surveys followed standard guidance (Collins, 2016).<br>Buildings and trees that could potentially be affected by the proposed development were assessed from the ground and assigned a roost category based on their BRP.<br>Three bat activity surveys will be undertaken with transects including the perimeter of the site to assess the use of boundary features for commuting and foraging, and passes over the centre of the site to assess use of the arable fields for foraging. |
| Badger Surveys | 30th March 2016 and 5th April 2016 | The survey followed accepted standard guidance (Harris et al., 1989 and Highways Agency et al., 1993) and covered all suitable habitats within 1kmm of the site. |
| Otter Survey | 30th March 2016 | The survey followed standard guidance (Chanin, 2003) and covered the Brunstane Burn running along the northern boundary of the site, and the unculverted sections of the Magdalene Burn where it passes through Newhailes Estate. |
| Water Vole Survey | 30th March 2016 | The survey followed standard guidance (Strachan and Moorhouse, 2006) and covered the Brunstane Burn running along the northern boundary of the site, and the unculverted sections of the Magdalene Burn where it passes through Newhailes Estate. |

During all surveys, sightings of other notable species were recorded e.g. grey squirrel.

***Limitations***

The timing of the Extended Phase 1 Habitat Survey (late-autumn) contained within the PEA (Appendix 6.A) was sub-optimal as in Scotland the generally accepted survey window for Phase 1 Habitat surveys is April to September inclusive. The habitat survey information was updated during the course of the species-specific ecological surveys undertaken in 2016. Consequently a reasonable level of confidence is placed in the findings, as the dominant habitats occurring on the site are arable fields, with some semi-improved neutral grassland and scattered scrub. It is considered highly unlikely that any botanical species of interest will have been overlooked.

It is considered likely that the true extent of Indian balsam along the Brunstane Burn corridor has been understated as no plants were yet visible during the NNIS survey of March 2016, although it was noted to be present there during the Extended Phase 1 Habitat Survey in November 2015.

Although three breeding bird surveys were undertaken on the site, it is likely that a small number of bird species and a significant number of territories remained unrecorded, given that the standard CBC methodology requires ten survey visits.

Planned further surveys will provide further information on bats using the site, and will be reported in an addendum to this ES.

It was not possible to gain access to all the parcels of land within the zone of influence for surveys including Wanton Walls Farm, Brunstane Farm Steading and the private golf course at Milton Glen. Our approach for dealing with data gaps in this regard was discussed and agreed with SNH via email correspondence.

### 6.6.4 Assessment

***Determination of Baseline Conditions***

In undertaking the evaluation of baseline conditions, the following definitions are used:

- An ecological feature is a habitat, species or ecosystem within the zone of influence(s) that might be influenced by a change in baseline conditions;
- An important ecological feature is one that is determined to be important by consultation, literature review and desk-based studies, field survey information, legal protection/conservation status and professional judgement.

This approach meets CIEEM guidance, which advises that the determination of ecological value should involve professional judgement informed by available guidance and information, together with advice from experts who know the locality of the project, and the distribution and status of the species or features that are being considered. It is vital to note that just because features are not identified as important, this does not mean that they are necessarily without ecological value.

Species populations are assessed on their distribution, abundance and population trends, not on the basis of the level of protection they receive. For example, badgers are widespread and common in lowland Scotland, and they are important due to welfare and legal protection reasons, not their biodiversity value.

Ecosystem services, where present, have been regarded as ecological features, and are evaluated accordingly.

Ecological receptors were assigned a value using the framework presented in Table 6.2.

**Table 6.2: Evaluation Criteria for Ecological Features**

| Importance | Attributes |
|---|---|
| **International and European** | **Habitats**<br>An internationally designated site or candidate site i.e. Special Protection Area (SPA), potential SPA (pSPA), Special Area of Conservation (SAC), Sites of Community Importance (SCI), Ramsar site, Biogenetic/Biosphere Reserve, World Heritage Site or an area which meets the published selection criteria for such designations.<br>A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that are essential to maintain the viability of a larger whole.<br>**Species**<br>Any regularly occurring population of an internationally important species, which is threatened or rare in the UK, i.e. a UK Red List species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UKBAP) or of uncertain conservation status, or of global conservation concern in the UKBAP.<br>A regularly occurring, nationally significant population/number of any internationally important species. |
| **National** (Scottish) | **Habitats**<br>A nationally designated site i.e. SSSI, National Nature Reserve (NNR), Marine Nature Reserve, or a discrete area, which meets the published selection criteria for national designation (e.g. SSSI selection guidelines).<br>A viable area of a priority habitat identified in the UKBAP, or of smaller areas of such habitat that are essential to maintain the viability of a larger whole. |

| Importance | Attributes |
|---|---|
| | **Species**<br>A regularly occurring, regionally or county significant population/number of an internationally/nationally important species.<br>Any regularly occurring population of a nationally important species which is threatened or rare in the region or county (see LBAP).<br>A species identified as a priority species listed in the UKBAP.<br>Species listed as Nationally Scarce, Nationally Notable A or Notable B (rare and scarce species not based on IUCN criteria). |
| **Regional** (Lothians) | **Habitats**<br>Sites which exceed the county-level designations but fall short of SSSI selection criteria.<br>Viable areas of key habitat identified in the regional BAP or smaller areas of such habitat that are essential to maintain the viability of a larger whole.<br>Viable areas of key habitat identified as being of regional value in the appropriate SNH Natural Heritage Future area profile.<br>**Species**<br>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 SNH Natural Heritage Future area on account of its regional rarity or localisation.<br>A regularly occurring, locally significant population/number of a regionally important species.<br>Sites maintaining populations of internationally/nationally important species that are not threatened or rare in the region or county. |
| **Authority Area** (CEC) | **Habitats**<br>Sites that are recognised by local authorities e.g. Sites of Interest for Nature Conservation (SINC) and District Wildlife Sites (DWS).<br>County/district sites that the designating Authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves (LNR).<br>A viable area of habitat identified in county/district BAP or in the relevant SNH Natural Heritage Future area profile.<br>Semi-natural ancient woodland greater than 0.25ha. |

| Importance | Attributes |
|---|---|
| | **Species**<br>Any regularly occurring, locally significant population of a species that is listed in a county/district BAP on account of its regional rarity or localisation.<br>A regularly occurring, locally significant population of a county/district important species (particularly during a critical phase of its life cycle).<br>Sites supporting populations of internationally/nationally/regionally important species that are not threatened or rare in the region or county, and are not integral to maintaining those populations. Sites/features that are scarce within the county/district or which appreciably enrich the county/ district habitat resource. |
| **Local** | **Habitats**<br>Areas of habitat considered to appreciably enrich the habitat resource e.g. species-rich hedgerows, ponds etc.<br>Sites that retain other elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats within the local area are not considered for the above classifications. Semi-natural ancient woodland smaller than 0.25ha.<br>**Species**<br>Populations/assemblages of species that appreciably enrich the biodiversity resource within the local context.<br>Sites supporting populations of county/district important species that are not threatened or rare in the region or county, and are not integral to maintaining those populations. |

***Impact Assessment***

Knowledge and assessment of construction methods and operational activities, together with professional judgment by an experienced ecologist has been used to identify the potential impacts of the proposed development on ecological features.

A standard list of potential areas of concern that could impact on an ecological receptor is used:

- Land-take;
- Direct mortality;

- Changes to hydrology;
- Water pollution;
- Construction of structures;
- Effects of road/bridge/building lighting;
- Dust/air pollution;
- Noise/disturbance;
- Alien species transfer (e.g. Japanese knotweed).

For the purposes of this assessment, ecological impacts are described with reference to the following characteristics:

- Positive or negative;
- Extent;
- Magnitude;
- Duration of impact (short term, medium term, long term or permanent);
- Timing;
- Frequency;
- Reversibility.

Impact magnitude was classified as negligible, minor, moderate or high, taking into account the above impact characterisation approach. Table 6.3 presents these criteria:

**Table 6.3: Criteria for Impact Magnitude**

| Impact Character | Impact Magnitude |
|---|---|
| A permanent or long-term effect on the distribution and/or abundance of a habitat, species or population.<br>If negative this would have implications for the integrity of the receptor and its conservation status, and if positive would result in an improvement to the conservation status of the receptor. | Major |
| A permanent or long-term effect on the distribution and/or abundance of a habitat, species or population. | Moderate |
| If negative this would have negligible implications for the integrity of the receptor or its conservation status, and if positive would not alter the conservation status of the receptor. | Minor |
| A short-term reversible effect on the distribution and/or abundance of a habitat, species or population, and within normal fluctuations observed within the ecology of the receptor. | Negligible |

Once potential impacts were understood and the value of the ecological features determined, professional judgement was used to focus the assessment on impacts that would require avoidance or mitigation. For example, common mammal species such as roe deer (*Capreolus capreolus*) would be evaluated as being of local ecological value and would not progress through the assessment process. However, an impact on a European Protected Species (e.g. otter) would progress through the assessment process, with mitigation and residual effects identified.

A sequential approach was adopted to avoid, mitigate and compensate ecological impacts ('the mitigation hierarchy'). Once measures to avoid and mitigate ecological impacts were finalised, assessment of the residual impacts was undertaken to determine the significance of their effects on important ecological features. In accordance with CIEEM (2016), a significant effect is an effect (negative or positive) that either supports or undermines conservation objectives for important ecological features, or for biodiversity in general. The assessment is based on professional judgment and the available information on the effect and the ecological feature.

The level of impact significance was further determined through the application of a matrix which weighed the value of the ecological feature (Table 6.2) and the magnitude of the impact of the development on this feature (Table 6.3). The impact significance matrix is reproduced below in Table 6.4. Although this is a departure from the published CIEEM guidance on EcIA, which discourages use of the matrix approach, it has been followed to allow direct comparison with the other environmental impacts contained within this ES.

**Table 6.4: Significance of Impacts**

| Ecological Feature Value | Magnitude of Impact | | | |
|---|---|---|---|---|
| | **Negligible** | **Minor** | **Moderate** | **Major** |
| International and European | Not significant | Not significant | Significant | Major Significant |
| National | Not significant | Not significant | Significant | Major Significant |
| Regional | Not significant | Not significant | Significant | Major Significant |
| Authority Area | Not significant | Not significant | Significant | Significant |
| Local | Not significant | Not significant | Not significant | Not significant |

Any significant impacts remaining after mitigation (the residual impacts), together with an assessment of the likelihood of success of the mitigation, are the factors to be considered against legislation, policy and development control in determining the application.

## 6.7 Baseline Conditions

This section describes the current baseline for habitats and species on the site, and the ecosystem services currently provided by the site.

Full details of the legislative context for protected habitats and species are provided in Appendix 6.B.

### 6.7.1 Designated Sites

Designated nature conservation sites are illustrated on Figure 6.2 and described below. There are no statutory designated sites within the site. The Firth of Forth, approximately 400m north of the site, is designated as a Special Protection Area (SPA), Ramsar site and a Site of Special Scientific Interest (SSSI).

The qualifying interests of the Firth of Forth SPA include wintering populations of red-throated diver (*Gavia stellata*), Slavonian grebe (*Podiceps auritus*), golden plover (*Pluvialis apricaria*), bar-tailed godwit (*Limosa lapponica*), pink-footed goose (*Anser brachyrhynchus*), shelduck (*Tadorna tadorna*), knot (*Calidris canutus*), redshank (*Tringa totanus*) and turnstone (*Arenaria interpres)* of European importance. The Firth of Forth also qualifies by virtue of supporting a wintering waterfowl assemblage of European importance, and a post-breeding (passage) population of sandwich tern (*Sterna sandvicensis*). It is known that a number of Firth of Forth SPA bird species spend a proportion of their time away from the coast, at inland feeding and day roosting sites (supporting habitat). Many of these are close to the coast, and most species rarely fly more than 5km from the coast on a regular basis.

The Firth of Forth SSSI is also designated for its bird interest but additionally due to its importance for a variety of geological and geomorphological features, coastal and terrestrial habitats, vascular plants and invertebrates.

Duddingston Loch SSSI lies approximately 3.3km to the west of the site and is the only remaining example of a natural freshwater loch in the City of Edinburgh area. It is a small lowland eutrophic loch, with characteristic aquatic and fringing marshland vegetation including reedbeds and willow scrub.

Arthur's Seat Volcano SSSI lies 3.5km to the west of the site and is one of the most studied ancient volcanoes in the world. Holyrood Park is unique in Edinburgh as an example of lowland, unimproved grassland and is the largest, most diverse area of such unimproved grassland in the Lothians.

Dalkeith Oakwood SSSI lies 3.5km to the south-east of the site. It is one of only two remaining ancient park woodlands in Scotland and is unique in the Lothians as an ecological and historical record. It also supports a species-rich beetle fauna, most of which are dependent on deadwood, and this includes several nationally scarce species.

The site is bounded to the north by the Brunstane Burn which is identified as a Local Biodiversity Site (LBS) (formerly Urban Wildlife Site) in the Edinburgh City Local Plan, 2010. The Brunstane Burn LBS is designated for the burn and associated scrub, woodland and grassland habitats which form part of an important ecological network. It also hosts two locally notable flowering plants. Some of the woodland along the Brunstane Burn to the north of the site is listed as semi-natural native woodland in the Native Woodland Survey of Scotland (Forestry Commission Scotland, 2015).

Further LBS within 2km of the site are Duddingston Golf Course, 2km to the west listed for its semi-improved grassland and locally notable plants, and Figgate Burn Park 1.7km to the north-west, listed for its mixture of habitats including a burn.

On the southern boundary of the site a disused railway (and adjoining semi-natural habitats) running between Newcraighall Road and Brunstane forms a section of the wider Disused Railway Network LBS. It is proposed that this large linear LBS will be split up into smaller Local Nature Conservation Sites (LNCS) as part of the adoption process of the ELDP. The section to the south of the site will become the Brunstane to Newcraighall LNCS.

To the east of the site lies Newhailes House and its associated policy woodlands. These are listed in the SNH Ancient Woodland Inventory as being long-established woodlands of plantation origin.

### 6.7.2 Habitats

A plan of the survey area displaying the Phase 1 habitat map and protected species target notes, is provided on Figure 6.3. Target notes are reproduced in full in Appendix 6A.

***Development Site***

The site consists of two intensively managed large arable fields sloping gently to the north-east. These fields are used for growing arable crops, most recently wheat during 2015. In November 2015, the stubble from the previous crop was in the process of being ploughed up during the survey.

The stubble hosted a diverse range of arable weeds including fumitory spp. (*Fumaria* spp.), sun spurge (*Euphorbia helioscopia*), field pansy (*Viola arvensis*), scentless mayweed (*Tripleurospernum inodorum*) and prickly sowthistle (*Sonchus asper*). Around the western field, a wide headland of rank semi-improved grassland has been retained which is dominated by the grasses, false oat-grass (*Arrhenatherum elatius*), and Yorkshire fog (*Holcus lanatus*) with some barren brome (*Anisantha sterilis*), and tall herbs typical of nutrient-rich, disturbed habitats including creeping thistle (*Cirsium arvense*), hogweed (*Heracleum sphondylium*) and common nettle (*Urtica dioica*). This rank grassland vegetation is also found along either side of the track dividing the two western fields and in the railway cutting that divides the site in two.

To the south-east of the western field, a parcel of semi-improved neutral grassland extending to around 0.8ha in size remains uncultivated. This is dominated by false oat-grass and cock's-foot (*Dactylis glomerata*), and probably as a result of the lack of grazing or mowing, it is rapidly becoming colonised by bramble (*Rubus fruticosus*). To the south of this parcel of semi-improved grassland and along the boundary of the site with Wanton Walls Farm, an area of tall ruderal habitat dominated by rosebay willowherb (*Chamerion angustifolium*) and common ragwort (*Senecio jacobaea*) has developed over ground which appears to have been recently stripped of vegetation. Further small areas of rank, ungrazed semi-improved neutral grassland occur on the western boundary of the site in the vicinity of Brunstane Farm. These are also being colonised by bramble, raspberry *(Rubus idaeus*) and tall ruderal species including mugwort (*Artemisia vulgaris*) and great willowherb (*Epilobium hirsutum*). On the poorest soils, open areas of grassland persist with common bent (*Agrostis capillaris*), hairy tare (*Vicia hirsuta*) and ribwort plantain (*Plantago lanceolata*).

Also to the south-east of Brunstane Farm, and just outwith the site boundary, a former quarry which has been used as a farm dump is developing into woodland. Presently tree species are restricted to low-growing elder (*Sambucus nigra*) and wych elm (*Ulmus glabra*) with a dense ground layer of common nettle and in more open areas, cleavers (*Galium aparine*).

The access corridor to the site from the north, which extends from the north of the eastern field across the valley of the Brunstane Burn, to join with Milton Road East is currently a mosaic of tall ruderal vegetation and dense scrub. Tall ruderal species include rosebay willowherb, raspberry, common nettle with dense stands of butterbur (*Petasites hybridus*) and reed canary-grass (*Phalaris arundinacea*) adjacent to the burn, with scrub comprising bramble and broom (*Cytisus scoparius*) dominating the northern slopes of the valley. In places butterfly-bush (*Buddleja davidii*) is abundant, with silver birch (*Betula pendula*) and goat willow (*Salix caprea*) also frequent.

***Adjacent Habitats***

The most important semi-natural habitats within the study area are those occurring just outside the site boundary. These include broad-leaved semi-natural woodland along the Brunstane Burn to the north of the site and within the Newhailes Estate to the east of the site. Both of these woodland areas extend right up to the site boundary. The woodland along the Brunstane Burn is most valuable to the north of the western fields (upstream of the railway line) where there are many mature ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*) and wych elm trees, often clothed with a dense growth of ivy (*Hedera helix*). The understorey is provided by elder and blackthorn (*Prunus spinosa*), the latter of which often forms dense stands of scrub on the edge of the woodland up to the site boundary.

Immediately to the east of the railway, the woodland associated with the Brunstane Burn is primarily broad-leaved plantation woodland ('Brunstane Community Woodland') and is less important in nature conservation terms, with a less well-developed understorey and ground flora. Further east lies the privately-owned Milton Glen Golf Course, which is separated from the site by a strip of mixed plantation woodland and a hard surfaced path which forms part of the John Muir Way.

In places, a tall overgrown hawthorn (*Crataegus monogyna*) hedge runs along the southern side of the path to form the north-east boundary of the site. Within the golf course, approximately 25m north of the site boundary, the Brunstane Burn has been dammed to create a small pond. This was dry at the time of the Extended Phase 1 Habitat survey in November 2015 when it may have been drawn down for maintenance, but during March and April 2016, it was full with water discharging over the spillway at the eastern end.

Other small areas of broad-leaved plantation woodland have been established on the site boundary to the north-west and south-east of the site. The area of plantation to the north-west of the site backing on to Gilberstoun Place and Brunstane Road South, has trees up to 15m in height of a diverse range of species. These include silver birch, alder (*Alnus glutinosa*) and wild cherry (*Prunus avium*).

As might be expected of a recent plantation, the understorey is sparse with some hazel (*Corylus avellana*), elder and bramble, while the ground floor is dominated by ivy, to the exclusion of other species. The occasional additional native flora includes male fern (*Dryopteris filix-mas*), broad buckler-fern (*Dryopteris dilatata*), wood avens (*Geum urbanum*) and common nettle. Non-native invasive species including rose-of-sharon (*Hypericum calycinum*) and cotoneaster spp. (*Cotoneaster spp*) are frequent throughout this area of plantation.

The area of plantation to the south-east of the site comprises a 15m strip between the eastern field and the boundary wall of the Newhailes Estate. It is possible that some of this woodland, dominated by ash with occasional wych elm, beech and sycamore is self-seeded as there is no evidence of tree-guards or other woodland management. The shrub layer consists only of bramble, while the ground flora is very poor with wood avens the commonest species.

***Waterbodies and Watercourses***

No ponds are present on the site, with aquatic habitats in the zone of influence restricted to the Brunstane Burn running along the northern boundary of the site, and the partially culverted Magdalene Burn which is above ground where it passes through the wooded Newhailes Estate to the east of the site. Despite the prevalence of discarded shopping trolleys and other urban detritus, the water quality of the Brunstane Burn is good as evidenced by the presence of nesting dipper (*Cinclus cinclus*) and grey wagtail (*Motacilla cinerea*) and beds of stream water-crowfoot (*Ranunculus penicillatus* subsp. *pseudofluitans*).

***Buildings***

Two groups of derelict buildings associated with Brunstane and Wanton Walls Farms are found just outside the site boundary to the west and south. Those associated with Brunstane Farm appear to be in the process of being demolished. Both sets of buildings are considered likely to offer potential for roosting bats and breeding birds.

***Groundwater Dependent Terrestrial Ecosystems***

No Groundwater Dependent Terrestrial Ecosystems (GWDTE) were identified on the site.

Table 6.5 identifies the habitat types present on the site and their extent, and includes the likely loss of habitat resulting from the proposed development.

**Table 6.5: Phase 1 Habitat Types within the New Brunstane Development Site (54.6ha)**

| Habitat Type | Area (ha) (% of site area) |
|---|---|
| Broad-leaved semi-natural woodland | 0.80ha (1.5%) |
| Broad-leaved plantation woodland | 0.90ha (1.6%) |
| Mixed plantation woodland | 0.13ha (0.2%) |
| Dense/continuous scrub | 0.24ha (0.4%) |
| Tall ruderal | 1.15ha (2.1%) |
| Unimproved neutral grassland | 0.80ha (1.5%) |
| Semi-improved neutral grassland | 7.3ha (13.4%) |

| Habitat Type | Area (ha) (% of site area) |
|---|---|
| Arable | 43.00ha (78.8%) |
| Roads and hard standing | 0.28ha (0.5%) |

### 6.7.3 Species

***Plants***

The TWIC search revealed a number of notable plant species within the Zone of influence (site + 50m) as shown in Table 6.6.

**Table 6.6: Notable Plant Species Recorded within New Brunstane Zone of Influence**

| Species | Location | Date | Status |
|---|---|---|---|
| Giant bellflower (*Campanula latifolia*) | Brunstane (NT3172) | 1981-1999 | City of Edinburgh LBAP |
| Fat-hen (*Chenopodium album*) | Newhailes (NT328727) | 19/09/1998 | Local (Lothians) |
| Common Stork's-bill (*Erodium cicutarium*) | Newcraighall – Stoneyhill: Disused Railway (NT324721) Newhailes (NT328727) | 30/04/1998 May 1998 | Local (Lothians) |
| Shining Crane's-bill (*Geranium lucidum*) | Newhailes (NT328727) | May 1998 | Local (Lothians) |
| Small-flowered Crane's-bill (*Geranium pusillum*) | Newhailes (NT3272) | 05/06/2010 | Local (Lothians) |
| Bluebell (*Hyacinthoides non-scripta*) | Newhailes (NT328727) | May 1998 | Scottish Biodiversity List City of Edinburgh LBAP |
| Wood millet (*Milium effusum*) | Newhailes (NT328727) | May 1998 | City of Edinburgh LBAP |
| Corn buttercup (*Ranunculus arvensis*) | Newhailes (NT3272) | 15/06/1998 | UKBAP |
| Stream water-crowfoot (*Ranunculus penicillatus subsp. pseudofluitans*) | Newhailes (NT3272) | 15/06/1998 | City of Edinburgh LBAP |

| Species | Location | Date | Status |
|---|---|---|---|
| White campion (*Silene latifolia*) | Newhailes (NT3272) | 05/06/2010 | Local (Lothians) |
| Charlock (*Sinapis arvensis*) | Newhailes (NT3272) | 06/06/2010 | Scottish Biodiversity List |
| Spring vetch (*Vicia lathyroides*) | Newhailes (NT328727) | May 1998 | Local (Lothians) |
| Smooth tare (*Vicia tetrasperma*) | Brunstane Burn (NT317727) | 09/07/1999 | Very Local (Lothians) |
| Sweet violet (*Viola odorata*) | Newhailes (NT37G) | 18/06/2012 | Local (Lothians) |

These plants broadly fall into two habitat groupings: plants of disturbed and cultivated ground (fat-hen, common stork's-bill, shining crane's-bill, small-flowered crane's-bill, corn buttercup, white campion, and charlock), and woodland plants (giant bellflower, bluebell and wood millet). Stream water-crowfoot was recorded at multiple locations along the Brunstane Burn during the otter and water vole survey undertaken on 30th March 2016.

A number of non-native invasive plant species were recorded on the site and within the zone of influence during the surveys carried out by HEL and IKM Consulting, as shown in Table 6.7 and Figure 6.4.

**Table 6.7: Non-Native Invasive Plant Species Recorded within New Brunstane Zone of Influence**

| Location | Stand size | Date | Notes |
|---|---|---|---|
| **Giant hogweed (Heracleum mantegazzianum)** | | | |
| Brunstane Burn (NT37) | Unknown | 27/08/2012 | Small stands intermittently along Brunstane Burn |
| Brunstane Eastern field NT32530 72633 | 2 x 2m | 09/11/2015 | Dead stems (apparently treated) adjacent to boundary wall |
| Brunstane Burn NT31741 72694 | 1 plant | 30/03/2016 | South side of burn |
| Brunstane Burn NT31864 72743 | 3 plants | 30/03/2016 | North side of burn |

| Location | Stand size | Date | Notes |
|---|---|---|---|
| Brunstane Burn NT31886 72758 | 2 plants | 30/03/2016 | South side of burn |
| Brunstane Burn NT31921 72794 | 1 plant | 30/03/2016 | North side of burn |
| Brunstane Burn NT31933 72808 | 1 plant | 30/03/2016 | North side of burn |
| Brunstane Burn NT31951 72814 | 3 plants | 30/03/2016 | South side of burn |
| Brunstane Burn NT31691 72663 | 1 plant | 30/03/2016 | Between path and burn on north bank |
| Brunstane Burn NT31673 72659 | 1 plant | 30/03/2016 | Next to path |
| Brunstane Burn NT31572 72621 | 1 plant | 30/03/2016 | Next to path |
| Brunstane Mill Park NT32547 72943 | 2 plants | 05/04/2016 | On edge of amenity grassland |
| Newhailes NT32639 72926 | 1 plant | 05/04/2016 | In woodland on south bank of burn |
| Newhailes NT32636 72926 | 6 plants | 05/04/2016 | In woodland on south bank of burn |
| Brunstane Eastern field NT32487 72935 | Several plants | 14/04/2016 | Headland of field |
| Brunstane Eastern field NT32496 72916 | 1 plant | 14/04/2016 | Headland of field |
| Brunstane Eastern field NT32546 72939 | Several plants | 11/05/2016 | Several small plants growing amongst crop |
| Brunstane Burn NT32140 72920 | 10 plants | 11/05/2016 | On western side of access corridor to Milton Road East, on the southern side of the Brunstane Burn |
| Brunstane West Field NT32234 72235 | 30 plants | 23/06/2016 | Large flowering plants growing amongst rank grassland and scrub towards the south of the site |

| Location | Stand size | Date | Notes |
|---|---|---|---|
| **Japanese knotweed (*Fallopia japonica*)** | | | |
| Brunstane Burn (NT37) | Unknown | 27/08/2012 | Small stands intermittently along Brunstane Burn |
| Brunstane Burn NT31770 72697 | $1m^2$ | 30/03/2016 | North side of burn |
| Brunstane Burn NT31855 72736 | 2 x 2m | 30/03/2016 | North side of burn |
| Brunstane Burn NT32058 72869 | 20 x 5m | 30/03/2016 | North side of burn backing on to Portobello Cemetery |
| Brunstane Burn NT32100 72899 | 10 x 5m | 30/03/2016 | North side of burn backing on to Portobello Cemetery |
| Brunstane Burn NT31829 72726 | $1m^2$ | 30/03/2016 | Next to path |
| **Few-flowered garlic (Allium paradoxum)** | | | |
| Brunstane Burn NT31640 72633 | 3 x 0.5m | 30/03/2016 | South side of burn |
| Brunstane Burn NT31759 72697 | 10 x 8m | 30/03/2016 | South side of burn |
| Brunstane Burn NT31795 72707 | $1m^2$ | 30/03/2016 | Several plants on north bank of burn |
| Brunstane Burn NT31802 72699 | 2 x 1m | 30/03/2016 | South side of burn |
| Brunstane Burn NT31945 72809 | 20 x 5m | 30/03/2016 | South side of burn |
| Newhailes NT32636 72926 | 10 x 10m | 05/04/2016 | South side of burn in woodland |
| Newhailes NT32697 72951 | 100 x 10m | 05/04/2016 | Downstream of this point, a near continuous stand in woodland above burn |
| Newhailes NT32748 73034 | 80 x 50m | 05/04/2016 | Forming dense ground cover in woodland with ivy. |

| Location | Stand size | Date | Notes |
|---|---|---|---|
| **Indian balsam (*Impatiens glandulifera*)** | | | |
| Brunstane Burn (NT37) | Unknown | 27/08/2012 | Frequent along Brunstane Burn |
| Brunstane Burn NT32145 72929 | Several plants | 09/11/2015 | South side of burn |
| **Butterfly-bush (*Buddleja davidii*)** | | | |
| Brunstane Burn NT32101 73059 | Several plants | 09/11/2015 | Amongst bramble and broom scrub in access corridor to Milton Road East |
| Brunstane Burn NT31902 72778 | 1 plant | 30/03/2016 | North side of burn |
| Brunstane Burn NT31909 72788 | 1 plant | 30/03/2016 | North side of burn |
| **Flowering currant (*Ribes sanguineum*)** | | | |
| Brunstane Burn NT31866 72742 | 4 plants | 30/03/2016 | North side of burn |
| **Spanish bluebell (*Hyacinthoides hispanica*)** | | | |
| Brunstane Burn NT31789 72711 | Several plants | 30/03/2016 | Next to path |
| **Cherry laurel (*Prunus laurocerasus*)** | | | |
| Brunstane Burn NT31849 72732 | 1 plant | 30/03/2016 | South side of burn |

***Invertebrates***

The TWIC search revealed a number of notable invertebrate species within the zone of influence (site + 50m), as shown in Table 6.8 below.

**Table 6.8: Notable Invertebrate Species Recorded within New Brunstane Zone of Influence**

| Species | Location | Date | Status |
|---|---|---|---|
| A booklouse (*Philotarsus picicornis*) | Newhailes (NT325729) | 19/09/1998 | Local (Lothians) |
| Small heath butterfly (*Coenonympha pamphilus*) | Newhailes (NT328726) | 08/03/1998 – 05/09/1998 | UKBAP |

| Species | Location | Date | Status |
|---|---|---|---|
| Common blue butterfly (*Polyommatus icarus*) | Newhailes (NT325728) | 15/06/2004 | City of Edinburgh LBAP |
| Maple button moth (*Acleris forsskaleana*) | Newhailes (NT326725) | 24/08/2007 | Local (Lothians) |
| Small clouded-brindle moth (*Apamea unanimis*) | Newhailes (NT325728) | 05/07/2001 | Local (Lothians) |
| Long-horned flat-body moth (*Carcina quercana*) | Newhailes (NT326725) | 24/08/2007 | Local (Lothians) |
| Tawny speckled pug moth (*Eupithecia icterata*) | Newhailes (NT326725) | 24/08/2007 | Very Local (Lothians) |
| Broad-bordered yellow underwing moth (*Noctua fimbriata*) | Brunstane Burn (NT326730) | 02/09/1999 | Local (Lothians) |
| Suspected moth (*Parastichtis suspecta*) | Brunstane Burn (NT326730) | 30/07/1999 | Very Local (Lothians) |
| Six-striped rustic moth (*Xestia sexstrigata*) | Newhailes (NT325728) | 15/08/2001 | Local (Lothians) |
| Iberian threeband slug (*Ambigolimax valentianus*) | Newhailes (NT326725) | 06/06/2010 | Local (Lothians) |
| a spider (*Araniella cucurbitana*) | Newhailes (NT327729) | 19/05/2008 | Local (Lothians) |

In addition to these, 18 species of macro-moth identified as being UKBAP priority species have been previously recorded at Brunstane Burn and Newhailes. These have not been listed individually in the table as they appear on the UKBAP List as widespread and common, but rapidly declining species. Their listing in the UKBAP is to encourage study by research bodies to look at wider changes in the countryside that may be affecting invertebrate populations, rather than to prioritise conservation effort.

No incidental records of notable invertebrate species were recorded during the field surveys for other ecological features, though this is likely to be as a result of the timing of surveys, rather than the current absence of notable species.

It is considered likely that notable species would be concentrated in the Brunstane Burn LBS and Newhailes policy woodlands, rather than in the intensively managed arable habitats making up the majority of the site.

***Amphibians***

The TWIC search revealed no amphibian records within the Zone of influence (site + 50m) or within 2km of the site. No amphibians were recorded during the field surveys for other ecological features. The only area of standing water within the Zone of influence is a large pond within the private Milton Glen Golf Course at NT32326 72959, approximately 25m to the north of the site boundary. This pond is fed by the Brunstane Burn and is hence is likely to be accessible to fish populations resident in the burn. Access was not granted to this pond for amphibian surveys, but a HSI assessment was completed on the basis of data collected remotely from aerial photographs and viewing through binoculars. The information gathered for the HSI assessment is provided in Table 6.9 below.

**Table 6.9: Milton Glen Golf Course Pond – HSI Assessment**

| Suitability Indices | Field Score | SI Score |
|---|---|---|
| SI1 - Location | B – marginal | 0.5 |
| SI2 – Pond Area | 1600m2 | 0.865 |
| SI3 – Pond Drying | Never dries | 0.9 |
| SI4 – Water Quality | Moderate – feeder stream (Brunstane Burn) supports water-crowfoot and nesting dippers/grey wagtails | 0.67 |
| SI5 - Shade | 40% | 1 |
| SI6 - Fowl | Minor (mallard present on 30/03/2016) | 0.67 |
| SI7 - Fish | Possible (pond fed by Brunstane Burn) | 0.67 |
| SI8 - Ponds | 0 | 0.1 |
| SI9 – Terrestrial Habitat | Moderate | 0.67 |
| SI10 - Macrophytes | 50% cover (unable to assess – 50% estimate) | 0.8 |

HSI = (0.5x0.865x0.9x0.67x1x0.67x0.67x0.1x0.67x0.8) = 0.6022 (Average).

The HSI assessment gave a HSI score of 0.60 (Average Suitability for GCN), although it should be noted that it was not possible to obtain definitive data on three of the criteria (drying out, fish presence and macrophyte cover). No GCN records were returned from the desk study, and taking into account the HSI score, it is considered that this species is absent from the site. Furthermore, the low suitability of the terrestrial habitat for amphibians within the site boundary (regularly cropped arable fields) within 500m of the pond, make it unlikely that the site currently has more than negligible value for amphibians.

***Reptiles***

The TWIC search revealed no reptile records within the zone of influence (site + 50m). No reptiles or evidence of reptile presence were recorded during the field surveys for other ecological features. Suitable reptile habitat offering foraging habitat and potential basking areas is found along the ECML railway corridor and along the Disused Railway Network LBS. Otherwise suitable habitat is restricted to small pockets of neutral grassland and scrub occurring across the site. The isolated nature of these habitat fragments and the likely high predation rate by domestic cats, make it unlikely that reptile populations would be viable.

***Birds***

National Trust for Scotland (NTS) has confirmed that barn owls nest in the northern wall of the walled garden at Newhailes House (NT32570 72579) adjacent to the site, with breeding confirmed in 2014 when young were heard. NTS also confirmed that an owl box erected at NT32525 72645 was erected with a view to attracting breeding barn owls, though it has not been used to date. Barn owl receive special protection under Schedule 1 of the Wildlife and Countryside Act, 1981.

The TWIC search identified a number of bird species of conservation importance not receiving statutory protection (e.g. UKBAP priority species and SBL species), occurring within 2km of the site boundary within the past ten years. Of these species, grey partridge, house sparrow, lapwing, tree sparrow and yellowhammer are considered to be potentially breeding in and around the site.

A pair of barn owl were observed sitting in the entrance hole to the walled garden nest site at Newhailes on 5th April 2016, with single birds observed in the entrance hole during the breeding bird surveys on 11th May and 23rd June 2016. The nest site lies within the cavity of a heated wall, with the entrance hole at around 4-5m height. The entrance hole is approximately 20m from the site boundary.

A dusk VP survey was undertaken from the eastern side of the ECML bridge in the centre of the site on 25th April 2016 in order to assess how barn owl are using the proposed development site. No barn owls were observed during this survey.

A further dusk VP survey was undertaken from within the walled garden at Newhailes on 17th July 2016 to assess the breeding status of the barn owl pair in 2016. This survey confirmed that breeding took place in 2016 with young heard 'screeching' from inside the northern wall of the walled garden, after both adult birds had left the nest site. A young barn owl was briefly observed in the entrance hole by the surveyor after both adult birds had left. The adult birds initially departed in an easterly direction into the Newhailes Estate, but later were observed to fly over the walled garden to land on the western wall, before departing to the west over the New Brunstane site.

Breeding bird surveys were undertaken across the proposed development site on 14th April, 11th May and 23rd June 2016. This recorded a total of 25 bird species that are considered likely to be breeding on the site. A further 26 species were recorded that are considered to be non-breeding species. Bird species recorded on the site and estimated numbers of territories are detailed in Table 6.10 and Figures 6.5.1 to 6.5.4.

**Table 6.10: Bird species recorded on the site during March and April 2016**

| Species | Latin name | Conservation Status | Estimated Number of Territories |
|---|---|---|---|
| Barn owl | *Tyto alba* | Green List, WCA, SBL | 1 |
| Blackbird | *Turdus merula* | Green List | 10 |
| Blackcap | *Sylvia atricapilla* | Green List | 3 |
| Blue tit | *Cyanistes caeruleus* | Green List | 8 |
| Bullfinch | *Pyrrhula* | Amber List, UKBAP, SBL, LBAP | 2 |
| Canada goose | *Branta canadensis* | No status | Non-breeding |

| Species | Latin name | Conservation Status | Estimated Number of Territories |
|---|---|---|---|
| Carrion crow | *Corvus corone* | Green List | 3 |
| Chaffinch | *Fringilla coelebs* | Green List | 9 |
| Chiffchaff | *Phylloscopus collybita* | Green List | 7 |
| Coal tit | *Periparus ater* | Green List | 1 |
| Collared Dove | *Streptopelia decaocto* | Green List | Non-breeding |
| Common whitethroat | *Sylvia communis* | Green List | 6 |
| Dipper | *Cinclus* | Amber List | 1 |
| Dunnock | *Prunella modularis* | Amber List, UKBAP, SBL | 5 |
| Feral pigeon | *Columba livia* | No status | 1 |
| Garden warbler | *Sylvia borin* | Green List | Non-breeding |
| Goldcrest | *Regulus* | Green List | Non-breeding |
| Goldfinch | *Carduelis* | Green List | 6 |
| Great spotted woodpecker | *Dendrocopos major* | Green List | Non-breeding |
| Great tit | *Parus major* | Green List | 4 |
| Greenfinch | *Carduelis chloris* | Green List | 1 |
| Grey wagtail | *Motacilla cinerea* | Red List | Non-breeding |
| Herring gull | *Larus argentatus* | Red List, UKBAP, SBL | Non-breeding |
| House martin | *Delichon urbica* | Amber List | Non-breeding |
| House sparrow | *Passer domesticus* | Red List, UKBAP, SBL | 3 |
| Jackdaw | *Corvus monedula* | Green List | Non-breeding |
| Linnet | *Carduelis cannabina* | Red List, UKBAP, SBL, LBAP | Non-breeding |
| Long-tailed tit | *Aegithalos caudatus* | Green List | Non-breeding |
| Magpie | *Pica* | Green List | 4 |
| Mallard | *Anas platyrhynchos* | Amber List | Non-breeding |
| Mistle thrush | *Turdus viscivorus* | Red List | Non-breeding |
| Mute swan | *Cygnus olor* | Amber List | Non-breeding |

| Species | Latin name | Conservation Status | Estimated Number of Territories |
|---|---|---|---|
| Oystercatcher | *Haematopus ostralegus* | Amber List | Non-breeding |
| Pheasant | *Phasianus colchicus* | No Status | 2 |
| Pied wagtail | *Motacilla alba* | Green List | Non-breeding |
| Robin | *Erithacus rubecula* | Green List | 6 |
| Rook | *Corvus frugilegus* | Green List | Non-breeding |
| Sand martin | *Riparia* | Green List | Non-breeding |
| Sedge warbler | *Acrocephalus schoenobaenus* | Green List | 1 |
| Siskin | *Spinus* | Green List, SBL | Non-breeding |
| Skylark | *Alauda arvensis* | Red List, UKBAP, SBL, LBAP | 2 |
| Song thrush | *Turdus philomelos* | Red List, UKBAP, SBL, LBAP | Non-breeding |
| Sparrowhawk | *Accipiter nisus* | Green List | Non-breeding |
| Starling | *Sturnus vulgaris* | Red List, UKBAP | Non-breeding |
| Stock dove | *Columba oenas* | Amber List | 1 |
| Swallow | *Hirundo rustica* | Green List | Non-breeding |
| Swift | *Apus* | Amber List, SBL | Non-breeding |
| Willow warbler | *Phylloscopus trochilus* | Amber List | Non-breeding |
| Woodpigeon | *Columba palumbus* | Green List | 19 |
| Wren | *Troglodytes* | Green List | 13 |
| Yellowhammer | *Emberiza citrinella* | Red List, UKBAP, LBAP | Non-breeding |

WCA: Specially protected under Schedule 1 of the Wildlife and Countryside Act, 1981, UKBAP: Listed as priority species in UK Biodiversity Action Plan, SBL: Listed on Scottish Biodiversity List, LBAP: Listed for action in Edinburgh Local Biodiversity Action Plan.

The conservation status of breeding birds was assessed with reference to Joint Nature Conservation Committee (JNCC) Red and Amber Lists compiled by government and non-government conservation organisations, based on a review of the population status of birds regularly found in UK (Eaton et al., 2015). The Red List includes species that show historical population decline, rapid decline in breeding population/ranges or are globally threatened. The Amber List includes, but is not limited to, species that show historical decline but are recovering or with moderate declines in breeding population/range. Green listed species have no identified threat to their population status.

Dippers nest in the culvert which carries the Brunstane Burn under the ECML, with both active and historical nests noted on 30th March 2016.

The site is likely to provide some value for wintering birds although this is likely to be heavily influenced by the type of crop which is grown each year. Recent crops on the site have included potatoes, which could potentially provide an important autumn/early winter food source for greylag (Anser anser) and pink-footed geese (A. brachyrhynchos) in the form of post-harvest waste. During the winter of 2015-16, cereal stubble was left over-winter before being planted with spring cereals in March 2016. This could potentially have provided a valuable food source for wintering seed-eating passerines such as linnet and chaffinch. Conversely autumn-sown cereals are of low value to wintering birds, and are almost universally avoided (Wilson et al., 1996).

***Bats***

The TWIC search revealed only two bat records within 2km of the site and none within the zone of influence (site + 50m). Soprano pipistrelle (*Pipistrellus pygmaeus*) has been recorded at two locations, the closest being in 2009 approximately 1.2km to the south at Millerhill.

NTS advised that both soprano and common pipistrelle (*Pipistrellus pipistrellus*) are regularly recorded on bat walks at Newhailes, with soprano pipistrelle roost sites located at six locations within the Newhailes stable block, and a further two sites above the library area in Newhailes House in August 2015.

No roost sites have been located in trees. Nine bat boxes erected in trees on the southern boundary of Newhailes show evidence of occupation with DNA analysis confirming that soprano pipistrelle use the boxes.

A survey to locate trees with bat roost potential (BRP) within the site boundary identified several trees as having BRP. These trees are listed below in Table 6.11 and in Figure 6.6.

**Table 6.11: Trees Assessed as Having Low, Moderate or High BRP within the New Brunstane Zone of Influence**

| Location | Tree Species and Age | Roost Category | Height, Aspect and Type of Roost Feature(s) |
|---|---|---|---|
| Brunstane Burn NT31879 72721 | Ash (mature) | 2A (high) | 10m, S aspect, multiple cavities |
| Brunstane Burn NT31855 72705 | Ash (mature) | 2B (moderate) | 8m, S aspect, cavities and splits associated with dead wood |
| Brunstane Burn NT32224 72934 | Ash (mature) | 3 (low) | 3m, ESE aspect, single cavity |
| Brunstane Quarry NT31854 72225 | Beech (mature) | 3 (low) | Ivy clad beech tree |
| Newcraighall – Brunstane: Disused Railway NT32110 72098 | Oak (semi-mature) | 3 (low) | 3m, NE aspect, snag |
| Newhailes NT32410 72283 | Ash (mature) | 2B (moderate) | 8m, NW aspect, hollow tree |
| Milton Road East Access NT32120 72986 | Several ivy clad trees | 3 (low) | Several ivy clad semi-mature trees either side of access corridor |

It is considered likely that further trees with BRP are present within the zone of influence in the woodland along the Brunstane Burn and within Newhailes Estate.

Structures assessed as having more than negligible BRP are also mapped in Figure 6.6.

The derelict farm buildings associated with Brunstane and Wanton Walls Farm steadings are assessed as offering high BRP owing to missing tiles, collapsed roofs and many wall cavities. Brunstane House itself is also assessed as offering high BRP with missing tiles, missing skylights, large cavities at the eaves and loose flashing. None of these properties have been subject to detailed inspection owing to access constraints.

The underbridge carrying the ECML over the Brunstane Burn on the northern edge of the site is generally well maintained with evidence of recent pointing and ivy removal on the upstream side, with only one cavity offering low BRP in the voussoir (cavity 100mm x 10mm). On the downstream abutment of the culvert, a large crack extends down from the top of the abutment to the base offering high BRP. Inside the culvert, which extends to around 45m in length, three distinct sections are visible corresponding to different construction periods. The upstream stone-lined section extends to around 30m in length and has negligible bat roost potential, the middle section extending to around 10m is brick-lined and has many weepholes at 1m height offering moderate BRP, while the downstream section is again stone-lined offering negligible BRP.

The underbridge carrying the ECML over the John Muir Way at NT32034 72808 has a long linear cavity on both sides of the bridge where the newer pre-cast concrete structure abuts the older stone structure. These linear cavities also serve as pipe ducts, but there are multiple locations where bats could potential gain access to a larger cavity between the two structural features. These are assessed as offering moderate BRP.

At the southern end of the site, where the former Newcraighall – Stoneyhill railway crosses the Newcraighall Road, the railway bridge has been removed leaving stone abutments on either side of the road at NT32265 72058. The abutment on the northern side of the road has moderate BRP with a number of deep cavities where pointing has become displaced between stone blocks.

The overbridge carrying the farm access track over the railway in the centre of the site has a modern barrel, is well maintained with recent pointing, and is consequently assessed as having negligible BRP.

Flight activity transects will be undertaken to determine how bats use the site for commuting and foraging. Because arable land is generally poor for bats (Entwistle et al., 2001) and there are few hedgerows, ditches and significant field margins on the site which could provide commuting and foraging corridors, it is considered that the site will be of low value for bats. A more detailed assessment will be provided on the completion of activity surveys, which will be reported upon in an addendum to this ES.

***Badger***

Scottish Badgers provided six records of road casualties between 2004 and 2015, the closest of which was approximately 810m south-east of the site on the A1 Queen Margaret University Junction, in January 2015. The nearest known sett is 3.3km to the south-east at Whitecraig on the other side of the A1. The TWIC data search identified a badger record in Newhailes Estate (House and Gardens) adjacent to the site from between 1997 and 2001 but no further details were available. The NTS Ranger was unaware of any badger setts currently at Newhailes.

In November 2015, an elder tree was discovered with distinctive scratch marks on its trunk from ground level up to a height of 0.8m in the broad-leaved plantation backing on to Gilberstoun Place and Brunstane Road South at NT31682 72501 to the north-west of the site. No setts were found in this woodland area, and given that such scratching posts are usually located close to setts (Roper, 2010), it is considered most likely that domestic cats were responsible for the tree damage.

No badger setts or signs of badgers were found during the badger survey on 30th March 2016 and 5th April 2016 which extended to 1km around the site boundary. A well-trodden mammal path crosses the wall between the site and Newhailes Estate at NT32512 72675. The stones on top of the wall have been smoothed by passage of animals and there are clear paths leading out into the arable field and into the woodland. No badger field signs (hairs, footprints or latrines) were however found in the field on or adjacent to the path. The NTS Ranger advised that this path had been created by dog walkers and an active fox (*Vulpes vulpes*) earth was also discovered nearby at NT52537 72654. A further fox earth was located close to the entrance of Newhailes at NT32636 72277 and a fox was seen in woodland to the north of Newhailes at NT32803 72987.

Although it was not possible to gain access to the private Milton Glen Golf Course to the north-east of the site, the absence of any confirmed badger field signs within the site, make it possible to state with reasonable confidence that badgers are not present.

***Otter***

The TWIC search revealed only one otter record within 2km of the site, below the weir on the River Esk at Inveresk in 2012. No otter records were identified within the zone of influence (site + 50m). At a Consultee Workshop on 1st March 2016, SNH confirmed that otters are in the Brunstane Burn, though no further details were provided. The NTS Ranger at Newhailes reported no otter records from Newhailes, though anecdotal signs of otter had been recorded along the Brunstane Burn some years previously. A survey of riparian mammals (otter and water vole) along the Brunstane Burn on 30th March 2016 identified high levels of otter activity along the Brunstane Burn, summarised in Table 6.12 and Figure 6.7.

**Table 6.12: Otter Activity Recorded Along the Brunstane Burn on 30th March 2016**

| Location | Field sign | Notes |
|---|---|---|
| Brunstane Burn NT31630 72631 | Spraint | Prominent in-stream rock outcrop with several deposits of spraint ranging from recent (in the last week) to old |
| Brunstane Burn NT31646 72649 | Spraint | Low rock platform on south side of burn: two deposits of old spraint |
| Brunstane Burn NT31685 72660 | Spraint | Low rock outcrop on south side of burn: large amount of spraint of varying age |
| Brunstane Burn NT31721 72679 | Spraint | Old fence post on south side of burn: recent (in the last week) spraint present |
| Brunstane Burn NT31748 72695 | Spraint | Low rock outcrop on north side of burn: fresh spraint present |
| Brunstane Burn NT31778 72694 | Spraint | Bankside boulders: old spraint present |
| Brunstane Burn NT31795 72707 | Spraint | Streamside boulder on north bank of burn: several old spraints present |
| Brunstane Burn NT31802 72700 | Spraint | Bankside boulders on south side of burn: several old spraints present |

| Location | Field sign | Notes |
|---|---|---|
| Brunstane Burn NT31835 72729 | Spraint | Bankside boulder on north side of burn: fresh spraint present |
| Brunstane Burn NT31932 72808 | Spraint | In-stream boulder: recent spraint present |

No otter activity on the Brunstane Burn was noted downstream of the culvert passing under the ECML. It is considered likely that this is due to the lower density of ground cover associated with the recently planted plantation woodland, private golf course and residential development close to the burn.

No otter resting sites were identified along the Brunstane Burn corridor. Nonetheless the steep semi-natural broad-leaved woodland and dense scrub on the southern side of the Brunstane Burn upstream of the ECML offers numerous opportunities for above-ground couches which would be difficult to detect.

The unculverted sections of the Magdalene Burn where it passes through Newhailes Estate were checked for otter activity on 5th April 2016, but no signs of otters were found. Water quality in this burn appeared to be poor with no aquatic plants visible and grey colouration, with the NTS Ranger advising that it had been subject to a serious pollution incident upstream in 2015.

***Water Vole***

The TWIC search revealed no water vole records within 2km of the site. A survey of riparian mammals along the Brunstane Burn on 30th March 2016 recorded no evidence of water vole presence. Habitat along the Brunstane Burn is considered to be unsuitable for water vole despite the banks being conducive to burrowing, as the watercourse is mainly shallow (<30cm deep) and fast-flowing, is generally heavily shaded and has little in the way of emergent vegetation.

The unculverted sections of the Magdalene Burn where it passes through Newhailes Estate were checked for water vole activity on 5th April 2016, but no signs of water vole were found. The habitat was considered to be unsuitable for water vole as it runs through mature woodland and is consequently very shaded, and the water appeared to be polluted with no aquatic plants visible and grey colouration, shallow, fast-flowing with no aquatic or emergent vegetation.

***Red Squirrel***

The TWIC search revealed no red squirrel records within 2km of the site. The NTS Ranger reported only grey squirrel as being present at Newhailes. Grey squirrel (*Sciurus carolinensis*) were regularly seen in the woodland along the Brunstane Burn and at Newhailes during the course of the other surveys.

### 6.7.4 Ecosystem Services

Ecosystem services are the benefits that people derive from the natural environment. The UK National Ecosystem Assessment (UKNEA, 2011) separates them into four categories: supporting (e.g. soils and nutrient cycling), provisioning (e.g. food, fibre, fresh water), regulating (e.g. climate, pest regulation, pollination) and cultural (e.g. recreation and aesthetic value). Table 6.13 details the ecosystem services currently provided by the New Brunstane development site.

**Table 6.13: Ecosystem Services Currently Provided within the New Brunstane Zone of Influence**

| Habitat | Category | Service |
|---|---|---|
| Woodland and scrub (especially semi-natural woodland along the Brunstane Burn corridor) | Provisioning | Minor food source through hedgerow products such as sloes (sloe gin), elderflowers/elderberries (champagne, cordial and wine), blackberries (jam and flavoured spirits) and fungi.<br>Urban biodiversity (nest sites for garden birds). |
| | Regulating | Filtration of airborne pollutants including dust, ammonia and atmospheric nitrogen<br>Carbon sequestration (taking up and retaining atmospheric carbon)<br>Reduction of heat island effect |

| Habitat | Category | Service |
|---|---|---|
| | | Reduction of flooding by interception of rainwater and reducing runoff during storms<br>Protection of soils from erosion on steep valley sides and sediment control<br>Maintenance of water quality in stream by reducing diffuse pollution outputs<br>Habitat for crop and garden pest predators<br>Habitat for pollinators<br>Shielding residential areas from noise and visual intrusion from traffic. |
| | Cultural | Greenery in urban areas provides well documented benefits to people's physical and mental health<br>Allows people to experience nature, view wildlife and 'get away' from urban life<br>Informal recreation (walking, dog walking, bird-watching). |
| | Supporting | Uptake of atmospheric nitrogen<br>Leaf litter contributing to secondary productivity in streams. |
| Arable fields | Provisioning | Cereal and vegetable production for human consumption in close proximity to potential end consumer.<br>Arable flora providing genetic reservoir for future crop development.<br>Farmland biodiversity (farmland bird populations e.g. skylark). |
| | Regulating | Field margins slowing flow of rainwater runoff. |
| Unimproved and semi-improved grassland and tall ruderal vegetation | Provisioning | Urban biodiversity (nest sites for garden birds, breeding sites for butterflies etc.). |
| | Regulating | Carbon sequestration (taking up and retaining atmospheric carbon).<br>Reduction of flooding by interception of rainwater and reducing runoff during storms.<br>Maintenance of water quality in stream by reducing diffuse pollution outputs<br>Habitat for crop and garden pest predators<br>Habitat for pollinators. |

| Habitat | Category | Service |
|---|---|---|
| Brunstane Burn | Regulating | Positive ions generated by water flowing over rocks and cascades.<br>Natural purification of water and recycling of nutrients (fertiliser runoff).<br>Natural watercourse with debris dams reduces risk of flash flooding downstream. |
| | Cultural | Health and wellbeing benefits.<br>Informal recreation for children (paddling, dam building, baggie netting etc.). |
| | Supporting | Nutrient recycling including leaf litter. |

### 6.7.5 Valuation of Ecological Features

The ecological value of the baseline conditions has been determined using the criteria set out in Table 6.2. Important ecological features are defined as those which have a value of at least Authority (CEC) level. All other ecological receptors are henceforth not considered further in this chapter, apart from where legal considerations need to be taken into account, for example, where the breeding bird assemblage is considered to be of Local value, but where legal considerations need to be further assessed. A summary evaluation of designated sites, habitats and species, and ecosystem services is provided in Table 6.14.

**Table 6.14: Summary Evaluation of Ecological Features in the New Brunstane Zone of Influence**

| Ecological Feature | Rationale for Evaluation | Valuation |
|---|---|---|
| **Designated Sites for Nature Conservation** | | |
| Firth of Forth SPA and SSSI | SPAs are designated for their habitats and species of European value and are therefore of international value. | International |
| Brunstane Burn LBS | LBS are identified in the Edinburgh Local Development Plan as sites of local nature conservation value which should be protected from developments likely to have an adverse impact. | Authority |
| Disused Railway Network LBS | As above | Authority |

| Ecological Feature | Rationale for Evaluation | Valuation |
|---|---|---|
| **Habitats** | | |
| Newhailes Estate Policy Woodland | Listed in the SNH Ancient Woodland Inventory as long-established woodlands of plantation origin. | Authority |
| Broad-leaved semi-natural woodland | This habitat is restricted to the Brunstane Burn corridor and the Newhailes policies. The structure of these woodlands is varied with a wide range of tree species of different ages, an often dense understorey and an occasionally rich ground flora. Dead wood is frequently found throughout the woodland adding further diversity. | Authority |
| Broad-leaved and mixed plantation woodland | Recently planted woodlands around the site will increase in ecological value over time, but are currently of limited value. | Local |
| Scrub | Several areas of scrub have developed around the edges of the site, but it is not notable in biodiversity terms. | Local |
| Arable | Farmland is identified as locally important in the LBAP. Nonetheless, this habitat is very common both regionally and nationally, although it is likely to be of restricted occurrence in the CEC area. | Local |
| Unimproved and semi-improved neutral grassland | Semi-natural grassland is identified as locally important in the LBAP, though the areas of neutral grassland within the site are generally restricted to field margins and railway cuttings. All areas of grassland are ungrazed which has led to the sward becoming rank and dominated by coarse grasses and in places is reverting to scrub. | Local |
| Tall ruderal vegetation | Tall ruderal vegetation occurs on the site where ground has been disturbed and then allowed to revert to nature with typical species including rosebay willowherb and common nettle. Although affording some value to nesting birds and invertebrates, it is of limited nature conservation value. | Less than Local |

| Ecological Feature | Rationale for Evaluation | Valuation |
|---|---|---|
| Running water (Brunstane Burn and Magdalene Burn) | Although the Brunstane Burn suffers from fly-tipping like many urban watercourses, the water quality remains moderately good with breeding dipper and grey wagtail and water crow-foot beds. | Local |
| Buildings | The old buildings within the Zone of influence at Brunstane and Wanton Walls are likely to offer roosting and nesting habitat for bats and birds of Local Value. | Local |
| **Species** | | |
| Plants | A number of plant species classified as local or very local in the Lothians and/or listed in the City of Edinburgh LBAP occur on or immediately adjacent to the site. A UKBAP species was found in 1998. | Local |
| Invertebrates | A number of invertebrate species classified as local or very local in the Lothians and/or listed in the City of Edinburgh LBAP occur on or immediately adjacent to the site. Several UKBAP Lepidoptera species have also been recorded immediately adjacent to the site. | Local |
| Amphibians | No amphibians recorded on site during surveys or in zone of influence in desk study. | Less than Local |
| Reptiles | No amphibians recorded on site during surveys or in zone of influence in desk study. | Less than Local |
| Breeding birds | 25 species of breeding birds recorded including four UKBAP priority species; bullfinch, dunnock, house sparrow, and skylark. | Authority |
| Barn owl | A pair of barn owl nest in the walled garden at Newhailes, approximately 20m from the boundary of the development site. It is likely that barn owl hunt over the headlands and grassland of the development site. | Authority |

| Ecological Feature | Rationale for Evaluation | Valuation |
|---|---|---|
| Bats | Small numbers of common and soprano pipistrelle bats recorded in roosts nearby and likely to forage over site. Results from bat activity surveys to be included in addendum to this ES. | Local |
| Badger | No badger recorded on site during surveys or in zone of influence in desk study. | Less than Local |
| Otter | Otters regularly use the Brunstane Burn for commuting and are also likely to utilise above-ground resting places (couches) in the woodland on the south side of the burn. | Authority |
| Water vole | No water vole recorded on site during surveys or in zone of influence in desk study. | Less than Local |
| Red squirrel | No red squirrel recorded on site during surveys or in zone of influence in desk study. | Less than Local |
| **Ecosystem Services** | | |
| Woodland and scrub | The woodland and scrub on the site particularly that associated with the Brunstane Burn corridor provides a range of ecosystem services including provisioning, regulating, cultural and supporting. These benefit a large number of people and are considered to be important for the CEC area. | Authority |
| Arable fields | The two arable fields which make up the majority of the site provide provisioning (food production and farmland biodiversity) and regulating (field margins slowing runoff) ecosystem services that are important on a local level. | Local |
| Unimproved and semi-improved grassland and tall ruderal vegetation | Areas of rough grassland and tall ruderal vegetation around the edges of the site and associated with the railway, provide provisioning (nesting sites for garden birds and habitat for pollinators) and regulating (carbon sequestration, reduction of flooding and water purification) services that are important at a local level. | Local |

| Ecological Feature | Rationale for Evaluation | Valuation |
|---|---|---|
| Brunstane Burn | The Brunstane Burn provides regulating and supporting (nutrient recycling and flood alleviation), and cultural (informal recreation) services that are important at a local level. | Local |

The most important ecological features identified on the site and within the zone of influence are the Firth of Forth SPA/SSSI which is of international importance, and those assessed as being of Authority Area importance: the Disused Railway Network LBS, the semi-natural broad-leaved woodland associated with the Newhailes Policies, the breeding bird assemblage, barn owl and otter. The areas of woodland, particularly those mature areas associated with the Brunstane Burn and Newhailes Policies are also considered to provide important ecosystem services.

It will be important to ensure that any impacts on these receptors are minimised and mitigated for where impacts cannot be avoided.

The stands of non-native invasive species (Japanese knotweed, giant hogweed etc.) along the Brunstane Burn corridor, around the headland of the eastern field and in the area of rank grassland and scrub at the south of the site will require to be addressed during the construction of the proposed development.

Duddingston Loch SSSI, Arthur's Seat Volcano SSSI, Dalkeith Oakwood SSSI and the two LBS at Duddingston Golf Course and Figgate Burn Park lie more than 1.5km away from the site, and there are no ecological linkages with these sites. Consequently, these sites are not considered further in this assessment.

No signs of the presence of amphibians, reptiles, badger, water vole or red squirrel were recorded and these species are therefore not considered further in this assessment.

## 6.8 Identification and Evaluation of Key Impacts

Construction projects have a range of well-documented impacts associated with their construction and operation. This section identifies the potential risks and predicts the associated impacts of the proposed development upon terrestrial and freshwater ecological receptors in the absence of mitigation.

Potential impacts associated with this type of project include:

- Habitat loss through land-take;
- Direct mortality of animals during construction and operation such as through increased cat predation;
- Behavioural changes of animals during operation due to increased disturbance;
- Fragmentation of existing habitats;
- Physical obstructions caused by road and building construction;
- Disturbance during construction;
- Pollution via road and residential drainage, runoff and spray from road traffic;
- Visual and light pollution caused by lighting.

Additionally, for aquatic habitats and species relying on a clean, reliable source of water, the following potential impacts are also considered:

- Point source and diffuse pollution;
- Increased sediment loading;
- Changes to discharge regime.

All of these potential impacts described would be considered as significant in accordance with CIEEM guidance. Mitigation is proposed to avoid, reduce or offset these potential impacts in Section 6.10.

The effects these impacts could potentially have on ecological features is summarised below. The potential impacts described below are all considered to be negative unless otherwise stated.

### 6.8.1 Designated Sites

***Firth of Forth SPA and SSSI***

*Construction*

During the construction phase, the site will become unavailable for populations of over-wintering birds which form the qualifying interest of the Firth of Forth SPA, primarily due to disturbance by machinery and site operatives.

In the absence of mitigation, a temporary negative effect of minor magnitude at the International Level is predicted on the Firth of Forth SPA/SSSI during the construction phase which will continue into the operational phase.

*Operation*

The loss of 43 ha of arable fields will result in this habitat no longer being available as supporting habitat for the over-wintering bird species forming the qualifying interest of the SPA. SNH in their scoping response of 23rd March 2016, stated that in light of survey results for similar development sites nearby and the strategic Habitats Regulation Appraisal (HRA) undertaken for the ELDP, that they consider it unlikely that the site will be used in any numbers by bird species forming the qualifying interest of the SPA. The HRA undertaken for 30 proposed housing development sites in the ELDP (First Proposed Plan) concluded that each housing site represented a tiny fraction of the total resource of supporting habitat, and concluded that for each individual housing site that there would be no likely significant effect on the Firth of Forth SPA. For housing allocations within 5km of the coast, such as at Brunstane, the HRA concluded that cumulatively there would be a very small loss of supporting habitat, which would constitute a minor residual effect (CEC HRA, 2013).

In the EIA Scoping Opinion for the proposed development, CEC requested an assessment of any impacts arising from discharges from the SUDS ponds on the site which are proposed to drain into the Brunstane Burn, which henceforth flows into the SPA. An appropriate management / treatment sequence will be established throughout the site ensuring source control and sufficient treatment is carried out to the surface water via swales, attenuation basins and permeable paving before clean water is discharged into the Brunstane or Magdalene Burns from the SuDS ponds. The impacts of the SuDS ponds on the SPA are likely to be negligible.

In the absence of mitigation, a permanent negative effect of minor magnitude at the International Level is predicted on the Firth of Forth SPA/SSSI as a result of the development.

***Brunstane Burn LBS***

*Construction*

In the absence of mitigation, potential pollution from accidental spills and silt runoff from the site could impact the Brunstane Burn through affecting the water quality. The woodland habitat adjacent to the site could be affected by dust, building materials and site waste blowing off the site during construction. Inappropriate siting of welfare units, construction compounds and generators on the northern boundary of the site could also result in the disturbance of wildlife and habitats. These impacts would not be likely to be long lasting, since vegetation and water quality will quickly recover on completion of the proposed development.

Without mitigation, the construction of a crossing and a maintenance bridge over the Brunstane Burn in the northern access corridor could result in fish and invertebrate mortality and significant sediment release and deposition downstream.

With all mitigation measures adopted, a temporary negative effect of negligible magnitude at the Authority Level is predicted on the Brunstane Burn LBS during the construction phase.

*Operation*

Permanent loss and fragmentation of scrub, mixed plantation woodland, semi-improved neutral grassland and tall ruderal habitat will occur in the Milton Road East access corridor as a result of the operational footprint of the proposed development. The removal and installation of a replacement rising main, a water main maintenance road and bridge, and a new permanent crossing of the Brunstane Burn are permanent features which will affect the ecological functioning of the watercourse. The new access across the Brunstane Burn will result in changes to channel morphology and substrate, loss of riparian habitat and will reduce the permeability of the watercourse for wildlife.

Residential development is likely to result in an increase in air pollution, noise, lighting, human activity, pets, cutting of trees and shrubs, removal of deadwood and the dumping of domestic and garden rubbish into the woodland.

In the absence of mitigation, permanent negative impacts of moderate to major magnitude at Authority Level are predicted on the Brunstane Burn LBS as a result of the development.

With mitigation measures adopted, a permanent negative effect of minor magnitude at the Authority Level is predicted on the Brunstane Burn LBS during operation.

***Disused Railway Network LBS***

*Construction*

The grassland, scrub and tall ruderal vegetation along the disused railway and adjacent habitats that constitute this LBS could be affected by dust, building materials and site waste blowing off the site during construction. Inappropriate siting of welfare units, construction compounds and generators on the south-eastern boundary of the site could also result in the disturbance of wildlife and habitats. These impacts would not be likely to be long lasting, since vegetation will quickly recover on completion of the proposed development.

A temporary negative effect of minor magnitude at Authority Level is predicted on the Disused Railway Network LBS during the construction phase.

*Operation*

Loss and fragmentation of grassland, scrub, and tall ruderal vegetation within the LBS will occur as a result of the proposed principal eastern access corridor at Newcraighall-Wanton Walls Farm. An 80m section of the LBS will require to be excavated to a maximum depth of 5m through the disused railway embankment, to accommodate an access road from the Newcraighall North development which is currently under construction, into New Brunstane. Further losses and fragmentation of habitat within the LBS will occur with the operation of a proposed secondary western access corridor between the New Brunstane development and the Newcraighall North residential development. A 60m section of the LBS will require to be excavated to a maximum depth of 2.4m through the disused railway embankment to accommodate this access road.

In the absence of mitigation, the loss these habitats would result in a permanent reduction of these habitats within the LBS, while habitat fragmentation would affect the effectiveness of the ecological corridor currently provided by the LBS.

Residential development is likely to result in an increase in air pollution, noise, lighting, human activity, pets, cutting of trees and shrubs, and the dumping of domestic and garden rubbish into the LBS.

In the absence of mitigation, a permanent negative effect of moderate magnitude at Authority Level is predicted on the Disused Railway Network LBS as a result of the development.

### 6.8.2 Habitats

The only habitat within the zone of influence assessed as being of more than Local nature conservation value, for which impacts have not already been evaluated under the Brunstane Burn LBS and Disused Railway Network LBS headings, is the broad-leaved semi-natural woodland adjacent to the site at Newhailes.

***Newhailes Estate Policy Woodlands***

*Construction*

Although it is considered likely that the high wall around Newhailes Estate will help prevent building materials and site waste blowing off the site during construction, dust generation during dry weather could result in a significant impact without mitigation. Inappropriate siting of welfare units, construction compounds and generators on the north-eastern boundary of the site could also result in the disturbance of wildlife and habitats. These impacts would not be likely to be long lasting, since vegetation will quickly recover on completion of the proposed development.

In the absence of mitigation, a temporary negative effect of moderate magnitude at Authority Level is predicted on the Newhailes Estate Policy Woodland during the construction phase.

*Operation*

No direct habitat loss will occur within the Newhailes Estate as a result of the operational footprint of the proposed development.

In the absence of mitigation, it is considered likely that unauthorised human access into the Newhailes Estate over the boundary wall is likely to increase as a result of the development. Residential development also has the potential to result in an increase in air pollution, noise, lighting, human activity, pets, cutting of trees and shrubs, removal of deadwood and the dumping of domestic and garden rubbish into the woodland.

In the absence of mitigation, a permanent negative effect of moderate magnitude at Authority Level is predicted on the Newhailes Estate Policy Woodland as a result of the development.

### 6.8.3 Species

***Plants***

*Construction*

Potential impacts arising from the spread of Japanese knotweed, giant hogweed and other non-native invasive species could occur during construction. The spread of non-native species would be a legal offence and would result in the displacement of native plant species. The spread of Japanese knotweed could result in potential structural damage at any recipient locations, while contact with giant hogweed carries significant health risks.

In the absence of mitigation, a temporary negative effect of major magnitude at the Authority Level is predicted for non-native invasive plant species.

*Operation*

The arable fields support a diverse range of arable weeds that are likely to be of local nature conservation value. These are likely to persist in allotments and in private gardens and indeed may increase due to the proportionally lower application of pesticides.

The dumping of garden waste over garden fences is likely to result in an increase in the number of non-native species entering the local environment. If no steps are taken to eradicate giant hogweed during the development of the site, it is likely that it will continue to pose a significant health risk where it occurs.

In the absence of mitigation, a permanent negative effect of major magnitude at the Authority Level is predicted for non-native invasive plant species.

***Breeding Birds***

*Construction*

The removal of suitable nesting habitat during the bird breeding season to accommodate site access roads, site compounds and other temporary work areas could lead to the destruction of nests and eggs and the direct mortality of young birds.

Disturbance generated through construction activities such as noise generated through the use of heavy plant or the presence of works personnel is also likely to result in the disturbance of breeding birds. This results in more visible breeding bird activity in the vicinity of nests (flushing of incubating birds, aborted visits to nests to feed young and remove waste) leading to higher incidences of nest predation and nest abandonment than would normally be the case.

In the absence of mitigation, a temporary effect of moderate magnitude at Authority Level is predicted on the breeding bird populations during the construction phase.

*Operation*

The loss of arable, scrub and semi-natural grassland habitats will result in the loss of some species of farmland bird from the site which are of high nature conservation value (e.g. skylark).

Losses will be partially offset by a likely increase in common garden birds such as tits, blackbird, woodpigeon, and house sparrow which will benefit from food put out by residents and by the increased number of potential nest sites afforded by garden hedges and landscape planting as the development matures.

Direct mortality of birds through collision with road traffic is likely to occur as birds attempt to cross the various new roads associated with the proposed development, while predation by cats is also likely to increase. Bird mortality from cats is already likely to be high in the Brunstane Burn LBS due to the close proximity of existing residential development.

The operational phase of the proposed development would also lead to disturbance of bird species in adjacent areas through noise and light pollution. These impacts would remain for the duration of the operational phase of the proposed development. These impacts are likely to be restricted to within close proximity of the proposed development and are likely to reduce over time as birds become habituated to disturbance.

Overall, a permanent negative effect of moderate magnitude at the Authority Level is predicted for the assemblage of farmland bird species present on the site. This will be partially offset by the predicted increase in common garden bird species over time as the development matures.

***Barn Owl***

*Construction*

In the absence of mitigation, construction activities are likely to result in disturbance of the pair of breeding barn owls nesting in the northern wall of the walled garden at Newhailes. Disturbance of barn owls occurs where the behaviour of adult birds is modified to the extent that an active nest site is abandoned or where it results in failure to rear young to independence, typically 11-14 weeks after hatching. The nest site lies approximately 20m from the development site boundary, and during the breeding season (March-August inclusive), breeding activity is likely to be negatively affected by disturbance, particularly that resulting from noisy activities in close proximity to the nest site such as site investigations and during Phase 3 of the construction phase, activities such as earth moving and pile driving

It is also considered likely that foraging over the New Brunstane site will be markedly curtailed during the construction phase.

In the absence of mitigation, a significant temporary effect of moderate magnitude at the Authority Level is predicted on barn owl populations during the construction phase.

*Operation*

Barn owl prey on small mammals, primarily field voles (*Microtus agrestis*). Optimal field vole habitat is rough grassland, specifically with a litter layer or thatch at its base. Rough grassland is typically found on brownfield sites awaiting development as well as agricultural situations such as lightly grazed fields and ungrazed arable field margins.

Arable fields containing cereals such as those at New Brunstane do not provide suitable habitat for field voles, although at certain times of the year, such as during harvest, they can, for short periods, expose small mammals and temporarily attract barn owls. Prior to harvest, however, arable crops are largely impenetrable to foraging barn owls because of the stiff nature of the crop and high density of planting. Consequently, arable fields like those at New Brunstane lacking wide (>3m) grass margins are considered unsuitable for barn owls (Shawyer, 2011).

The loss of 6.6 ha of unimproved and semi-improved grassland habitat as a result of the development will result in some loss of key foraging habitat within the home range of the pair of barn owl nesting in the Newhailes walled garden. Barn owls require around 30-50ha of rough grassland which is the preferential habitat for hunting within their home range of 350-500ha, for successful breeding to occur (Shawyer, 2011). Within the Newhailes Estate, grassland and the currently disused wall garden provide around 20ha of suitable foraging habitat, suggesting that grassland within the New Brunstane site, the ECML and the Brunstane to Newcraighall disused railway line are also used for foraging. The grassland habitat along the ECML, is not without problems as main line railways often result in barn owl mortality through collisions, which can result in the depletion and loss of local breeding populations within a 3km corridor.

Less than 1% of barn owls in the UK are recorded breeding within conurbations such as towns and cities (Shawyer, 1987). Their requirement for open grassland habitats and sensitivity to intensive human activity causes them to avoid such areas.

The loss of grassland foraging habitat within the New Brunstane site, together with increased recreational pressure on remaining semi-natural habitat may be significant enough to reduce the chance of breeding success of the Newhailes pair of barn owl to a level where recruitment of young birds to the home range is no longer sufficient to offset current mortality. The long term result may be the loss of breeding barn owl at Newhailes.

In the absence of mitigation, a permanent negative effect of major magnitude at the Authority Level is predicted for the barn owl population at Newhailes.

***Bats***

*Construction*

In the absence of mitigation, there is the potential for direct mortality of bats in roosts within trees to be cut or felled during the construction of the proposed development.

Potential impacts during construction resulting from noise, vibration and light disturbance may occur across the site. These impacts have the potential to displace bats from foraging habitats and commuting routes.

Potential pollution of the Brunstane Burn resulting from accidental spills and sediment runoff could lead to a negative impact as pollution in watercourses and vegetation would be detrimental to the availability of invertebrate prey species.

In the absence of mitigation, a temporary effect of minor magnitude at the Local Level is predicted on the bat populations during the construction phase.

With full mitigation measures adopted the effect of the development on bats is assessed as negligible.

*Operation*

Fragmentation of habitats will occur primarily at the three access points to the site which cross the Brunstane Burn LBS and Disused Railway Network LBS. Both of these sites are likely to be used as foraging habitat and commuting routes by bats. Increases in disturbance due to traffic and residential noise and lighting are likely to have a negative impact on adjacent bat foraging habitat in the two sites and also in the Newhailes Estate Policy Woodland.

The loss of the arable fields is unlikely to be significant in terms of foraging habitat for bats. Arable land is generally poor due to the application of pesticides which reduce the invertebrate resource available, and it affords little cover from predators or inclement weather conditions (Entwistle et al., 2001).

The proposed residential development will result in an increase in potential bat roost sites, while as the landscaping and gardens mature the foraging opportunities for bats are also likely to increase, though this will be offset by an increase in cat predation.

In the absence of mitigation, a permanent impact of moderate magnitude at the Local Level is predicted on the bat populations during operation.

With full mitigation measures adopted, an overall permanent positive effect of minor magnitude at the Local Level is predicted for bat populations present on the site.

***Otter***

*Construction*

Potential mortality of otters resulting from collision with construction traffic would result in a negative, albeit unlikely, impact. Due to disturbance of the Brunstane Burn corridor from the construction of the new access road to Milton Road East and the associated passage of construction traffic, it is likely that the passage of commuting otters along the Brunstane Burn will be affected until such time as they become habituated to the new crossing.

Potential pollution incidents resulting from the new crossing of the Brunstane Burn could lead to a temporary reduction in the quality of otter habitat downstream of the proposed development.

In the absence of mitigation, a temporary effect of minor magnitude at the Authority Level is predicted on the otter population using the Brunstane Burn during the construction phase.

*Operation*

Without mitigation, the access road crossing the Brunstane Burn from Milton Road East is likely to result in the occasional mortality of otters through road traffic accidents. Inappropriate lighting of the section of this access road where it crosses the burn will also lead to disturbance of commuting otters.

Recreational pressure on the Brunstane Burn corridor is likely to increase as a result of the new development, with more walkers, cyclists and dog-walkers using this resource. This will lead to an increase in disturbance experienced by otters using the corridor, particularly any that use the wooded southern bank for lying up during the day. This disturbance effect could be further exacerbated by house-holders whose gardens back onto the Brunstane Burn LBS, creating gates into the woodland to facilitate the exercise of dogs.

Potential pollution of the Brunstane Burn resulting from road runoff (sediment, salt, fuel spills) from the new access road to Milton Road East could lead to a decline in water quality and hence food availability for otters using the burn.

The creation of SUDS ponds above the Brunstane Burn corridor could result in a new seasonal food resource (amphibians) for the otter population, which would be a significant positive impact.

With the full adoption of mitigation measures, the proposed development is predicted to have a negligible effect at the Authority Level on the local otter population using the Brunstane Burn corridor.

### 6.8.4 Ecosystem services

***Woodland and Scrub***

*Construction*

During construction, the provisioning, regulating and supporting services provided by the Brunstane Burn LBS and the Newhailes Policy Woodlands will continue to function. The cultural services will however be impacted as access around the boundaries of the site will be restricted during construction. In addition, construction activity is likely to result in noise impacts, which will detract from the recreational enjoyment of these features, particularly the ability to gain respite from 'urban life'.

In the absence of mitigation, a temporary effect of minor magnitude at the Authority Level is predicted on the ecosystem services provided by the woodland in the Brunstane Burn LBS and Newhailes Policy Woodland during the construction phase.

*Operation*

Following the completion of the development, the ecosystem services provided by the Brunstane Burn LBS and the Newhailes Policy Woodlands will assume even greater importance than presently, due to the large increase in numbers of people living within close proximity to the sites.

Unless additional resources are committed to managing the pressures on these ecosystem services, it is likely that their value will decline in the long-term. In particular, the increase in recreational pressure could change the character of these woodlands from wild semi-natural habitat to something more akin to an urban park.

In the absence of mitigation, a permanent negative effect of minor magnitude at the Authority Level is predicted to occur in relation to the ecosystem services provided by woodland and scrub adjacent to the site.

## 6.9 Cumulative Effects

The EIA Regulations require consideration of cumulative effects, which are those effects resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed development.

Broadly, there are two types of cumulative effects considered as part of the EIA process:

- The combined effects of interrelationships between individual assessment topics (for example noise, dust and visual impacts) on an individual or group of receptors. These are termed Type 1 Cumulative Effects. No such effects have been identified in relation to ecology, biodiversity and nature conservation;

- The combined effects resulting from the impacts of several developments, which individually may or may not be significant, but when considered together may result in significant effects. These are termed Type 2 Cumulative Effects.

A longlist of sites within approximately 6km of the site were identified and are listed in Chapter 15. Four were shortlisted for more detailed consideration of their cumulative effects together with New Brunstane due to their physical proximity to the site. The cumulative assessment of the ecological effects of these developments is presented in Table 6.15.

**Table 6.15: Cumulative Effects Assessment – Ecology, Biodiversity and Nature Conservation**

| | **Site 1**<br>**Newcraighall North**<br>13/03181/FUL* | **Site 2**<br>**Newcraighall East**<br>10/03506/PPP*<br>15/04112/AMC* | **Site 14**<br>**Brunstane Steadings**<br>06/02742/FUL*<br>08/02704/FUL *<br>14/01049/FUL* | **Site 20**<br>**Wanton Walls**<br>PPA-230-491* |
|---|---|---|---|---|
| Summary of Development Proposal | Residential development of 220 units comprising houses, cottages and flats and two commercial units (as amended). Land 335 Metres Southwest of 103 Newcraighall Road Edinburgh.<br>Currently under construction. | Residential development comprising 176 No. dwellings and associated infrastructure.<br>Construction not yet commenced. | Convert steading and outbuildings to form 12 dwelling houses (as amended).<br>Currently under construction. | Erection of 11 houses, alteration to access road and demolition of 105 Newcraighall and outbuildings.<br>Development status unconfirmed. |
| Summary of relevant development aspects and interactions | Area of formerly cultivated land which had reverted to tall ruderal vegetation of low nature conservation value. Potential foraging area for barn owls nesting at Newhailes.<br>Small areas of scrub adjacent to Disused Railway Network LBS that were likely to be of local importance to breeding birds and contributed to the semi-natural habitat network provided by the LBS.<br>Potential low quality foraging area for bats. | Mostly arable land with small areas of tall ruderal and scattered scrub. | Loss of potential barn owl nest sites, though very close to existing development and therefore likely to be sub-optimal due to disturbance.<br>Loss of bat roost sites. | Loss of potential barn owl nest sites, though very close to existing development and therefore likely to be sub-optimal due to disturbance.<br>Loss of bat roost sites. |

| | **Site 1**<br>**Newcraighall North**<br>13/03181/FUL* | **Site 2**<br>**Newcraighall East**<br>10/03506/PPP*<br>15/04112/AMC* | **Site 14**<br>**Brunstane Steadings**<br>06/02742/FUL*<br>08/02704/FUL *<br>14/01049/FUL* | **Site 20**<br>**Wanton Walls**<br>PPA-230-491* |
|---|---|---|---|---|
| Potential cumulative effects with New Brunstane | Loss of potential foraging habitat for barn owls at Newhailes, which together with the loss of foraging habitat at Brunstane could make the population unviable.<br>Cumulative impacts on the integrity and value of the Disused Railway Network LBS as an ecological network.<br>Cumulative losses of nesting habitat for species of breeding bird with conservation value e.g. bullfinch and dunnock.<br>Disruption of bat foraging areas and commuting routes. | Loss of potential foraging habitat for barn owls at Newhailes, which together with the loss of foraging habitat at Brunstane could make the population unviable.<br>Loss of habitat for wintering birds forming the qualifying interest of the Firth of Forth SPA.<br>Cumulative impacts on the integrity and value of the Disused Railway Network LBS as an ecological network.<br>Cumulative losses of nesting habitat for species of breeding bird with conservation value e.g. skylark.<br>Disruption of bat foraging areas and commuting routes. | Loss of bat roost sites. | Loss of bat roost sites. |
| Likelihood of cumulative effects with New Brunstane (H/M/L) | Barn owl – High<br>Disused Railway Network LBS – Medium<br>Breeding birds – Medium<br>Bats – Low | Barn owl – Low<br>Firth of Forth SPA – Low<br>Disused Railway Network LBS – Medium<br>Breeding birds – Low<br>Bats – Low | Barn owl – Low<br>Bats – Low | Barn owl – Low<br>Bats – Low |

| | **Site 1**<br>**Newcraighall North**<br>13/03181/FUL* | **Site 2**<br>**Newcraighall East**<br>10/03506/PPP*<br>15/04112/AMC* | **Site 14**<br>**Brunstane Steadings**<br>06/02742/FUL*<br>08/02704/FUL *<br>14/01049/FUL* | **Site 20**<br>**Wanton Walls**<br>PPA-230-491* |
|---|---|---|---|---|
| Proposed mitigation (with apportionment if relevant) | Barn owl – off site mitigation<br>Breeding birds – landscape planting of native scrub around edges of site<br>Disused Railway Network LBS – landscape planting of native scrub to provide buffers between New Brunstane and the Disused Railway Network LBS | Disused Railway Network LBS – landscape planting of native scrub to provide buffers between New Brunstane and the Disused Railway Network LBS | Barn owl – off site mitigation | Barn owl – off site mitigation |
| Residual cumulative effects with New Brunstane | Barn owl – Medium<br>Disused Railway Network LBS – Low<br>Breeding birds – Low<br>Bats – Negligible | Barn owl – Negligible<br>Firth of Forth SPA – Negligible<br>Disused Railway Network LBS – Low<br>Breeding birds – Negligible<br>Bats – Negligible | Barn owl – Negligible<br>Bats – Negligible | Barn owl – Negligible<br>Bats – Negligible |

A further two sites at Queen Margaret University (Planning Reference: 15/00337/PM) and North Old Craighall Services (Planning Reference: 08/00669/OUT) were also considered for their likely cumulative effects on ecological features, with particular reference to barn owl and wintering birds forming the qualifying interest of the Firth of Forth SPA.

These two sites lie within the likely home range of the pair of breeding barn owl at Newhailes. Although they are predominantly arable land sown with winter cereals, there are also areas of scrub, rough neutral grassland and a defunct hedgerow which back on to a disused railway which extends to the north to connect with the Disused Railway Network LBS. These areas are likely to provide foraging habitat for barn owl. It is considered that when assessed cumulatively with the New Brunstane and other local developments, that there is likely to be a moderate impact on barn owls.

The arable fields have the potential to support flocks of wintering birds such as golden plover and pink-footed goose. The Strategic HRA undertaken for the First ELDP, considered it unlikely that such sites would be used in any numbers by bird species forming the qualifying interest of the SPA. Overall the cumulative residual effect on the Firth of Forth SPA is considered to be minor.

## 6.10 Proposed Mitigation

This section outlines mitigation measures to avoid, reduce or offset the adverse effects of the proposed development in accordance with best practice guidance and UK, Scottish and local government environmental impact, planning and sustainability policies.

As noted in Section 6.6.4, proposed mitigation will follow a hierarchical approach adopted, where possible, in the following order (IEEM 2016):

- Avoidance: Seek options that avoid harm to ecological features;
- Mitigation: where avoidance is not possible, reduce the adverse impacts with the aim of avoiding or minimising impacts through mitigation measures, either through design of the project or subsequent measures that can be guaranteed, for example through planning conditions or planning agreements;

- Compensation: where significant residual adverse residual impacts remain despite the mitigation measures proposed, compensatory measures to offset the adverse impacts may be required;

- Enhancements: Provision of net benefits to biodiversity over and above requirements for avoidance, mitigation or compensation.

Mitigation includes best practice methods and principles applied to the proposed development as a whole (generic measures) and specific mitigation measures applied to individual ecological features (specific measures).

### 6.10.1 Design Evolution / In-Built Mitigation

***Avoidance***

The siting of the four proposed northern SUDS ponds (Ponds C, D, E and F) avoid encroaching into the Brunstane Burn LBS. The housing layout has been designed to allow a substantial buffer zone of at least 25m width between the edge of the built development and the Brunstane Burn LBS to the north and the Newhailes Policy Woodlands to the east. The buffer zones will contain a mixture of swales, grassland and trees which will complement the existing habitats of nature conservation value.

***Mitigation***

*Generic Measures*

Generic mitigation measures that apply to all ecological features across the proposed development consist of:

- A Construction Environmental Management Plan (CEMP) will be developed to identify all committed mitigation measures and best practices to minimise the effects of construction on site ecology. Compliance with the specified measures will be a condition of contract placed upon any appointed contractors;

- Pre-construction surveys will be undertaken as appropriate prior to the commencement of each project phase in order to confirm the location of protected species;

- All contractor work packages should include an ecological section which will be signed off by an ecologist prior to commencement of works;

- Clearance of the whole site in one go will be avoided in favour of phased works to ensure that there are always reservoirs of semi-natural habitat nearby for displaced wildlife to move into;

- Plant and personnel will be constrained to a prescribed working corridor through the use of temporary barriers, thereby minimising damage to habitats and potential direct mortality and disturbance to species. No site compounds, storage sites or haul roads to be sited within 30m of the Brunstane Burn LBS or Newhailes boundary;

- Works compounds, storage sites and access roads will avoid, as far as possible, areas of woodland, grassland and scrub to be retained post-construction to minimise degradation of semi-natural habitats;

- Adherence to best practice guidance with respect to SuDS design as set out in the CIRIA SUDS Manual (C697) and SEPA Guidance Note 2.

***Specific Measures***

*Habitats*

The following design measures were incorporated into the proposed development during the design phase to minimise potential adverse effects on ecological features present on the site.

Locations for habitat creation have been identified with the aim of providing at least a 1:1 replacement of any loss of semi-natural habitat (excluding arable land) within the site boundary. Four principles informed the habitat creation proposals:

- Provision of new habitat contiguous with existing semi-natural habitat;

- Avoidance of the creation of small scattered, fragmented habitats across the site;

- Semi-natural habitat corridors providing linkages between newly created habitats;

- Linkages into adjacent habitat networks of nature conservation value (Brunstane Burn LBS, Disused Railway Network LBS and Newhailes Estate Policy Woodland).

All habitat creation will use native species of local provenance, unless otherwise stated.

Habitat creation is informed by the Edinburgh LBAP and the habitats already present on the site of the proposed development. The Edinburgh LBAP includes 6 Habitat Action Plans all of which seek to maintain and enhance the distribution of habitats of nature conservation value within the City. Opportunities exist at New Brunstane to make a significant contribution to the following Habitat Action Plans:

- Lowland and urban;

- Freshwater and wetland;

- Woodland.

In accordance with comments received as part of the Scoping Opinion from CEC, the aims and objectives of the Edinburgh Living Landscape Project, will play a key role in the detailed landscape design of the proposed development. The primary aims of the Living Landscape Project are to transform the parks and greenspaces of Edinburgh into areas which are attractive and biodiverse and are more resilient to climate change. The Project includes a range of measures which will be embedded into the detailed landscape design at New Brunstane such as connecting semi-natural habitat networks, creation of wildflower meadows requiring a less intensive management regime than conventional amenity grassland, and planting of woodlands. Wildflower meadows will be sown with the Edinburgh Meadow Mix 2015, formulated specifically for establishment of meadow within the city by Scotia Seeds.

Ongoing management of these areas of semi-natural habitat creation will be vital in maintaining their value for wildlife, and management prescriptions will be developed for inclusion in the landscaping scheme for the proposed development. Table 6.16 provides an estimate of the change in habitats resulting from the proposed scheme, based on the current Masterplan. The post-construction figure takes account of both habitat loss related to construction, and habitat created as a result of mitigation.

**Table 6.16: Estimate of Habitat Change at New Brunstane (54.6ha)**

| Habitat Type | Pre-construction Habitat Area (Ha) | Post-construction Habitat Area | Habitat Change (Ha and %) |
|---|---|---|---|
| Broad-leaved Semi-natural Woodland | 0.80 | 0.80 | - |
| Broad-leaved Plantation Woodland | 0.90 | 1.90 | +1.00ha (+111%) |
| Mixed Semi-natural Woodland | 0.13 | 0.13 | - |
| Scrub | 0.24 | 0.00 | -0.24ha (-100%) |
| Unimproved neutral grassland | 0.80 | 0.00 | -0.80ha (-100%) |
| Semi-improved Neutral Grassland | 7.30 | 1.50 | -5.80ha (-79%) |
| Amenity Grassland | 0.00 | 5.00 | +5.00ha (new habitat) |
| Marshy grassland | 0.00 | 1.00 | +1.00ha (new habitat) |
| Tall Ruderal | 1.15 | 0.00 | -1.15ha (-100%) |
| Swamp | 0.00 | 0.12 | +0.12ha (new habitat) |
| Arable | 43.00 | 0.50 (allotments) | -42.50ha (-99%) |

| Habitat Type | Pre-construction Habitat Area (Ha) | Post-construction Habitat Area | Habitat Change (Ha and %) |
|---|---|---|---|
| Introduced Shrub | 0.00 | 0.70 | +0.70ha (new habitat) |
| Standing Water | 0.00 | 0.12 | +0.12ha (new habitat) |
| Other (e.g. buildings, roads and hard standing) | 0.28 | 42.83 | +41.75ha (+99%) |

The six SuDS ponds offer opportunities to create a series of semi-natural wetland habitats on the site where there are currently none. Water will be permanently present in the SuDS ponds up to 500 – 600mm in depth, and will make a contribution to the Freshwater and Wetland Habitat Action Plan in the Edinburgh LBAP, as well as providing valuable foraging habitat for bats which have their own Species Action Plan within the LBAP. Other beneficiaries are likely to include amphibians and aquatic invertebrates. Any planting of the pond will use native plants of local provenance.

The crossing required over the Brunstane Burn to accommodate the northern access road will be designed to meet the minimum requirements as set out in the CIRIA Culvert Design and Operation Guide (C689). The design of the crossing will be determined by the design flow of the watercourse and its gradient at the crossing point. The exact design will be agreed with SEPA prior to construction.

### 6.10.2 Proposed Additional Mitigation Measures

***Non-Native Invasive Species***

Surveys will be undertaken pre-construction to confirm the current locations of any Japanese knotweed and giant hogweed stands. These stands and a buffer zone of at least 7m (Japanese knotweed) and 10m (giant hogweed) will be fenced and clearly marked to avoid any incursion by vehicles/operatives.

If access is required to the buffer areas, soil and/or vegetation from within these buffer zones will be treated to ensure there is no transfer of plant material elsewhere in the proposed development or off-site.

A scheme for the control of Japanese knotweed and giant hogweed will be submitted to and approved by CEC prior to the commencement of the development.

***Breeding Birds***

Site clearance of vegetation will be undertaken outside of the main bird breeding season where possible (typically mid-March - August inclusive). Where site clearance works must be undertaken during the main bird breeding season, deployment of bird-nesting deterrent measures will be employed during late winter/early spring to reduce the risk of birds establishing nests in areas to be cleared.

Where vegetation clearance of suitable bird-nesting areas is required, a pre-construction survey must be taken involving both early-morning vantage point surveys of the area to be cleared followed by a hand search of vegetation. If bird nests are found then an exclusion zone will be put in place and no works will be permitted to be undertaken within this area until such time as the young have fledged or the nest fails.

The Edinburgh LBAP Swift Species Action Plan (SAP) recognises the strong association of breeding swifts with tenement buildings in the city. Unfortunately routine repair works on tenements often results in the loss of nest sites. Among the objectives of the Swift SAP are the incorporation of swift nesting sites into new developments through the inclusion of 'swift bricks'. These are commercially available in a variety of designs and materials, and can be built into the fabric of buildings alongside normal building materials. They require a minimum 5m clearance below and in front of the nest opening. Swift bricks will be incorporated into the design of some buildings in the proposed development.

***Barn Owl***

If Phase 3 of the construction works cannot be programmed to avoid the barn owl breeding season, the works will be phased to allow acclimatisation. In addition, alternative nest sites would be provided.

Mitigation for the predicted loss of breeding barn owl at Newhailes is severely constrained by the lack of suitable undeveloped habitat within the home range. It is considered that offsetting provides the best opportunity to provide successful mitigation.

Offsetting for the predicted loss of breeding barn owl at Newhailes will be delivered through:

- Consultation with the Scottish Ornithologists' Club (SOC) and Royal Society for the Protection of Birds (RSPB) to identify barn owl home ranges within the eastern half of Lothian Region (City of Edinburgh, East Lothian and Midlothian) where the successful breeding of barn owl is considered to be restricted by the lack of suitable nest sites;

- Liaison with land managers within these home ranges to identify those who would be sympathetic to the erection of barn owl boxes on their land;

- Erection of five barn owl boxes in suitable locations;

- Monitoring the usage of these locations for five years following the installation of barn owl boxes;

- Where necessary, moving the boxes or providing additional boxes.

***Bats***

Trees in the proposed development site identified as having potential for bat roosts will be climbed and inspected by a licensed bat worker if they are required to be felled. If bats are found to be present then options will be explored to retain the trees and incorporate as features in the detailed landscape layout.

If trees containing bat roosts require to be felled, this will be carried out under SNH licence with specific mitigation provided (e.g. bat boxes erected elsewhere on site).

Trees with bat roosts will be felled by experienced contractors under the supervision of a licensed bat worker according to agreed felling methods and any licensing conditions to reduce direct mortality of bats through loss of roosts. Such methods may include allowing dispersal times, exclusion of roosts, soft felling techniques, or retention of roost features in newly created areas. This approach will be extended to any trees where it was not possible for the bat inspection to inspect the full extent of any cavities.

Where any construction work is going to take place within 30m of structures which have been assessed as having more than negligible potential for roosting bats, these will be the subject of between one and three emergence/re-entry surveys, depending on their BRP prior to commencement of works. Surveys should be taken between mid-May and September (inclusive) and follow Bat Conservation Trust (BCT) guidance. If bats are found to be present then further mitigation measures may be required to minimise disturbance of bats in roost sites.

Strict adherence to light pollution mitigation measures to the north and east of the site adjacent to the Brunstane Burn LBS and the Newhailes Estate Policy Woodland will be observed. The design of operational lighting will control the potential for light spillage outwith the boundary of the proposed scheme in according to BS 5489 requirements and following guidance on lighting (e.g. BCT and Institute of Lighting Engineers, 2009) including the use of directional lighting or preventative measures (e.g. installation of shields or hoods).

***Otter***

A combination of otter-proof fencing on both sides of the access road together with the provision of mammal ledges on each wall of the Brunstane Burn crossing will be used to reduce the likelihood of any otters being run over on the access. The fence must be installed on both sides of the access road to a distance of at least 50m from the crossing. The crossing will be designed to provide sufficient breathing space above water for otter during times of flood.

Mammal ledges will be built into the crossing, will be at least 450mm wide and will be accessible from the banks of the burn via ramps at the 1 in 50-year flood level. There will also be provision made for otters to reach the ledge from the water, with ramps leading down to water level. The ledges will be sited above the 1 in 50-year flood level and will allow at least 450mm of headroom.

## 6.11 Summary of Residual Effects and Statement of Significance

The Firth of Forth is designated a SPA under the EC Directive 2009/147/EC ("the Bird's Directive") which means that the Conservation (Natural Habitats &c.) Regulations (the "Habitats Regulations) apply.

With the incorporation of mitigation measures to ensure that SuDS ponds are designed in line with best practice, the residual effects on the SPA are considered to be minor.

It is considered that the information presented in this ES Chapter is sufficient to address the requirements of Section 48 of the Habitats Regulations, which requires an assessment to be carried out of the implications of a proposed development upon European Sites. It is concluded that there will be no likely significant effect on the interest features of the Firth of Forth SPA and, as such, a Habitats Regulations Assessment is not required.

During construction, no residual effects that would be judged significant in terms of the EIA process have been identified (i.e. major significance as defined in Table 6.4). Providing all mitigation measures are adopted during construction, then residual negative effects are assessed as negligible.

During operation, the Disused Railways LBS will suffer a moderate negative residual effect from the development due to the fragmentation of the linear railway habitat resulting from the construction of two southern access roads. Together with long term effects resulting from noise and light disturbance from neighbouring properties and the predation of wildlife by the increased cat population, it is considered likely that there will be a significant long-term negative residual effect at the Authority Level on the Disused Railways LBS.

If the barn owl offsetting scheme is successfully adopted, then it is considered that there will only be a minor negative residual effect at a Regional level.

These negative residual effects are offset by the creation of new semi-natural habitats through the proposed development including woodlands, grasslands, wetlands, wildflower meadows, orchards and allotments. Allied to the creation of new habitats are new nesting and roosting opportunities for nesting birds and bats. Together with the delivery of an invasive species strategy to tackle Japanese knotweed and giant hogweed, these are assessed as having a significant moderate positive residual effect if mitigation proposals are fully implemented.

No residual operational effects that would be judged significant in terms of the EIA Regulations have been identified (i.e. major significance as defined in Table 6.4). A summary of the predicted effects of the development are presented in Table 6.17 and a summary of the proposed mitigation is presented in Table 6.18.

**Table 6.17: Ecology, Biodiversity and Nature Conservation, Summary of Predicted Effects**

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| **Construction / Temporary** | | | | | | | |
| Impact Adverse / Beneficial | High / Medium / Low / Negligible | Major / Moderate / Minor / Negligible | Short / Medium / Long Term | Temporary / Permanent | Major / Moderate / Minor / Negligible | Major / Moderate / Minor / Negligible | Major / Moderate / Minor / Negligible |
| Disturbance of wintering birds forming the qualifying interest of the Firth of Forth SPA | High | Minor | Short | Temporary | Minor | Minor | Minor |
| Brunstane Burn LBS – Pollution | Medium | Major | Medium | Temporary | Major | Minor | Negligible |
| Brunstane Burn LBS – Noise and Light Disturbance | Medium | Moderate | Short | Temporary | Moderate | Minor | Negligible |
| Brunstane Burn – Construction of crossing at northern access | Medium | Moderate | Short | Temporary | Moderate | Minor | Negligible |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| Disused Railway Network LBS – Noise and Light Disturbance | Medium | Minor | Short | Temporary | Minor | Minor | Negligible |
| Newhailes Estate Policy Woodland – Noise and Light Disturbance | Medium | Moderate | Short | Temporary | Moderate | Minor | Negligible |
| Spread of Invasive Species | High | Major | Long | Permanent | Major | Negligible | Negligible |
| Breeding Birds – Destruction of nests | Medium | Moderate | Short | Permanent | Moderate | Minor | Negligible |
| Breeding Birds – Disturbance | Medium | Minor | Short | Temporary | Minor | Negligible | Negligible |
| Disturbance of breeding barn owl | Medium | Moderate | Short | Temporary | Moderate | Minor | Negligible |
| Bats – Destruction of roosts | Low | Moderate | Long | Permanent | Minor | Negligible | Negligible |
| Bats – Disturbance | Low | Minor | Short | Temporary | Minor | Minor | Negligible |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| Otters – Disturbance | Medium | Minor | Short | Temporary | Minor | Minor | Negligible |
| Otters – Fragmentation of commuting habitat | Medium | Minor | Short | Temporary | Minor | Minor | Negligible |
| Ecosystem Services – Restricted access to circular walks | Medium | Minor | Medium | Temporary | Moderate | Minor | Negligible |
| **Operation / Permanent** | | | | | | | |
| Loss of wintering bird habitat of species forming the qualifying interest of the Firth of Forth SPA | High | Minor | Long | Permanent | Minor | Minor | Minor |
| Brunstane Burn LBS – Pollution | Medium | Major | Medium | Temporary | Major | Minor | Negligible |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| Brunstane Burn LBS – Noise and Light Disturbance | Medium | Moderate | Long | Permanent | Moderate | Minor | Minor |
| Brunstane Burn – Construction of crossing at northern access | Medium | Moderate | Long | Permanent | Moderate | Minor | Negligible |
| Disused Railway Network LBS– Fragmentation of Habitat | Medium | Moderate | Long | Permanent | Moderate | Moderate | Moderate |
| Disused Railway Network LBS– Noise and Light Disturbance | Medium | Moderate | Long | Permanent | Moderate | Minor | Minor |
| Newhailes Estate Policy Woodland – Noise and Light Disturbance | Medium | Moderate | Long | Permanent | Moderate | Minor | Minor |
| Control of invasive species [**Positive**] | High | Major | Long | Permanent | Major -VE | Minor +VE | Minor +VE |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| Creation of new habitats (woodland, wildflower meadows, wetlands, allotments and orchards) [**Positive**] | Low | Moderate | Long | Permanent | n/a | Moderate +VE | Moderate +VE |
| Breeding Farmland Birds – Loss of Habitat | Medium | Major | Long | Permanent | Moderate | Moderate | Moderate |
| Breeding Birds – Creation of new Habitat and Nesting Opportunities [**Positive**] | Low | Moderate | Long | Permanent | n/a | Moderate +VE | Moderate +VE |
| Breeding Birds – Predation by Pets | Low | Moderate | Long | Permanent | Moderate | Moderate | Moderate |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| Loss of barn owl foraging habitat to a level whereby recruitment to breeding population is unsustainable | Medium | Major | Long | Permanent | Major | Minor | Minor |
| Bats – Fragmentation of habitats along commuting routes | Low | Minor | Medium | Temporary | Minor | Negligible | Negligible |
| Bats – Disturbance of roost sites, foraging and commuting routes by light and noise pollution | Low | Moderate | Long | Permanent | Moderate | Minor | Minor |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| Bats – Creation of new foraging habitat and new roost sites in houses **[Positive]** | Low | Moderate | Long | Permanent | n/a | Minor +VE | Minor +VE |
| Otter – Road mortality | Medium | Moderate | Medium | Permanent | Moderate | Minor | Negligible |
| Otter – Fragmentation of habitat | Medium | Minor | Long | Permanent | Minor | Negligible | Negligible |
| Otter – Recreational Disturbance | Medium | Minor | Long | Permanent | Minor | Negligible | Negligible |
| Ecosystem Services – Increase in Pressure | Medium | Moderate | Long | Permanent | Moderate | Minor | Minor |

**Table 6.18: Ecology, Biodiversity and Nature Conservation, Summary of Proposed Mitigation**

| Reference | Proposed Mitigation and Management | Project Phase | | | |
|---|---|---|---|---|---|
| | | Pre-Construction | Construction | Operation | Deconstruction |
| EC1 | Pre-construction surveys for protected and invasive species. | ✓ | ✓ | | |
| EC2 | Phasing of works to ensure that there are always reservoirs of semi-natural habitat nearby for displaced wildlife to move into. | | ✓ | | |
| EC3 | No site compounds, storage sites or haul roads to be sited within 30m of the Brunstane Burn LBS or the Newhailes Policy Woodlands. | | ✓ | | |
| EC4 | All habitat creation will aim to use native species of local provenance. | | ✓ | ✓ | |
| EC5 | Wildflower meadows to be established with the Edinburgh Meadow Mix 2015. | | ✓ | ✓ | |
| EC6 | Management prescriptions will be developed for inclusion in the landscaping scheme for the development. | ✓ | ✓ | ✓ | |
| EC7 | Best practice guidance with respect to SuDS design as set out in the CIRIA SUDS Manual (C697) and SEPA Guidance Note 2 to be adhered to. | | ✓ | ✓ | |

| Reference | Proposed Mitigation and Management | Project Phase | | | |
|---|---|---|---|---|---|
| | | Pre-Construction | Construction | Operation | Deconstruction |
| EC8 | The crossing of the Brunstane Burn for the northern access road will be laid a minimum of 200mm below natural bed level to allow natural substrate to be used, and at the same gradient. Exact design to be agreed with SEPA. | | ✓ | | |
| EC9 | Scheme for the eradication of Japanese knotweed and giant hogweed will be submitted to and approved by CEC prior to the commencement of the development. | ✓ | ✓ | ✓ | |
| EC10 | Site clearance of vegetation will be undertaken outside of the main bird breeding season where possible (typically mid-March - August inclusive). | ✓ | ✓ | | |
| EC11 | Swift bricks will be incorporated into the design of some buildings in the development. | | ✓ | | |
| EC12 | Works to be phased to reduce disturbance to breeding barn owls and alternative nest sites to be provided, if required. | ✓ | ✓ | | |
| EC13 | Development of offsetting scheme for barn owl to be approved with SNH prior to the commencement of the development. | ✓ | ✓ | ✓ | |

| Reference | Proposed Mitigation and Management | Project Phase | | | |
|---|---|---|---|---|---|
| | | Pre-Construction | Construction | Operation | Deconstruction |
| EC14 | Trees in the proposed development site identified as having potential for bat roosts will be climbed and inspected by a licensed bat worker in the unlikely event that they are required to be felled. | ✓ | ✓ | | |
| EC15 | Any construction work within 30m of structures which have been assessed as having more than negligible potential for roosting bats, should be informed by emergence/re-entry surveys prior to commencement of works. | ✓ | ✓ | | |
| EC16 | Design of operational lighting to minimise the potential for light spillage outwith the boundary of the proposed scheme in according to BS 5489 requirements. | ✓ | ✓ | | |
| EC17 | Otter fencing to be installed on both sides of the northern access road to a distance of at least 50m from the Brunstane Burn crossing. | ✓ | ✓ | ✓ | |
| EC18 | Mammal ledges will be built into the Brunstane Burn crossing and will be at least 450mm wide and be accessible from the banks of the burn via ramps at the 1 in 50-year flood level. There will also be provision made for otters to reach the ledge from the water, with ramps leading down to water level. | ✓ | ✓ | ✓ | |

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# 7. LANDSCAPE, TOWNSCAPE AND VISUAL IMPACT ASSESSMENT

## 7.1 List of Figures

- 7.1 ZTV;
- 7.2 Townscape/Landscape Local Character Areas;
- 7.3 Viewpoint Location Plan and Linear Visual Receptors;
- 7.4 Strategic Landscape Framework (by AREA);
- 7.5 – 7.12 (a & b) Visualisations (before and after).

## 7.2 List of Appendices

- Appendix 7.A LVIA Methodology;
- Appendix 7.B Viewpoint Assessments.

## 7.3 Introduction

This chapter assesses the potential impacts of the proposed development on landscape, townscape and visual amenity. It describes and analyses the existing landscape of the area that may be affected and considers the sensitivity of the landscape to the development. It defines the extent to which the proposals would be visible and illustrates and analyses a representative sample of views to give a clear picture of what the development may look like and the impact it could have on visual amenity.

Although this assessment covers areas of townscape as well as landscape, the text generally refers only to “landscape” rather than “landscape and townscape” for ease of readability.

This chapter was written by WSP|Parsons Brinkerhoff.

## 7.4 Legislation, Policy and Guidance

There is no legislation that specifically protects the landscape or visual amenity, although the UK has ratified the European Landscape Convention, which acknowledges that all landscapes can be important, whether or not they are designated.

Planning policy is discussed in detail in Chapter 5, which includes an assessment of how the proposed development performs in terms of planning policy and objectives.

Guidance for landscape and visual impact assessment is discussed in the methodology (7.6, below)

## 7.5 Consultation

In addition to the consultation through the EIA scoping process, the scope of the LVIA was discussed with participants of the Consultee Workshop on 1st March 2016. The location of viewpoints to be illustrated and the style of visualisation were discussed and agreed at a meeting with CEC Planning on 18th April 2016.

## 7.6 Assessment Methodology

### 7.6.1 Introduction

The following paragraphs summarise the assessment methodology. It is set out in full in Appendix 7A.

The LVIA has been undertaken in accordance with the Guidelines for Landscape and Visual Impact Assessment (GLVIA3) (ref 1). Cognisance was also taken of the Landscape Character Assessment Guidance for England and Scotland (SNH and the Countryside Agency) 2002. Viewpoint photography is in accordance with Landscape Institute advice (ref 3).

The LVIA assesses two distinct but closely related areas: landscape character and visual amenity.

Landscape and visual assessments are separate although linked processes, describing closely related but distinct sets of effects.

Landscape effects are direct physical changes to the landscape caused by the development or indirect changes to landscape character and how the landscape is perceived following the development. Landscape impact assessment considers these effects both in terms of the individual components of the landscape and on the structure, coherence and character of the landscape as a whole.

Visual effects are changes in the composition and character of views available in the area affected by the proposed development. Visual impact assessment considers the response of the people who experience these effects, who may be living or working in the area, enjoying recreational activities or simply passing through. The assessment considers the overall consequence of the effects on the visual amenity – the pleasantness of the view or outlook – that the people affected enjoy.

The site masterplan has been developed by AREA through a careful process of site analysis and consultation and is designed to respond to the landscape and historic character of the site, its constraints and opportunities. As such, landscape and visual mitigation has been built in to the design and this chapter considers the residual effects.

There is a degree of overlap between this chapter and Chapter 8 of this ES (Historic Environment) which discusses landscape and visual issues with regards to the setting of Listed Buildings and Scheduled Monuments (SM) and the effects of the proposed development on Inventory Gardens and Designed Landscapes (GDL). This chapter considers the present-day situation of, for example, Newhailes House (i.e. as an open space enjoyed by the public and a tourist destination) and not its historic setting. This chapter also describes aspects of the landscape mitigation designed into the proposals, for example to provide an appropriate new setting for Brunstane House. As such, whilst it is accepted that there may be some 'double-counting' of mitigation proposals, care has been taken to avoid double-counting of effects as the two chapters are concerned with different aspects of environment effects defined by the EIA Regulations.

### 7.6.2 Sources of Information

Information has been gathered primarily from a structured site survey but also by desk study and from consultations with relevant consultees.

Detailed landscape and visual site survey work was carried out in the winter of 2015/16, as far as practical, choosing days when visibility was good. The field survey was designed to collect data for both the landscape and visual impact assessments, and therefore covered:

- Landscape character;
- Topography;
- Vegetation of landscape value;
- Areas of important features of cultural heritage or local importance;
- Visual receptors;
- Identification of possible mitigation measures for discussion with the team.

Relevant publications that have been taken into consideration include:

- Edinburgh Green Belt Boundary Study, 2010 (EGBS) (ref 5);
- Edinburgh Landscape Character Assessment, Jan 2010 (ELCA);
- Edinburgh Review of Local Landscape Designations, Land Use Consultants, 2010.

### 7.6.3 Limits to Visibility

The area of study for both the landscape and visual impact assessments is effectively the area from which the proposed development may be seen. Visual effects can only occur where at least some part of the development is visible. Similarly landscape and townscape effects are limited to areas from which the development is visible, although it can be argued that a perceptual change can spread wider, when a user "knows what is around the corner".

The first step in the assessment therefore is to establish this area, the 'zone of visual influence' or Zone of Theoretical Visibility (ZTV). The ZTV, shown in Figure 7.1, was produced by computer modelling. A number of points equating to high points in proposed development roofline were overlain on the Ordnance Survey (OS) digital terrain model (DTM), then areas of mature woodland and existing development that block the view were added in. Computer generated 'lines of sight' were generated from these 'rooftops' to identify where the development could be seen from the surrounding area.

The ZTV is described as 'theoretical' because there will be glimpses of the site through the woodland areas as modelled (importantly the case for Newhailes House where there would be filtered views from parts of the grounds in winter and glimpses through gaps in the woodland belts in summer), because smaller screening factors (e.g. groups of trees, walls and hedges) are not possible to model, because assumptions are necessarily made about the heights of buildings – both those proposed and those existing, and because the map base does not show the shape of buildings in absolute detail.

The ZTV extends to approximately 3km from the site. Observation in the field indicates that beyond this distance even where the development may be visible it is not likely to be noticed by the ordinary observer.

### 7.6.4 Significance

Both for the landscape and visual assessments the significance of the various effects derives from the combination of the magnitude of change to the landscape or to a view as a result of the proposed development and the sensitivity of the landscape, townscape, or visual receptor.

A full methodology, including significance criteria and effect significance, is set out in Appendix 7.A.

## 7.7 Baseline Conditions

### 7.7.1 Landscape Character Assessment

The Edinburgh Landscape Character Assessment (LCA) defined and appraised the open spaces of the city. It defined the site and the adjacent Newcraighall North site as "Brunstane Farmland" landscape character area of the "Settled Farmland" landscape character type. It is described as:

*"…a largely flat to very gently undulating area of farmland lying between Brunstane, Newhailes in East Lothian and Newcraighall. The area comprises large arable fields with some outgrown hedgerows and trees. The area is crossed by the north east coast railway to North Berwick and a disused railway line, which is now an access route, runs alongside the current track. Although adjacent to the policies of Newhailes, the influence of these does not extend into this landscape character area. The urban edge of Brunstane and Newcraighall is prominent in this landscape and comprises dense, modern housing estates. The landscape is also crossed by power lines which have a strong visual influence and there is noise intrusion from the A6095. The development of Queen Margaret College is taking place just over the local authority boundary in East Lothian."*

The landscape assessment notes that this is an *"open area of arable farmland with large scale fields, influenced by urban features such as pylons and built development",* and *"This low lying arable farmland is typical of the landscape of the City of Edinburgh with a high degree of fragmentation by road and railway lines, areas of new development and the close proximity of the urban edge typical of urban fringe landscapes."* It goes on to state that the landscape is not rare or unique within Edinburgh and that it is not prominent. The only points of note are the proximity to the Newhailes GDL, the existence of SMs within the site and the recreational use of the disused railway along the edge of the site. No mention is made of Brunstane House.

### 7.7.2 Overview of the Study Area

The Brunstane site is located in the south east of the city of Edinburgh, and comprises two fields of nearly flat, undeveloped land which slopes from a high point on the western edge of the site at about 35m AOD gently down to the north east - towards the sea and, along the northern boundary, more steeply towards the incised valley of the Brunstane Burn. The low point of the site, at the northeast corner, is at about 15m AOD.

The site is approximately 54.6 hectares (ha) in extent, and is surrounded on three sides by existing built development; including new housing at Newcraighall North, which is currently under construction, and on the fourth by the designed landscape of Newhailes House. There is a small area of former landfill adjacent to Wanton Walls, covered with rough grass and scrub. The site is bisected by the East Coast Main Line railway (ECML) and a depowered overhead transmission line.

From within the site there are some extended views out to the Firth of Forth and Fife, and to Arthur's Seat, but there are limited views into the site from the surrounding areas.

### 7.7.3 Site Features

The western half of the site is generally flat, very slightly undulating and overall sloping gently from the southwest towards the northeast. There is a drop of approximately 5m over the 400m or so width of the site. The eastern half of the site continues the gentle fall, becoming slightly steeper and more pronounced towards the northern edge as the ground drops down to the Brunstane Burn. The overall level change is a little over 10m in 600m.

As noted above, almost the entire site is under intensive arable cultivation. The exceptions are an area of worked or potentially infilled ground adjacent to Wanton Walls, which is covered in rough grass with a small amount of scrub, and the steep bank down to the Brunstane Burn to the west of the railway line which is covered in well-established woodland. The policy woodlands of Newhailes House border and add maturity to the eastern edge of the site.

There is no formal public access to the site and very limited signs of informal use. The signed path which cuts diagonally across the Newcraighall North site (to the south of the proposed site) terminates at the National Cycle Route (NCR) 1 path along the old railway embankment. The line of the path carries on into the proposed development and through to the corner of Brunstane House. It is not signed and is substantially overgrown.

There is evidence on the ground that it is lightly used up to the edge of the Brunstane House grounds, and users then follow the edge of the field up to the rough track that leads to the railway bridge. There is no sign of any informal path beyond the bridge. National Trust for Scotland (NTS) have advised that dog-walkers use the field close to the boundary with Newhailes.

### 7.7.4 Site Periphery and Features

The northern edge of the site is formed by the valley of the Brunstane Burn. West of the railway the site extends to the burn itself whilst to the east it is marked by the line of the Brunstane Burn walkway which runs close to the top of the valley side.

The Brunstane Burn is the main watercourse, along the northern edge of the site, quite steeply incised west of the railway, opening out slightly (although still very distinctly cut in) east of the railway. A small stream out-with the site boundary runs into the Brunstane Burn from the south, through the woodland policies of Newhailes House immediately east of the site. The only significant slopes on the site are at the edges of the Brunstane Burn valley.

The eastern edge of the site abuts the designed landscape of Newhailes House with its mature policy woodland. Along most of this edge the boundary is marked by the stone wall enclosing the grounds of the house.

Immediately west of the ECML, the southern boundary of the site is formed by the boundary hedge of the Niddrie Bowling Club, and then west of that it is open and indistinct against the steading of Wanton Walls (which appears to be derelict).

The southern boundary is enclosed by a disused railway embankment, now part of NCR 1, partly scrub covered and with a number of mature trees. A stone wall, generally in good condition, along the toe of the railway embankment would appear to be the actual field boundary. A high voltage overhead power line follows the line of the railway embankment.

Brunstane House, with its small walled gardens and a semi-derelict area of former policies forms the western boundary and overlooks the site. A short length of boundary north of Brunstane House is formed by the back garden fences of housing at Gilberstoun.

### 7.7.5 Wider Context

The topography of the surrounding area is similar to that of the site itself – generally low-lying and relatively flat. The one exception is immediately to the north of the site where the Brunstane Burn is incised in a distinct and quite narrow, well wooded valley generally between five and ten metres below the surrounding land.

Figure 7.2 shows the areas of distinct landscape and townscape character immediately surrounding the site, with the potential to be influenced by the proposed development. The following paragraphs give an overview description of them.

***Brunstane Burn***

As discussed above, Brunstane Burn differs in character to the site in that it is generally a steeply incised valley running along the northern edge of the site, eventually spreading out into the Firth of Forth downstream. The riparian character of the burn is especially evident along the site boundary, where the banks are steep and heavily vegetated aside from the north east corner where there is a small area of flatter land forming public open space at the edge of Newhailes.

***Brunstane Mill Development***

This development consists of a self-contained cul-de-sac of large, detached properties some of which back onto the Brunstane Burn and John Muir Way. The houses are relatively new build, which contrasts with the surrounding townscape of more traditional single storey homes. This in effect isolates the development somewhat, and it has a quiet, peaceful character.

***Newhailes***

Newhailes House, a neo-Palladian villa, dates back to the 17th century. It retains most of its original grounds, which are a designated GDL. The house stands centrally and slightly elevated within its designed landscape, placed to command extensive views out to the north-east, over lawns and parkland, to the Firth of Forth. In simple terms the estate comprises an area of parkland to the northeast of the house, pleasure gardens and a terrace around the house, outhouses and a kitchen garden to the west of the house, with the kitchen garden bounding the proposed development, a woodland grove to the southeast of the house, and a paddock to the southwest. The estate is enclosed on all four sides by mature woodland belts, although that to the northeast sits on a bank at a lower elevation so it does not constrain views to the Forth. A shallow valley runs down the broad woodland belt that bounds the proposed development site to join the Brunstane Burn at Brunstane Mill. Near the top of this valley is a shell grotto from which there was a designed view across the proposed development to Arthur's Seat, although this view is now lost because the woodland has not been managed for many years. The park and grounds are open at all times, ungated, and used as a park by local residents.

***Newcraighall***

The core of the former mining village of Newcraighall to the south western edge of the site is a row of traditional, single-storey harled miners' cottages along Newcraighall Road, with a block of two-storey stone houses at the centre, and a church and school opposite. The south side of the village was developed as social housing in the 1970's. The area retains a mining village character, despite the new development and the nearby shopping multi-complex, and features a number of historical features such as the original stone railway embankment opposite Wanton Walls.

***Portobello Cemetery***

The cemetery lies to the north of the proposed development, on a slightly higher elevation which affords some views across the site. It is enclosed by a high stone wall and mature vegetation which affords a peaceful, tranquil setting as one would expect from a cemetery. Although the ECML runs along its western edge, the existing tree cover is sufficient to act as a visual barrier to the railway.

***Edinburgh College***

Edinburgh College (formerly Jewel & Esk Valley College) lies in an elevated position to the north western edge of the site boundary. It covers an area of approximately 2.5ha and its main building is five storeys high. The various college buildings are of a contemporary style, and have been added to recently by the addition of flats to the west adjacent to the college grounds.

***Brunstane House***

On the western edge and overlooking the site lies Brunstane House, a 16$^{th}$ century listed building which has changed hands a number of times. Although the majority of the associated policies which covered the surrounding area (including parts of the site) have since gone, the house retains its stature. To the south of the main house beyond its walls lies a group of semi-derelict steadings.

***Milton Road East and Brunstane***

These well-established developments lie to the north of the site, and typically consist of single storey detached bungalow properties of 1930-40's era.

***Gilberstoun and Newcraighall North***

Gilberstoun lies immediately west of the site, and consists of late 20$^{th}$ century brick-built semi-detached houses with private gardens in a typical cul-de-sac and courtyard layout. Well-established planting and retained existing woodland enclose and demarcate most of the site.

Newcraighall North is a recent addition to the surrounding townscape, a development under construction again of brick-built semi-detached houses with private gardens although differentiated from Gilberstoun by the absence of mature trees within the development and a more permeable street layout.

***Daiches Braes***

These properties are relatively modern in comparison to the surrounding developments described above, and lie directly to the north-west of the site and at a lower elevation with a screen of mature tree planting to the south.

### 7.7.6 Landscape and Landscape Related Designations

***Landscape Designations***

There are no landscape designations covering the site or close enough to have the potential to be indirectly affected.

***Green Belt***

The site is currently part of the Edinburgh Green Belt as defined in the Edinburgh City Local Plan (ECLP) 2010, allocated for housing in the Edinburgh Local Development Plan - Second Proposed Plan (ELDP).

Green Belt is a planning policy designed to control the distribution of development in order to, inter alia, protect and enhance the setting of the city and protect and provide access to open space. Although the purpose of the Green Belt does not include the protection or enhancement of the landscape, the Edinburgh Green Belt Study 2008 (EGBS) included an assessment of landscape character which provides a useful baseline. The key landscape and open space characteristics identified by the EGBS were:

- Partly fragmented landscape influenced by transport corridors and residential edge;
- Generally well managed farmland, however lacking distinctive landscape features;

- Together with Newhailes provides visual separation between Musselburgh and Joppa, Brunstane and Newcraighall;

- Although largely flat landform, existing settlement edge defined by trees and woodland;

- Landscape includes several access routes and open space role.

In reality however, the site does not provide any public open space role and, as clearly demonstrated by the ZTV (Figure 7.1) it is so little visible that it only provides visual separation between Musselburgh and Joppa for users of the national cycle route along the old railway line to the south of the site and, very briefly, for rail passengers.

***Gardens and Designed Landscapes***

*Newhailes House*

Newhailes House is an A-Listed neo-Palladian villa that sits in an extensive walled designed landscape. The main aspect and designed vista from the house is towards the sea, to the northeast.

The mature woodland framework to the designed landscape effectively isolates the house from the surrounding area, although NTS advise that the size and structure of this woodland framework is today more substantial than the original design intention. It is understood that there would originally have been a clear view towards Arthur's Seat from the House, as well as a designed view towards Arthur's Seat from the Shell Grotto that is today rather lost within the boundary woodland.

The policy woodlands of the designed landscape are visible from a number of locations across the proposed site and the EGBS notes that the proposed development site *"performs some function in providing setting for the policy woodlands".*

### 7.7.7 Visual Receptors

The visibility of the proposed development, taking into account the screening effects of built form and vegetation, was explored initially through desktop research (particularly from maps and Google Earth Pro and Street View) then subsequently through a series of site visits.

For a site this size in an urban area, there are remarkably few views in or out. There are few places with clear views into the site, even fewer of which are public places. The ZTV (Figure 7.1) demonstrates clearly the extent to which visibility of the site is contained by topography, woodland and development. The ZTV does however need to be read with caution because it suggests greater visibility to the north, from Joppa and Milton Road East than would actually be the case (house and cemetery walls would block more views) and it models the woodland boundary at Newhailes as a solid screen where in reality there would be filtered views in winter and glimpses through gaps in the woodland in summer.

From the north there would be private views towards the site from the bungalows along the south side of Milton Road (east of the cemetery), from the gated development at Milton Glen, and from parts of the new development at Brunstane Mill. There would also be clear views from most of the John Muir Way west of the railway line. From west of the cemetery, there would be private views from the houses along the south side of Brunstane Crescent, from parts of Edinburgh College and from the new flats adjacent to the college campus. There may also be views from upper storeys of the houses along Daiches Brae.

From the east, there are clear private views from Brunstane House. There are also views into the site from a few back gardens to houses on Gilberstoun Place.

From the south, there are clear public views across the site from the old railway line path, NCR 1, and from a short section of the A6095 Newcraighall Road where this crosses the railway line and alongside the Niddrie Bowling Club.

Theoretically, there are views from parts of the Newcraighall North site, but most of these will be lost when this site is developed. There are also glimpses of the site from a short section of the A1 where it passes over the road and railway between Newcraighall Station and the Queen Margaret University Campus. There are no views of the site from Newcraighall village.

From the west, views are heavily filtered through woodland on the edges of the Newhailes House policy grounds. From much of the grounds, the dense mature woodland and the estate boundary wall block views into the site. However there are some clear views into the site from the field west of the car park, and there are filtered views into the site in winter when the leaves are off the trees.

The site is distantly visible from Arthur's Seat (about 4km) and from the higher ground in East Lothian between Dalkeith and Tranent (about 5km at the closest).

There are brief glimpses of the site from the ECML railway, either end of the cutting through the site, generally lasting about five seconds for receptors using the service.

The visibility of the development is illustrated from a number of viewpoints agreed with CEC as part of EIA scoping consultation. These are shown on Figure 7.3 and Figures 7.5 to 7.12 show before and after views with a block model massing visualisation of the proposed development in place.

## 7.8 Proposed Mitigation

### 7.8.1 Design Evolution / In-Built Mitigation

The strategic masterplan (Figure 2.6) is carefully designed to respond sympathetically to the landscape and historic character and context of the site and its surroundings.

As discussed above, the proposed site is well contained both visually and physically, and is otherwise open with relatively flat topography. Consequently there will be no direct loss of tree cover.

A large open space has been provided around Brunstane House to retain an open aspect, effectively replicating the form of the original policy grounds to this side of the house. A broad landscape strip separates the development from the Newhailes GDL and the development along this edge will be lower density and generally be gable end on to the landscape to provide an interesting low-rise frontage. The open space would be a carefully considered, designed intervention which would create a green corridor and additional open space which would remain respectful of Newhailes historical policy planting.

The majority of the development would be two-storey, increasing to three along the main axes and streets to provide enclosure and urban form, and to four storeys around the open space referred to as Brunstane Green, around the SM to provide adequate enclosure to such a large space.

Around the edges of the site and internal open spaces, buildings will normally face the landscape to provide passive surveillance.

Broad streets to act as 'view corridors' have been introduced to retain historic views from Brunstane House towards the Firth of Forth and from Newhailes towards Arthur's Seat, and a visual connection has been created between the open space around the SM and Brunstane House. These would be lined with street trees to enhance and accentuate the views, and building heights would not exceed three storeys along these corridors.

The key aspects of the masterplan which can be considered as landscape and visual mitigation commitments, as well as historic environment mitigation in some instances, are as follows:

LV 1. Generally two-storey development, rising to three along key streets and a maximum of four storey to provide appropriate urban enclosure to the larger open spaces;

LV 2. Tree-framed open space around Brunstane House to create an appropriate new setting for the listed building;

LV 3. A broad street / linear green space providing a view corridor from Brunstane House to the sea;

LV 4. A substantial landscape buffer to the east to separate the proposed development from the designed landscape of Newhailes House, with the added benefit of providing new pedestrian linkages and a wildlife corridor;

LV 5. Lower density, up to two-storey development abutting the Newhailes landscape buffer, carefully designed to provide low-rise interesting frontages to the open space and to minimise any visual effects on views from the GDL;

LV 6. A broad street / linear green space providing a view corridor from the shell grotto in Newhailes to Arthur's Seat, along with a minor view corridor from Newhailes House;

LV 7. The creation of a broad landscape and open space buffer along the south side of the Brunstane Burn east and west of the new entrance road, to provide a quality landscape edge to the valley and new recreational connections to the John Muir Way;

LV 8. A landscape buffer along NCR 1 to provide a degree of 'breathing space' to this recreational route;

LV 9. Development abutting or adjacent public paths and open spaces around the site normally to be arranged with main frontages facing towards said path or open space;

LV 10. A green link along one side of the ECML railway, a combination of allotments and park that will also act as a wildlife corridor;

LV 11. Local open space distributed within the development, designed to be passively supervised by the arrangement of overlooking houses.

LV 12. Streets designed in response to existing topography (to minimise cut and fill);

LV 13. Streets designed to maximise views out to the wider landscape e.g. Berwick Law and the sea;

LV 14. Boundaries designed to respond to specific character of site;

LV 15. Tidy site management to reduce visual clutter, construction lighting in accordance with best practice.

## 7.9 Identification and Evaluation of Key Impacts

### 7.9.1 Landscape Effects

The landscape of the New Brunstane site itself would be changed entirely and there would be limited indirect effects on some of the adjacent areas of landscape and townscape.

***Brunstane Site (Settled Farmland LCA)***

*Nature of Change*

As described above, the site itself is a simple composition of three large open intensively farmed fields. The change to the site itself would inevitably be profound; development of a designed area of housing with local facilities, an extensive public open space network and a strong wooded framework.

*Landscape Sensitivity*

The site can reasonably be considered as being of low sensitivity. There are no landscape designations covering the site and, as intensively farmed fields, it is a commonplace landscape (albeit unusual in an urban context) with low scenic value.

The site has no apparent locally ascribed value, such as might be shown by recreational use (aside from being the context for a short section of footpath and cycle route) nor any literary or any other associations known to the assessment team.

In the landscape character assessment part of the Edinburgh Green Belt Boundary Study (EGBS), the site is ascribed a score of 2 (on a scale of 1 to 3) for integrity of landscape character and landscape condition. However, it is ascribed a 1 for distinctiveness of landscape character and contribution to the landscape setting of settlements.

The specific points on integrity made in the EGBS are *"the landscape comprises large flat arable fields, however the landscape is crossed by the mainline railway and pylon line which fragment the landscape"* and *"the area is intensively farmed and some of the hedgerows are outgrown."*

On distinctiveness of landscape character, the EGBS states simply *"The landscape comprises large open arable fields and lacks distinctive features",* whilst on setting it states *"the flat nature of the landform and relatively small extent between the urban areas mean that this area has a limited role to play in providing landscape setting."*

*Magnitude of Change*

The proposed development would completely change the character of the site itself, and is thus inevitably a change of high magnitude.

*Significance (Permanent Effects)*

As a high magnitude of change to a landscape of low sensitivity, the introduction of the proposed development can be considered to have a landscape impact of minor to moderate significance on the site itself.

Whether this is seen as being positive or adverse in nature depends on the observer's opinion of new development. However, as an impact assessed as being on the low side of moderate, this would not be considered to be a significant impact.

*Effect during Construction*

The activity of large earth-moving and construction machinery, the obviously changing shape of the landscape and the bare earth of the development would combine to create an impact on the landscape character during the construction period that was adverse in nature and of moderate significance, albeit a temporary impact.

***Brunstane Burn***

West of the ECML railway, the Brunstane Burn is separated from the proposed development by a belt of mature woodland, such that the development would hardly be perceived from this area of landscape. There would be a minimal or no indirect effect.

East of the railway and particularly east of the site access the development would face onto Brunstane Burn valley and the sense of semi-rural isolation currently perceived would be lost. The character of the valley would be perceived as much more urban.

The site access road would cross the valley on a large and artificially steep embankment, almost dam-like, which would break the linear nature of the valley, whilst traffic on this road would lead to a loss of tranquillity. Together these would be a high magnitude of change on a landscape of medium to high sensitivity. This would be a major adverse landscape effect, although very local in extent.

***Brunstane Mill Development***

The Brunstane Mill development is a tranquil self-contained townscape of large detached houses which 'borrows' some landscape from the Brunstane burn valley and the site as a backdrop. The proposed development would be little perceived from most of this townscape area, marginally reducing the sense of separation from surrounding development. This would be a change of low magnitude to a townscape of low to medium sensitivity, a negligible or minor change to the townscape character.

***Newhailes***

The policies of Newhailes are a heavily used local recreational resource – effectively used as a public park for parts of Musselburgh. The house, open to visitors in the summer is a visitor attraction for a wider catchment as is the garden centre, shop and visitor centre.

The main aspect and designed vista from the house is towards the sea, to the northeast, and from the sheep park it is this view that tends to draw the eye. There is residential and industrial development to the southeast and northeast of the grounds. The development to the southwest is occasionally perceived from within the grounds but the development to the northeast is mostly at a lower elevation and not perceptible except from very close to the boundary. These developments do not noticeably affect the parkland character.

The proposed development would be at a similar elevation to the policy grounds, set back by between about 25m and 50m so that views to Arthur's Seat would be unaffected. Development would be visible in winter through the boundary trees from parts of the grounds, particularly from the field west of the car park where the boundary woodland is more intermittent.

Although there are few views, the open nature of the site can be sensed from close to the estate boundary because of the open skies.

Introduction of the proposed development would lead to a slight reduction in the perception of remoteness and separateness currently enjoyed; the sense of being in a country house grounds would be slightly diminished. However the sense of openness to the sea and enclosure either side would remain unchanged.

Given the particularly high sensitivity and value of the estate, even such a slight change would have an adverse effect. It would be change of low magnitude to a highly sensitive landscape receptor. By strict application of the significance matrix (Appendix 7.A, Table 7.A.4) this is an effect of moderate adverse significance.

However, the present-day character of the Newhailes landscape is so self-contained that the overall indirect effect of the proposed development on the present-day landscape is not considered significant.

***Newcraighall***

Newcraighall is a former mining village with a distinct, self-contained, townscape character. The development of Newcraighall North has slightly altered the isolated character of the village, with two new road connections, one of which would also be used by the proposed development. The proposed development would not be perceived from within the village and would thus have no indirect effect on the townscape.

***Portobello Cemetery***

Portobello Cemetery has an enclosed tranquil character, cut off from Milton Road East by its boundary wall. It 'borrows' the landscape of the site and of Brunstane Burn by virtue of extensive views out, which together give it an almost 'country cemetery' character.

The introduction of the proposed development would change the nature of the borrowed landscape and the access road across the Brunstane Burn would remove some of the enclosing trees and introduce noise and activity to the immediate eastern boundary. Together these would give rise to a change of medium magnitude to a highly sensitive receptor. This would be an adverse landscape effect of moderate to high significance, although very local in extent.

***Edinburgh College***

Edinburgh College and the adjacent flats form a pocket of large scale campus development that sits in contrast to the surrounding interwar low-rise housing. The proposed development would be perceptible from parts of the college grounds but would have no effect on the townscape character of the campus.

***Gilberstoun and Newcraighall North***

Gilberstoun and Newcraighall North are late 20th and early 21st century housing developments, the latter still under construction. The proposed development would abut Gilberstoun and be separated from Newcraighall North by the old railway embankment. The proposed development would be perceived from the edges of both estates but unnoticed from their cores. As the open nature of the site in its current condition makes no real contribution to the townscape character of either area it is considered that the proposed development would have no effect.

***Brunstane House***

Brunstane House sits between the proposed development and the late 20th century suburban style housing of Gilberstoun. Whilst the house and its immediate surroundings (including the steadings) have a character of their own, they appear almost as an anomaly in the landscape: neither part of Gilberstoun nor a feature in the countryside that they presumably once dominated. The proposed development includes a large area of open space to the east and north of the house as well as view corridors axial to the house so it becomes a feature in the new townscape.

Given that the formal approach to the house is now subsumed by the Gilberstoun estate it cannot be considered sensitive to further new development. The proposed development is set back sufficiently from the house that it would have an effect of low to medium magnitude on the townscape of the house, an effect on the present-day townscape of low significance.

***Milton Road East and Brunstane***

Milton Road East and Brunstane are together a prosperous area of primarily inter-war and immediately post-war low-rise housing; Milton Road East more of a boulevard, low density ribbon development, Brunstane slightly higher density. The proposed development would be virtually imperceptible from most of this townscape area, although there would be clear views from the backs of the houses on the south side of Milton Road East and Brunstane Crescent. The proposed development would have no effect on the townscape character of this area.

***Daiches Braes***

Daiches Brae is a recent development of terraced townhouses at a low level along the north side of the Brunstane Burn valley, very much enclosed and isolated by the riparian woodland. The proposed development may be visible from the upper storeys of the houses but would be virtually imperceptible from the street and would therefore have no effect on this townscape area.

***Construction Phase***

The effects on the landscape resources during the construction period would be similar to the permanent effects (above) although generally of a slightly greater degree because of the active change going on and large machinery moving about. On the other hand, construction impacts may be considered to be less significant due to their temporary, short-term nature.

The mitigation of effects on the landscape and visual resource during construction are those integral to the construction process that is now routinely followed:

LV 16. Tidy site management to reduce visual clutter associated with the works and construction lighting in accordance with best practice to minimise lighting intrusion to surrounding sensitive receptors.

### 7.9.2 Visual Effects

The following paragraphs give an overview of the visual effects of the proposed development, following the order of the overview of visual receptors at Section 7.7.5. All places from which it was considered there could be a significant impact have been considered but groups of houses with similar views have been treated as one receptor.

***Houses on Milton Road East, Milton Glen, Brunstane Crescent and Flats by Edinburgh College***

About 20 bungalows along Milton Road and three large houses on Milton Glen enjoy a wide panoramic and quite rural prospect across the Brunstane Burn to the proposed site.

In a similar manner, about 20 houses on the south side of Brunstane Crescent and a new block of flats adjacent to Edinburgh College enjoy a similar wide panoramic and quite rural prospect across the Brunstane Burn to the proposed site. The proposed development would substantially change the character of the view and these highly sensitive receptors can be anticipated to consider it an adverse change of high magnitude: a major adverse visual effect. However, it should be noted that these are all private views and as such not a material consideration in planning law.

***Edinburgh College***

There is a similar wide panoramic and quite rural prospect across the Brunstane Burn to the proposed site from Edinburgh College and the change would be as discussed above. However, as this is a receptor of low sensitivity, the effect would be of minor significance.

***John Muir Way***

West of the ECML, the John Muir Way is low in the valley, screened by the valley-side woodland and virtually unaffected by the proposed development. West of the ECML it rises up and runs immediately along the site boundary, separated from it by an overgrown hedge along most of its length, and open to the site at the northern-most corner where the topography flattens out and there is a small area of public open space. Along this section (about 500 m), the proposed development will completely alter the character of the path and the views from it, most particularly either side of the access road where the path will have to be re-routed to cross the road at grade. Over a short section of the John Muir Way, there will therefore be a visual change of high magnitude to a short section of a highly sensitive receptor, a major visual effect which it is reasonable to envisage that most would consider adverse. In the context of the 215 km of the John Muir Way as a whole, however, this change would be insignificant.

***Brunstane House***

There is a clear prospect across the site from Brunstane House, albeit partially screened in summer by mature trees in the garden grounds. The development would be set back from the house by a considerable distance but would inevitably completely alter the character of this private view. This would be a high magnitude of change for a sensitive receptor, a major adverse visual effect, although, as noted above, a private view and as such not a material consideration in planning law.

***Gilberstoun Place***

Some half dozen houses on Gilberstoun Place back on to the site, separated from it by a tall hedge so with views primarily from upstairs windows. The development would be set back from the house by a considerable distance but would inevitably completely alter the character of this private view. As it is only seen from upper windows this is considered a low magnitude of change albeit to a sensitive receptor and a minor adverse visual effect, not significant.

***National Cycle Route 1***

From the south, there are clear public views across the site from about 500m of NCR1 where it follows the line of the old railway line path from south of Brunstane House to Newcraighall Road. The development will be set back a short distance from the path but would fill the view and inevitably completely alter its character. Again this would be a high magnitude of change for a sensitive receptor, a major adverse visual effect on a short section of public path.

***The A6095 by Niddrie Bowling Club***

The A6095 runs to the south of the proposed development, and passes Niddrie Bowling Club to the west of the ECML. The club greens are bounded by a low level hedge and some sparse deciduous tree planting allowing clear views through to the proposed site from both the road and the Bowling Club.

The site is clearly visible for road users on the A6095 Newcraighall Road for a hundred or so metres across the open space of the Niddrie Bowling Club.

This would be a change of medium magnitude for moderately sensitive receptors (road users), but for such a short duration that whilst likely to be considered adverse, it would be a minor visual effect, not material.

***Newcraighall North***

The proposed development will be visible from the houses along the edge of Newcraighall North. The residents should be aware that the proposed development is scheduled so will be less sensitive than existing residential receptors. Views of the development will be limited to the upper floors and thus a medium to low magnitude of change for a receptor of medium sensitivity, a minor adverse visual effect.

***A1***

There would be glimpses of the site from a short section of the A1 where it passes over the road and railway between Newcraighall Station and the Queen Margaret University Campus, sufficiently fleeting and distant to have no visual effect.

***Newhailes***

The proposed development will be set back between about 25m and 50m from the boundary of Newhailes Estate, with the greatest set back at the points where the site is higher.

There would be few if any views of the development from the house or from fields to the northeast of the house during the summer months thanks to the screening effects of the broad woodland belt and the boundary wall along the edge of the estate. From the kitchen gardens (plant nursery) where there are no trees, the boundary wall is high enough to block most if not all views. There would however be a number of clear views from the paddock to the southwest of the car park, where there are some small gaps in the tree belt. During the winter the development would be partially visible, filtered through the trees (see Fig. 7.8b).

Newhailes is a designed landscape, now as both a visitor attraction and a *de facto* public park. There were designed views across the proposed development (e.g. from the shell grotto) but for the present day users the views across the proposed development are very much secondary, screened by trees, with the eye drawn to the main prospect – the designed view to the Firth of Forth. As with the landscape effect, by strict application of the significance matrix (Appendix 7.A, Table 7.A.4) this is an effect of moderate adverse significance. However, although the proposed development would be visible in places from the policy grounds, and more so in winter, its introduction would have little effect on the overall visual amenity enjoyed by visitors and is therefore not considered significant.

***Arthur's Seat***

The proposed development would be distantly visible in the wide panorama of Edinburgh and its surroundings enjoyed from Arthur's Seat. An educated observer may notice the loss of the green space between Joppa and Newhailes once the proposed development is built but it would be generally unnoticed by the casual observer. The visual effect from this distant elevated viewpoint would be negligible.

***The East Coast Main Line Railway***

The ECML railway links London with Edinburgh and onto Aberdeen and bisects the proposed development, passing over the Brunstane Burn to the north, and under the A6095 to the south. The proposed development would be clearly visible to passengers for approximately 100m at the north end of the site and about 200m at the south end. This would be a change of medium magnitude for moderately sensitive receptors but for a short duration that whilst likely to be considered adverse, it would be a minor visual effect, not material.

## 7.10 Cumulative Effects

As identified in Chapter 15, there are four development sites in the vicinity of the proposed development with the potential to have cumulative effects in conjunction with the proposed development:

- Newcraighall North;
- Newcraighall East;
- Wanton Walls;
- Brunstane Steading.

Newcraighall North has been considered as part of the baseline in the main LVIA as it is currently under construction. It does however give rise to cumulative landscape and visual effects in conjunction with the proposed development, enclosing the NCR 1 on both sides and together eliminating the previous countryside character experienced along this short section of path. Newcraighall North in isolation would have a moderate visual effect and a moderate landscape effect on the path. The two developments combined would have a visual effect. Although this is no greater in significance than the level of effect assessed for the proposed development alone, the combined effect on this short section of public path is likely to be considered greater than that of Newcraighall East and can therefore reasonably assessed as moderate adverse.

There is unlikely to be any landscape or visual interaction between Newcraighall East and the proposed development, separated as they are by Newcraighall Village and the old railway embankments.

Brunstane Steading and Wanton Walls are too small to have any significant landscape or visual effects in combination with the proposed development.

### 7.11 Summary of Residual Effects and Statement of Significance

New Brunstane is a landlocked pocket of fields and visibility of the proposed development beyond the area immediately abutting the site is very restricted, as demonstrated by the ZTV (figure 7.1). Significant adverse visual effects would be limited to: a narrow strip on the north side of the Brunstane Burn where some 40 houses and a similar number of new flats currently experience a rural aspect across the site; Brunstane House; a short section of the Brunstane Burn path, the John Muir Way (about 500m), and; a short section of NCR 1 the old railway path along the south edge of the site (about 400m). This is considered to be a remarkably small number of visual impacts given the size of the proposed development.

The character of the site itself would obviously be fundamentally changed by the proposed development. There would be no adverse effects on any areas of the adjacent townscape and significant landscape effects would be limited to a small area of the Brunstane Burn valley east of the ECML. Importantly, there would be no significant adverse effect on the present-day character of the Newhailes House designed landscape. Development would change the setting of Brunstane House, but the retention of a reasonable landscape buffer to the house can be considered to provide an acceptable new setting.

Development of the site would be almost unnoticeable from the main road approaches to the city and briefly glimpsed from the main rail approach. The only real clear view of the site in the context of the city is that from Arthur's Seat.

**Table 7.1: Landscape, Summary of Predicted Effects**

Note that these are assessments of the residual effects of the development with mitigation built in to the design and design coding.

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Residual Effect |
|---|---|---|---|---|---|
| **Operation/Permanent** | | | | | |
| Local Landscape/Townscape Character Areas | | | | | |
| New Brunstane Site | Low | Major | Long-term | Permanent | Minor to moderate adverse |
| Brunstane Burn valley | Medium-High | Major | Long-term | Permanent | Major adverse very locally |
| Brunstane Mill | Low-Medium | Low | Long-term | Permanent | Negligible to minor adverse |
| Newhailes policy landscape | High | Low | Long-term | Permanent | Moderate adverse but not significant |
| Newcraighall | Low | Low | Long-term | Permanent | None |
| Portobello Cemetery | High | Medium | Long-term | Permanent | Moderate to high adverse very locally |
| Edinburgh College | Low | Low | Long-term | Permanent | None |
| Gilberstoun and Newcraighall North | Low | Low | Long-term | Permanent | None |
| Brunstane House | Low | Low-medium | Long-term | Permanent | Minor adverse |
| Milton Road East and Brunstane | Low | Low | Long-term | Permanent | None |
| Daiches Brae | Low | Low | Long-term | Permanent | None |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Residual Effect |
|---|---|---|---|---|---|
| **Construction** | | | | | |
| The construction period impacts would be of slightly greater degree because of the active change going on and large machinery moving about but may be considered to be less significant due to their temporary nature | | | | | |

**Table 7.2: Visual Amenity, Summary of Predicted Effects**

Note that these are assessments of the residual effects of the development with mitigation built in to the design and design coding.

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Residual Effect |
|---|---|---|---|---|---|
| **Operation/Permanent** | | | | | |
| Residential receptors overlooking the site from the north side of Brunstane Burn | High | High | Long-term | Permanent | Major adverse |
| Edinburgh College | Low | High | Long-term | Permanent | Minor adverse |
| John Muir Way<br>Note this is the effect on an approximately 500m section with visibility of the proposed development. The effect on the John Muir Way as a whole is insignificant | High | High | Long-term | Permanent | Major adverse |
| Brunstane House | High | High | Long-term | Permanent | Major adverse |
| Gilberstoun Place | High | Low | Long-term | Permanent | Minor adverse |
| NCR1<br>Note this is the effect on an approximately 500m section with visibility of the proposed development. | High | High | Long-term | Permanent | Major adverse |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Residual Effect |
|---|---|---|---|---|---|
| A6095 by Niddrie Bowling Club | Moderate | Medium | Long-term | Permanent | Minor adverse |
| Newcraighall North | Medium | Low | Long-term | Permanent | Minor adverse |
| A1 | Low | Low | Long-term | Permanent | None |
| Newhailes | High | Low | Long-term | Permanent | Moderate adverse but not significant |
| Arthur's Seat | High | Low | Long-term | Permanent | Negligible |
| ECML | Moderate | Medium | Long-term | Permanent | Minor adverse |
| **Construction** | | | | | |
| The construction period impacts would be of slightly greater degree because of the active change going on and large machinery moving about but may be considered to be less significant due to their temporary nature | | | | | |

**Table 7.3: Landscape and Visual, Summary of Proposed Mitigation**

| Reference | Proposed Mitigation and Management | Project Phase | |
|---|---|---|---|
| | | Construction | Operation |
| LV1 | Generally two-storey development, rising to three along key streets and a maximum of four storey to provide appropriate urban enclosure to the larger open spaces | | ✓ |
| LV2 | Tree framed open space around Brunstane House, creating a green corridor and considered policy style planting. | | ✓ |
| LV3 | A broad street/linear green space providing a view corridor from Brunstane House to the sea. | | ✓ |

| Reference | Proposed Mitigation and Management | Project Phase | |
|---|---|---|---|
| | | Construction | Operation |
| LV4 | Substantial landscape buffer to the east to separate proposed development from designed landscape of Newhailes House. | | ✓ |
| LV5 | Low density housing abutting Newhailes to minimise visual effects on views from GDL. | | ✓ |
| LV6 | A broad street/linear green space providing a viewing corridor from shell grotto to Arthur's Seat, and minor view corridor from Newhailes House. | | ✓ |
| LV7 | Broad landscape and open space buffer along south side of Brunstane Burn east and west of new entrance road. | | ✓ |
| LV8 | Landscape buffer along NCR1. | | ✓ |
| LV9 | Main frontages of development normally arranged towards paths or open spaces. | | ✓ |
| LV10 | Green link along one side of the ECML railway, a combination of allotments and park acting as a wildlife corridor. | | ✓ |
| LV11 | Local open space distributed within the development, designed to be supervised passively by overlooking houses. | | ✓ |
| LV12 | Streets designed in response to existing topography to minimise cut and fill. | | ✓ |
| LV13 | Streets designed to maximise views out to wider landscape e.g. Berwick Law and the Firth of Forth | | ✓ |
| LV14 | Boundaries designed to respond to specific character of the site. | | ✓ |
| LV15 | Tidy site management to reduce visual clutter, construction lighting in accordance with best practice. | ✓ | |

## 7.12 References


- The Landscape Institute and the Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, Routledge;

- Landscape Character Assessment Guidance for England and Scotland (SNH and the Countryside Agency) 2002;

- Landscape Institute (2011) Photography and photomontage in landscape and visual assessment, Landscape Institute Advice Note 01/11;

- Edinburgh Landscape Character Assessment, Land Use Consultants and Carol Anderson, Jan 2010;

- Edinburgh Green Belt Study, Land Use Consultants and Carol Anderson, Dec 2008;

- Edinburgh Review of Local Landscape Designations, Land Use Consultants, 2010.

# 8. HISTORIC ENVIRONMENT

## 8.1 List of Figures

- Figure 8.1 Historic Environment Assets within the Inner Study Area;
- Figure 8.2 Historic Environment Assets within the Outer Study Area;
- Figure 8.3 Existing view from Scheduled Monument SM4112 (Brunstane, enclosure 250m E of) Looking north-west;
- Figure 8.4 Sketch of view from Scheduled Monument SM4112 (Brunstane, enclosure 250m E of) Looking north-west;
- Figure 8.5 Existing view from Brunstane House (Category A Listed Building LB28034). Looking north-east;
- Figure 8.6 Sketch of view from Brunstane House (Category A Listed Building LB28034). Looking north-east;
- Figure 8.7 Existing view from Newhailes Shell Grotto (Category B Listed Building LB10915);
- Figure 8.8 Section from Newhailes Shell Grotto (Category B Listed Building LB10915) and Newhailes House (Category A Listed Building 10911) towards Arthur's Seat.

## 8.2 List of Appendices

- Appendix 8.A Historic Environment Assets within the Inner Study Area;
- Appendix 8.B Historic Environment Assets within the Outer Study Area;
- Appendix 8.C Geophysical Survey.

## 8.3 Introduction

This chapter assesses the potential impacts of the proposed development on historic environment assets. This chapter was written by CFA Archaeology Ltd (CFA).

The assessment was conducted in accordance with the Chartered Institute for Archaeologists' 'Code of Conduct' (CIfA 2014a) and 'Standard and Guidance for Historic Environment Desk-Based Assessment' (CIfA 2014b), and with reference to the relevant statutory and planning framework for the historic environment.

## 8.4 Legislation, Policy and Guidance

### 8.4.1 National Legislation and Policy

***National Planning Framework for Scotland 3 (NPF3) (The Scottish Government 2014a)***

NPF3 is government policy on how nationally important land use planning matters should be addressed across the country (Paragraph 1). NPF3 provides the strategic spatial policy context for decisions and actions by the Government and its agencies, and brings together Government plans and strategies in economic development, regeneration, energy, environment, climate change, transport and digital infrastructure to provide a coherent vision of how Scotland should evolve over the next 20 to 30 years.

One of the main elements of the spatial strategy set out in NPF3 is the intention to respect, enhance and make responsible use of Scotland's cultural assets (Section 4: A Natural Resilient Place) and the framework recognises the contribution made by our historic environment to our economy, cultural identify and quality of life. Planning authorities are required to consider NPF3 when preparing development plans, and it is a material consideration in the determination of planning applications.

***Scottish Historic Environment Policy (SHEP) (Historic Scotland 2011)***

This sets out the Scottish Ministers' policies for the historic environment, and provides policy direction for Historic Environment Scotland (HES) and a framework that informs the day to day work of a range of organisations that have a role and interest in managing the historic environment. Through the implementation of the SHEP, Scottish Ministers wish to achieve three outcomes for Scotland's historic environment:

- "*That the historic environment is cared for, protected and enhanced for the benefit of our own and future generations;*

- *To secure greater economic benefits from the historic environment;*

- *That the people of Scotland and visitors to Scotland value, understand and enjoy the historic environment*."

***Scottish Planning Policy (SPP) (The Scottish Government 2014b)***

In SPP (para 136) the historic environment is recognised as a key cultural and economic asset and a source of inspiration that should be seen as integral to creating successful places. Culture-led regeneration can have a profound impact on the well-being of a community in terms of the physical look and feel of a place and can also attract visitors, which in turn can bolster the local economy and sense of pride or ownership.

***Key Policy Principles Set Out in SPP are to:***

- "*Promote the care and protection of the designated and non-designated historic environment (including individual assets, related settings and the wider cultural landscape) and its contribution to sense of place, cultural identity, social well-being, economic growth, civic participation and lifelong learning;*

- *Enable positive change in the historic environment which is informed by a clear understanding of the importance of the heritage assets affected and ensure their future use. Change should be sensitively managed to avoid or minimise adverse impacts on the fabric and setting of the asset, and ensure that its special characteristics are protected, conserved or enhanced*."

Historic environment resources include sites with statutory and non-statutory designations, as defined in Scottish Planning Policy (SPP). Those relevant in the context of the proposed development include the following:

***Scheduled Monuments***

Under the Ancient Monuments and Archaeological Areas Act 1979 ('1979 Act'), the Scottish Ministers are required to compile and maintain a Schedule of monuments considered to be of national importance. The consent of the Scottish Ministers is required before any works are carried out which would have the effect of demolishing, destroying, damaging, removing, repairing, altering, adding to, flooding or covering up a Scheduled Monument (SM).

***Listed Buildings***

Under the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 ('1997 Act') (Scottish Government 1997), the Scottish Ministers are required to compile a list of buildings of special architectural or historic interest. Such buildings are classified into Categories A, B and C, in decreasing order of importance. Planning authorities and the Scottish Ministers are required to have special regard for the desirability of preserving Listed Buildings and their settings, and any features of special architectural or historic importance they possess.

***Inventory Gardens and Designed Landscapes***

SPP (Para 148) states that planning authorities should protect and, where appropriate, seek to enhance gardens and designed landscapes included in the Inventory of Gardens and Designed Landscapes and designed landscapes of regional and local importance.

***Inventory Historic Battlefields***

Under the provisions set out in Section 32B(1) of the Ancient Monuments and Archaeological Areas Act 1979 HES has compiled an Inventory of Historic Battlefields which it considers to be of national importance. The inventory provides information on those battlefields which are provided with statutory protection, to enable their sustainable management through the planning system. The impact of a development on a Historic Battlefield listed in The Inventory of Historic Battlefields (published by HES) is a material consideration in the determination of a planning application.

SHEP recommends that local development plans and, where appropriate, supplementary planning guidance, should set out policies and criteria that apply to the protection, conservation and management of historic battlefields.

***Conservation Areas***

Under the Planning (Listed Buildings and Conservation Areas) Scotland Act 1997 Act, areas of special architectural or historic interest can be designated by local authorities as Conservation Areas, the character or appearance of which it is desirable to preserve or enhance. SPP (para 143) states that proposals for development within Conservation Areas and proposals outwith which will impact on its appearance, character or setting, should preserve or enhance the character and appearance of the Conservation Area.

***Other Historic Environment Interests***

There is a range of other non-designated archaeological sites, monuments and areas of historic interest, including other (non-inventory) battlefields, historic landscapes, other (non-inventory) gardens and designed landscapes, woodlands and routes such as drove roads that do not have statutory protection. Sites without statutory protection are curated by the local planning authority, and SPP and PAN 2/2011 provide national planning policy guidance and advice on the treatment of such resources.

***Planning Advice Note (PAN) 2/2011 Planning and Archaeology (The Scottish Government 2011a)***

PAN 2/2011 advises that, in determining planning applications, planning authorities should take into account the relative importance of archaeological sites (para 5). It also notes that in determining planning applications that may impact on archaeological features or their setting, planning authorities may on occasion have to balance the benefits of development against the importance of archaeological features (para 6). The desirability of preserving a monument (whether scheduled or not) is a material consideration and the objective should be to ensure the protection and enhancement of monuments by preservation in situ, in an appropriate setting. When preservation in situ is not possible, recording and / or excavation followed by analysis and publication of the results may be an acceptable alternative (para 14).

### 8.4.2 Regional and Local Policy

***Edinburgh City Local Plan 2010***

Policy Env3 - Listed Buildings - Setting states: "*Development within the curtilage or affecting the setting of a listed building will be permitted only if not detrimental to the appearance or character of the building, or to its setting*".

Policy Env 7 - Historic Gardens and Designed Landscapes states: "*Development will not be permitted which would have a detrimental impact on the character of a site recorded in the Inventory of Gardens and Designed Landscapes, upon important views to, from and within the site, or upon component features which contribute to its value*."

Policy Env 8 - Protection of Important Remains states: "*Development will not be permitted which would: a) adversely affect a Scheduled Monument or other nationally important archaeological remains, or the integrity of their settings*

*b) Damage or destroy archaeological remains of more local significance which the Council considers should be preserved in situ*."

Policy Env 9 - Development of Sites of Archaeological Significance states: "*Planning permission will be granted for development on sites of known or suspected archaeological significance if it can be concluded from information derived from a desk-based assessment and 'walk-over' survey and, if requested by the Council, a field evaluation, that either:*

*a) No archaeological remains are likely to be affected by the development;*

*b) Any archaeological remains will be preserved in situ and, if necessary, in an appropriate setting;*

c) *The benefits of allowing the proposed development outweigh the importance of preserving the remains in situ. The applicant will then be required to make provision for archaeological excavation, recording, and analysis, and publication of the results before development starts, all to be in accordance with a programme of works agreed with the Council*."

***Edinburgh Local Development (Second Proposed Plan) (currently under examination by Reporters at DPEA)***

Policy Env 3 Listed Buildings - Setting states: "*Development within the curtilage or affecting the setting of a listed building will be permitted only if not detrimental to the architectural character, appearance or historic interest of the building, or to its setting*."

Policy Env 6 Conservation Areas - Development states: "*Development within a conservation area or affecting its setting will be permitted which: a) preserves or enhances the special character or appearance of the conservation area and is consistent with the relevant conservation area character appraisal*."

Policy Env 7 Historic Gardens and Designed Landscapes states: "*Development will only be permitted where there is no detrimental impact on the character of a site recorded in the Inventory of Gardens and Designed Landscapes, or upon component features which contribute to its value. Elsewhere, adverse effects on historic landscape features should be minimised. Restoration of Inventory sites and other historic landscape features is encouraged*."

Policy Env 8 Protection of Important Remains states: "*Development will not be permitted which would: a) adversely affect a scheduled monument or other nationally important archaeological remains, or the integrity of their setting b) damage or destroy non-designated archaeological remains which the Council considers should be preserved in situ*."

Policy Env 9 Development of Sites of Archaeological Significance states: "*Planning permission will be granted for development on sites of known or suspected archaeological significance if it can be concluded from information derived from a desk-based assessment and, if requested by the Council, a field evaluation, that either: a) no significant archaeological features are likely to be affected by the development or b) any significant archaeological features will be preserved in situ and, if necessary, in an appropriate setting with provision for public access and interpretation or c) the benefits of allowing the proposed development outweigh the importance of preserving the remains in situ.*

*The applicant will then be required to make provision for archaeological excavation, recording, and analysis, and publication of the results before development starts, all to be in accordance with a programme of works agreed with the Council*."

## 8.5 Consultation

Table 8.1 below summarises all consultation undertaken which relates to Historic Environment issues. A more detailed set of responses to the EIA Scoping Opinion specifically is presented in Appendix 4.B of this ES.

**Table 8.1: Summary of Consultation Responses Regarding Historic Environment Issues**

| Consultee | Issues Raised | Response |
|---|---|---|
| John Lawson, City of Edinburgh Council Archaeologist<br>Consultee Workshop (1st March 2016) | Raised concern about the loss of historic mine workings (known as bell pits) dating from the 16th and 17th centuries. Also noted that on adjacent development sites more mine shafts had been discovered than had been anticipated. | Geophysical survey has been undertaken in order to further understand the nature of any buried archaeological remains within the site. Further consultation was undertaken with John Lawson with regard to mitigation requirements. |
| | Questioned whether there had historically been a mill situated at the north-eastern corner of the site. | Cartographic sources show that the former mill site lies outwith the proposed development area. |
| | Encouraged the inclusion of some heritage interpretation, artwork or similar to be included within the masterplan. | This can be considered during the detailed design stage if appropriate. |
| | Noted that an archaeological evaluation would be required for the site. | Further consultation was undertaken with John Lawson (see below) |
| Steven Robb (Historic Environment Scotland)<br>Consultee Workshop (1st March 2016) | Noted that the landscape mitigation along the boundary of Newhailes Inventory Garden and Designed Landscape should be enhanced. Suggested that National Trust for Scotland (NTS) should be involved in discussions about this landscaping. | Landscaping along the Newhailes boundary was enhanced following this workshop, and following a meeting with NTS (see below). |

| Consultee | Issues Raised | Response |
|---|---|---|
| | A long-term management plan would be required for the various 'open-space' proposals of the masterplan. | Refer to masterplan document. |
| | Stated that the relationship between Brunstane House and its historic walled garden is not celebrated enough, and should be more implicit in street layouts and other features of the masterplan. | The masterplan has been refined since this time. The street pattern references the former location of the walled garden and the ponds located at its south-western edge through the inclusion of a tree-lined street, corresponding to the south-western edge of the walled garden, and the inclusion of a small pond at a similar location to the former ponds of the walled garden. |
| Meeting and site visit at Newhailes with representatives from National Trust for Scotland (NTS).<br>(15th March 2016) | Stated the importance of views out from the Shell Grotto, including the 'borrowed landscape' feature of Arthur's Seat.<br>Stated the importance of views out from Newhailes House across the proposed development area. | Following the meeting with NTS adjustments to the masterplan design included the addition of view lines between both Newhailes House and Newhailes Shell grotto and Arthur's Seat. |
| Historic Environment Scotland Scoping Opinion<br>(Received 17th March 2016) | Considers that the proposals are likely to have significant and detrimental impacts upon:<br>• Brunstane House (Category A Listed Building LB28034);<br>• Newhailes House with Gatepiers (Category A Listed Building LB10911);<br>• Newhailes House, Stables (Category A Listed Building LB10916); and | Refer to Appendix 4.B. |

| Consultee | Issues Raised | Response |
|---|---|---|
| | • Newhailes (Inventory Garden and Designed Landscape | |
| Edinburgh Urban Design Panel Meeting (30th March) | The draft masterplan proposal was presented to the meeting, who made the following recommendations: | N/A |
| | The design response to historic environment features within the area, including the SMs, Brunstane House and the Newhailes Shell Grotto were supported, and should remain within the proposals. | No action required. |
| | Further consideration should be given to the landscape setting of Brunstane House and its relationship with the Scheduled Monument. | A 2ha park, Brunstane Park, echoes the tree-lined parkland boundary from historic mapping to create a setting for Brunstane House and the Scheduled Monument. |
| | Further consideration should be given to the design of the visual link between Brunstane House and Brunstane Green (i.e. SM4112), and also to the configuration of Brunstane Green. | A 17.5m wide open space, Brunstane Walk, connects Brunstane Green with Brunstane Park. This space is on the axis between Brunstane House and the high point of the Scheduled Monument. |
| | Further consideration should be given to the design relationship of the proposed development with the setting of Newhailes House, and to the landscape treatment at the eastern site boundary. | Additional view corridors have now been added to the design, to enable views between the Shell Grotto and Arthur's Seat, and between Newhailes House and Arthur's Seat. |
| | Consideration should be given to using sectional information to assess the relationship between the masterplan and the landscape. | Sectional information for the views between the Shell Grotto and Arthur's Seat and between Newhailes House and Arthur's Seat is presented as Figure 8.8. |

| Consultee | Issues Raised | Response |
|---|---|---|
| Meeting with John Lawson (City of Edinburgh Council Archaeologist) regarding mitigation requirements (6th April 2016) | John Lawson noted that he would require a geophysical survey of the site boundary to be carried out in advance of the submission of the EIA. A 10% archaeological evaluation (trial trenching) would also be required, but could be undertaken on a phase-by-phase basis in advance of the construction of each phase of the development. | A geophysical survey has been carried out. The results are included in Appendix 8.C. The requirement for trial trenching evaluation is identified as a mitigation requirement in Section 8.8.2. |

## 8.6 Assessment Methodology

### 8.6.1 Study Area

The study area is comprised of two distinct parts:

- The Inner Study Area, which comprises the site, and covers an area of 54.6 hectares. The extent of this area is shown on Figure 8.1. The potential for direct impacts resulting from the construction of the proposed development is considered for all heritage assets within this area.

- The Outer Study Area, which extends 1km from the site. The Outer Study Area was used for the identification of additional heritage assets whose settings may be impacted by the proposed development (the Inner Study Area is also included within this). The Outer Study Area and the locations of these assets are shown on Figure 8.2.

### 8.6.2 Desk-Based Assessment

Details of the locations and extents of Scheduled Monuments, Listed Buildings, Conservation Areas, Inventory Gardens and Designed Landscapes and Inventory Historic Battlefields in GIS were downloaded from HES Spatial Data Warehouse (HES 2016a).

Details on the character and condition of known heritage assets within the site was obtained from the HES online archive (Canmore) (HES 2016b).

Ordnance Survey (OS) maps and other early maps held by the Map Library of the National Library of Scotland were examined, to provide information on assets of potential heritage value and on historic land-use development.

The online Historic Land-Use Assessment Data for Scotland maps (HLAMap), maintained by HES (HES 2016c) was consulted for information on the historic land use character of the proposed development.

The Scottish Palaeoecological Archive Database (SPAD) (Coles *et al.* 1998) which records the distribution of known sites across Scotland, was consulted for information on sites that may provide palaeoenvironmental and palaeoecological data within the site.

Reports of earlier archaeological and historic environment investigations carried out within, and in the vicinity of the site were consulted (Rennie 2015, Tweedie 2015; Wright 2015).

Material held by the National Archives of Scotland (NAS) regarding Brunstane House and Estate was consulted. This included consultation of signatures of the lands of Brunstane (NAS references SIG/43/56, SIG1/60/19; SIG1/60/30 & SIG/1/6/13), a plan of the estate of Brunstane (Lesslie 1764), and a series of letters from the Duke of Lauderdale and architect William Adam concerning plans for works at Brunstane (NAS References GD29/1897/5; GD/29/1897/6; GD/29/1897/7; GD/29/1897/8; and GD/29/1897/9).

Other bibliographic sources containing information with regard to either the Brunstane Estate, or the surrounding area (Baird 1898; Brown 2012; Coventry 2006; Milne 1893; White 1990; and Whyte 1792), were also consulted.

### 8.6.3 Field Survey

A walkover field survey of the proposed development site was undertaken as part of a baseline survey in 2015 (Rennie 2015). A further site visit was carried out on 22nd March 2016 to gain an understanding of the present layout of the site and to assess the potential impacts of the proposed development. Visits to heritage assets in the wider area were also undertaken, in order to assess their baseline settings and inform the assessment of potential impacts on their settings.

### 8.6.4 Geophysical Survey (see Appendix 8.C)

A geophysical survey of the proposed development site was undertaken in May 2016 in order to locate and characterise anomalies of possible archaeological interest within the proposed development area. This work was carried out in accordance with a Written Scheme of Investigation (WSI) agreed in advance with the City of Edinburgh Council (CEC) Archaeologist and Historic Environment Scotland (HES), who granted Section 42 consent for survey over the Scheduled Monuments.

A Bartington Grad601-2 magnetic gradiometer was used for the survey, with the data recorded in 20m x 20m grids. Readings were taken on the 100nT range (0.1 nT sensitivity) at 0.25m intervals on profiles spaced 1m apart and grid points set out and tied –in using a VRS RTK GNSS system to better than 0.05m accuracy.

The results of the geophysical survey are presented as Appendix 8.C and summarised in Section 8.7.

### 8.6.5 Assessment of Impacts: Methodology

The assessment of potential impacts considers:

- *Direct Impacts*: these occur when the construction of one or more elements of the proposed development would cause a physical change to the baseline condition of a heritage asset within the Inner Study Area. Direct impacts arising from construction activities are generally permanent and long-term;

- *Indirect Impacts (Impacts on Setting):* these can occur when the presence of features of the proposed development affect the settings of heritage assets, for example, when elements of the proposed development are present in important views of or from heritage assets in the vicinity of the proposed development. Permanent, long-term impacts on setting can arise as a consequence of new buildings erected in their vicinity and other changes associated with a proposed development, such as highway realignments, lighting, and landscaping. Temporary, short or medium term indirect impacts can result from construction related activities, such as the erection of safety fencing and screening hoardings, the use of cranes and other plant or the establishment of storage compounds;

- Cumulative impacts and impact interactions: these impacts occur through either the interaction between individual assessment topics included within the EIA, or from the combined effects resulting from the impacts of several developments which may not be significant individually, but together may result in significant effects;

- The assessment of impacts utilises the standard assessment criteria which have been adopted throughout this Environmental Statement (ES) (see Chapter 4 of this ES). Each impact is categorised as either adverse or beneficial.

***Approach to Assessment of Indirect Impacts (Impacts on Setting)***

The assessment of impacts on setting, set out below, follows guidance provided in 'Managing Change in the Historic Environment: Setting' (Historic Scotland 2010).

The guidance notes that: *"If proposed development is likely to impact on a setting, an objective written assessment should be prepared by the applicant to inform the decision-making process. The conclusions should take into account the significance of the historic asset and its setting and attempt to quantify the extent of any detrimental impact. The methodology and level of information should be tailored to the circumstances of each case".*

The guidance defines setting as *"the way in which the surroundings of a historic asset or place contribute to how it is experienced, understood and appreciated."* (para 2.1) and notes that that visual impacts alone do not constitute an unacceptable impact on heritage value: "*An understanding of the impact of a proposed change on setting should not be confined to whether key views to and from the historic asset or place are interrupted, but should also assess whether the proposed change would dominate or detract in a way that affects our ability to understand and appreciate the historic asset"* (para 4.13).

SHEP recognises that *"The protection of the historic environment is not about preventing change. Ministers believe that change in this dynamic environment should be managed intelligently and with understanding, to achieve the best outcome for the historic environment and for the people of Scotland. Such decisions often have to recognise economic realities"* (para 1.8). The key policy principles in SHEP, to ensure the protection and enhancement of the historic environment, are set out in paras 1.14 and 1.15. The criteria guiding decisions made under the directives in SHEP and SPP are set out in the Annexes to SHEP; those that are applicable in this assessment are: the cultural significance of Scheduled Monuments (Annex 1); the special interest of Listed Buildings (Annex 2). Consideration is also given to the 'values' of gardens and designed landscapes.

The assessment follows the guidance, and adopts the following three-stage approach:

- Stage 1: identify the historic assets that might be affected by a proposed change;
- Stage 2: define the setting by establishing how the surroundings contribute to the ways in which the historic asset or place is understood, appreciated and experienced;
- Stage 3: assess how any change would impact upon that setting. (SPP6.1; Section 4.1).

***Assessment Criteria***

Adopting this approach, the following tabulated criteria are employed in the assessment that follows. The sensitivity of the asset (Table 8.2) and the magnitude of the predicted impact (Table 8.3) are used to inform an assessment of the significance of the predicted effect (Table 8.4).

The sensitivity to change of historic environment assets reflects the relative weight given to them in SPP and SHEP. Table 8.2 summarises the relative sensitivity of historic environment assets that are relevant to this assessment.

**Table 8.2: Sensitivity of Heritage Assets**

| Sensitivity of Asset | Definition / Criteria |
|---|---|
| High | Sites of national importance, including:<br>• Scheduled Monuments and sites proposed for scheduling<br>• Category A Listed Buildings<br>• Inventory Gardens and Designed Landscapes<br>• Inventory Historic Battlefields |
| Medium | Sites of regional importance, including:<br>• Archaeological sites and areas of distinctive regional importance<br>• Category B Listed Buildings<br>• Conservation Areas |
| Low | Sites of local of importance, including:<br>• Archaeological sites of local importance<br>• Category C Listed Buildings<br>• Unlisted historic buildings and townscapes with local (vernacular) characteristics |
| Negligible | Sites of little or no importance, including:<br>• Artefact find-spots<br>• Unlisted buildings of minor historic or architectural interest<br>• Poorly preserved examples of particular types of features |

Magnitude of impacts (Table 8.3) are assessed in the categories Major, Moderate, Minor and Negligible, using the definitions adopted throughout the ES.

**Table 8.3: Magnitude of Impacts**

| Level of Magnitude | Definition |
|---|---|
| Major | Considerable impact (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards. |
| Moderate | Limited impact (by extent, duration, or magnitude) which may be considered significant. |
| Minor | Slight, very short or highly localised impact of no significant consequence. |
| Negligible | No significant impacts to an environmental resource or receptor. |

Where adverse or beneficial impacts are identified their significance is determined using the criteria adopted throughout the ES and set out in the Significance Matrix (Table 8.4) below.

**Table 8.4: Significance of Impacts**

| Sensitivity of Asset ▼ | Magnitude of Impact► | | | |
|---|---|---|---|---|
| | **Major** | **Moderate** | **Minor** | **Negligible** |
| **High** | Major | Major | Moderate | Minor |
| **Medium** | Major | Moderate | Minor | Negligible |
| **Low** | Moderate | Minor | Negligible | Negligible |
| **Negligible** | Minor | Negligible | Negligible | Negligible |

## 8.7 Baseline Conditions

### 8.7.1 Inner Study Area

***Prehistoric***

A circular feature (**2**), visible as a cropmark on aerial photography, has been interpreted as a 'prehistoric domestic and defensive enclosure' by HES, is designated as a Scheduled Monument (SM4112) of national importance, and is therefore considered to be of high sensitivity.

Research carried out into the former designed landscape of Brunstane House (Tweedie 2015) found that Lesslie's Plan of the Estate of Brunstane (1764) marks a circular feature at this location, outlined in red, which is used elsewhere on his plan to indicate the locations of walls.

Whilst Lesslie's Plan provides no indication of function, the gardens of Brunstane House are described in some detail in an account of the parish of Liberton (Whyte 1792), where it is noted that: *"on the north side of the [walled] garden is a pretty circular mount, about the circumference of which there has been a broad gravel walk. It was formerly surrounded with water; and there could be no access to it, except by a boat or a bridge."* It seems probable that the scheduled site is the remains of this mount and that the mount functioned as a viewing platform to afford views of the House, with the City of Edinburgh and Arthur's Seat visible in the distance, and also towards North Berwick Law. The feature is visible on the results of the geophysical survey (Appendix 8.C) but only as a weak response, suggesting that the ditch has been severely truncated by modern ploughing.

***Medieval***

A rectilinear enclosure (**1**), visible as a cropmark on aerial photography, is located at the western edge of the site. The moat would originally have extended further to the south-west, outwith the inner study area. The cropmark is believed to indicate the location of part of a medieval moat, which would have defined a high-status medieval defended residential settlement.

The location of the former moat, which is visible as a cropmark, and is visible in the results of the geophysical survey, is designated as a Scheduled Monument (SM10580), of national importance, and is considered to be of high sensitivity.

***Post-Medieval***

Brunstane House is situated outwith, but to the immediate west of the Inner Study Area. The house is a Category A Listed Building (LB28034). The House dates from at least 1639, but settlement of the manor of Brunstane, originally known as Gilbertoun, is known since at least 1373.

Brunstane House, which is situated just outwith the proposed development area, was originally situated within a wider area of gardens and designed landscape (see Tweedie 2015 for a detailed historic landscape assessment of the gardens and designed landscape). Figure 8.1 provides an indication of the original full extent of the gardens and designed landscape (**22**) as shown on Roy's Military Survey map (1747-55) and a detailed plan of the estate of Brunstane (Lesslie 1764).

The gardens appear to have had two main known redesigns, firstly during the 1670s according to plans by architect Sir William Bruce, and the Duke of Lauderdale, and secondly according to designs by William Adam at a date after 1733, when the property was probably owned by Lord Milton. Details of the first layout are unclear, but some brief information is available in correspondence from the Duke of Lauderdale to William Bruce, the key points being that the garden was situated primarily to the south-east of the House, and that the view towards the sea (i.e. the Firth of Forth) and Fife was considered important by Lauderdale. Gardens at this time were usually formal, with a symmetrical design, and the garden at Brunstane was most probably no exception. Roy's Military Survey (1747-55) indicates a largely symmetrical layout.

The second layout of the garden is known in more detail, not least due to the detailed plan of the estate of Brunstane (Lesslie 1764), and a textual description contained within an account of the parish of Liberton (Whyte 1792), which is quoted in full in Appendix 8.A.

The main built feature was the rectangular walled garden (**20**) to the south-east of the House. The plan shows a symmetrical layout of paths within the garden, and an area of woodland / orchards on the south-western edge of the walled garden (both within and outside the wall). Both the plan and description refer to two ponds situated at the southern end of the garden, with a building, or summerhouse situated on an artificial mount adjacent to the pond. The plan shows an additional pond (**21**) to the immediate north-east of the walled garden, from which an outflow runs in a generally south-easterly direction.

To the north-east of the walled garden (**20**), a circular feature (**2**) is marked on the plan, corresponding to the location of the cropmark which has been designated a Scheduled Monument (SM4112). Whyte's description of the gardens at Brunstane states "On the north side of the garden is a pretty circular mount, about the circumference of which there has been a broad gravel walk. It was formerly surrounded with water; and there could be no access to it, except by a boat or a bridge." It is likely that the cropmark has been misinterpreted as a prehistoric domestic and defensive enclosure, and should instead be understood as the remains of a circular viewing mount, surrounded by a ditch or pond, the mound affording views of the House, with the City of Edinburgh and Arthur's Seat visible in the distance, and also views towards North Berwick Law. Any remains of the former walled garden (**20**), or the pond (**21**) are considered to be of low sensitivity. The circular cropmark feature (**2**) is designated as a Scheduled Monument, and is therefore considered to be of high sensitivity. The results of the geophysical survey suggest that the ditch surrounding the mound has been severely truncated by modern ploughing.

Four buildings (**11**, **12**, **15** & **16**) of unknown function have been recorded from historic cartographic sources. Surface traces of one building (**16**) may survive, adjacent to the farm track which now traverses the proposed development area, but no upstanding remains of the other buildings (**11**, **12** & **15**) are visible. Any surviving elements of the four buildings (**11**, **12**, **15** & **16**) are considered to be of unknown, but likely no more than low sensitivity.

A further range of buildings (**13**) was formerly located at the southern edge of the proposed development, but they were destroyed by the construction of the Lothian Railways railway embankment. The former location of these buildings is considered to be of negligible sensitivity.

A well (**10**) named as St Ann's Well is first marked on Lesslie's 1764 plan of Estate of Brunstane. It is no longer named when it is simply annotated *"well"* on the First Edition OS map (1853). The location of the well is considered to be of negligible sensitivity.

The area to the north of the Brunstane Burn, which falls within the proposed development area is marked on the First Edition OS map (1854) as the 'Glen Nurseries', and is later known as 'Glen Market Gardens', the location of a single building (**14**) falls within the proposed development area. Due to the overgrown nature of the area, it is unclear whether any remains of the building survive; the function of the building is also unknown. The remains of the building are considered to be of unknown, but likely no more than low sensitivity.

Canmore records an area of rig and furrow cultivation remains, and some former field boundaries (**4**) which are visible on oblique aerial photography. The field is now in use as modern arable agricultural land and no upstanding remains of these features survive. The former location of the field boundary and rig and furrow cultivation is considered to be of negligible sensitivity.

***Industrial Features***

Coal mining activity within the site, and in the wider area, is known from the late medieval period onwards. A plan of the estate of Brunstane attributed to Slezer and thought to date from the 1690s marks a series of 'pond like' features (**6**) running in a generally north-east to south-west orientation across the eastern part of the Inner Study Area. A similar set of features is shown on other cartographic sources, and aerial photography, and in the results of the geophysical survey (Appendix 8.C). These features correspond with water holes or sits, which are considered by IKM to be evidence of mine working collapse noted on historical maps (see Chapter 10).

Similarly, mine abandonment plans indicate that a feature (**5**) identified from aerial photography within the same area, and recorded within the Canmore database as a possible shaft, is most likely to be another water hole or sit (see Chapter 10). This feature is also visible as an anomaly in the results of the geophysical survey (Appendix 8.C).

A second linear arrangement of features (**3**) identified as cropmarks on aerial photography, and visible within the results of the geophysical survey, follows a similar alignment within the western part of the site. An old shaft (**8**) lies to the immediate east of this linear distribution of mining related features, and is discussed further in Chapter 10. The archaeological remains of any mining related features are considered to be of negligible sensitivity.

The East Coast Main Line (ECML) railway traverses the Inner Study Area. A bridge (**19**) close to the centre of the Inner Study Area allows agricultural traffic to cross the railway, and is considered to be of negligible sensitivity. Adjacent to the bridge, on the eastern side of the railway, a small square building (**17**) was marked on the 1934 Ordnance Survey map. The building was most probably associated with the railway and bridge, and no upstanding remains of it are now visible. The location of the former building is considered to be of negligible sensitivity.

At the northern edge of the Inner Study Area a railway bridge (**18**) enables the railway to cross the Brunstane Burn, and creates a pedestrian underpass beneath the railway. The railway bridge is first shown on the 1854 edition of the OS map, and is considered to be of low sensitivity.

Only the parapet of a former railway bridge (**7**) close to the settlement of Wanton Walls now survives. It is considered to be of negligible sensitivity.

A former quarry (**9**) located at the north-eastern corner of the Inner Study Area is considered to be of negligible sensitivity.

### 8.7.2 Assessment of Archaeological Potential of the Inner Study Area

There is no evidence for prehistoric activity within the proposed development site. Since it is considered that Scheduled Monument SM4112 (Asset 2) has been misinterpreted as a prehistoric enclosure, and should instead be understood as an element of the gardens formerly associated with Brunstane House. There is little evidence for prehistoric activity known from the wider area, with the exception of sites identified as cropmarks on aerial photography, and assumed to be of prehistoric date.

A ring ditch cropmark to the immediate south, in the Newcraighall North site, had been suggested to be of prehistoric date, but when tested was found in fact to be related to mining activity (Blair 2014).

The medieval settlement of Gilberstoun was situated in the vicinity of the proposed development area, but its precise location remains unclear, although it may have been situated at the location of Brunstane House, which originally comprised a moated settlement, the remains of which are now visible as a cropmark, and were detected by the geophysical survey (SM10580, Asset 1).

The proposed development area has formed part of the Brunstane Estate since at least the mid-17th century, with the south-western part of the site originally comprising gardens associated with the house. The gardens had largely vanished by 1895, when the OS map shows only a small area of parkland to the north-east and south-east of the house. No upstanding features of the former gardens are now visible, the exception being a slight raise in topography which indicates the location of SM4112 (Asset 2). A number of features identified within the proposed development area are believed to relate to coal mining activities within the area. Mining activity is likely to have caused disturbance to any buried archaeological deposits which may have been present. The proposed development has been used as agricultural land throughout the 20th century.

The geophysical survey of the proposed development area identified features previously recorded by the desk-based assessment work, but recorded few other clearly identifiable features, with the exception of some possible ditch and enclosure features.

Thus, whilst it appears from the geophysical survey that some additional buried archaeological features may be present within the proposed development site, the remains are not dense or complex. The geophysical survey does not suggest that any buried archaeological remains of more than local significance will be found within the proposed development area.

### 8.7.3 Outer Study Area

A total of two Scheduled Monuments, three Category A Listed Buildings, one Inventory Garden and Designed Landscape, one Inventory Historic Battlefield, 24 Category B Listed Buildings, one Conservation Area and 18 Category C Listed Buildings are located within the Outer Study Area. The locations of these are shown on Figure 8.2 along with the Zone of Theoretical Visibility (ZTV) model for the proposed development.

The ZTV shows that, taking into account screening resulting from mature trees and intervening existing buildings, there is limited predicted visibility of the proposed development.

The baseline settings of the heritage assets within the Outer Study Area are described in Appendix 8.B.

## 8.8 Proposed Mitigation

The emphasis in the Scottish Government's Planning Advice Note (PAN) 2/2011: Planning and Archaeology is the preservation of important remains in situ where practicable and by recording, excavating and analysing where preservation is not possible.

### 8.8.1 Design Evolution / In-Built Mitigation

The design of the proposed masterplan has been informed by the conclusions of the following investigations related to historic environment issues:

- Wright, A. (2015) *Report on the historic setting and architectural development of Brunstane House*;
- Tweedie, H. (2015) *Brunstane House, City of Edinburgh (Category A Listed Building No. 28034) Historic Landscape Assessment*. CFA Report No. 3289;
- Rennie, C. (2015) *Brunstane, City of Edinburgh: Archaeological Desk-Based Assessment. Project 4044. Guard Archaeology*.

Based upon the results of this work, and ongoing historic environment advice during the masterplanning process, a number of in-built mitigation measures are included within the proposed masterplan design, as follows:

- The two Scheduled Monuments (SM10580 & SM4112) will be preserved in situ, within areas of parkland / open-space within the proposed masterplan;

- Views from Brunstane House LB28034 towards the sea are a key element of the House's setting, mentioned in correspondence from the Duke of Lauderdale with his architect William Bruce. The masterplan contains a linear park and residential street alignment 'Lauderdale View' which ensures that this view can still be obtained. The width of Lauderdale View (30m) has been determined following examples from the Edinburgh New Town where roads of this width enable good views out towards the sea;

- Based upon the findings of the research presented in the Historic Landscape Assessment (Tweedie 2015), Scheduled Monument SM4112 is believed to be the remains of a viewing platform, designed in part to enable good views north-west towards Brunstane House, with Arthur's Seat beyond. This view has also been incorporated into the masterplan design. From SM4112 views towards North Berwick Law are also achievable, and these have also been respected in the masterplan design, through the inclusion of a road following this alignment;

- Newhailes House Category A Listed Building (LB10916) and its surrounding Inventory Garden and Designed Landscape are situated to the immediate east of the proposed development area. Views from the House, across the flower garden (currently being restored), and towards Edinburgh and Arthur's Seat in the distance form an important element of its setting, although currently mature trees at the edge of the designed landscape partially screen these views. The masterplan design includes a road which will retain a view corridor towards Arthur's Seat from the House;

- Newhailes Shell Grotto Category B Listed Building (LB10915) forms an important element of the Newhailes Inventory Garden and Designed Landscape. It was intentionally positioned to utilise the 'borrowed view' towards Arthur's Seat, when looking out from the grotto over the water features which were formerly positioned to the west of the grotto.

Although view towards Arthur's Seat cannot currently be readily appreciated due to the mature trees situated at this point within the Newhailes Inventory Garden and Designed Landscape, it forms a key element of the grotto's setting. The masterplan design includes a view corridor from the shell grotto towards Arthur's Seat;

- The street pattern of the proposed masterplan references the former location of the walled garden (**20**), and the ponds formerly located at its south-eastern end through the inclusion of a tree-lined street which follows the course of the south-western edge of the former walled garden, and the inclusion of a small pond at a similar location to the former ponds of the walled garden.

A geophysical (gradiometer) survey of the proposed development area has been undertaken, at the request of the CEC Archaeologist. The results of this survey provide additional insight into the potential of the proposed development area to contain buried archaeological deposits. The results of the geophysical survey will be used to inform the mitigation strategy should consent for the proposed development be granted.

### 8.8.2 Proposed Additional Mitigation Measures

The mitigation measures presented below take account of the planning guidance provided in Planning Advice Note (PAN) 2/2011: Planning and Archaeology, and offer various commitments for recording and ensuring that, where practical, upstanding sites and features are preserved intact to retain the present historic elements of the landscape.

All proposed mitigation presented in the following paragraphs will take place prior to, or during, the construction of the proposed development, on a phase-by-phase basis. All work will be conducted by a professional archaeological organisation, and the scope of works will be detailed in Written Scheme of Investigation(s) (WSI).

The WSI(s) will make provision for appropriate investigation, post-excavation analysis, and dissemination of the results of the mitigation works, as well as for archiving of the project materials and records. The WSI(s) will be subject to the approval of the CEC archaeology service. All works would be carried out in accordance with the relevant Chartered Institute for Archaeologists Standard and Guidance Documents (CIfA 2014c, 2014d & 2014e). Any future archaeological excavation works may require permission from The Coal Authority and would need to take cognisance of and mitigate for the potential risk from subsidence or collapse of mine workings.

***Avoidance of Features***

The two Scheduled Monuments within the proposed development area (Historic Environment Asset **1**, Scheduled Monument SM10580; and Historic Environment Asset **2**, Scheduled Monument SM4112) will be fenced off during construction activity to prevent accidental damage occurring to the remains.

***Recording, Excavation and Post-Excavation***

A programme of archaeological recording work will be agreed with the CEC Archaeologist, and set out in a WSI. The results of the geophysical survey will be used to inform the precise scope and detail of the proposed works, but they are likely to comprise archaeological trial trenching evaluation. Additional work in the form of either archaeological excavation, archaeological monitoring and recording (watching briefs), post-excavation analyses and publication of the results of the work may also be required.

The purpose of all archaeological works would be to provide a permanent archive record of any surviving remains in sufficient detail to record the date, function and character prior to their removal. Further post-excavation work may be required, depending on the results of this stage of mitigation.

***Construction Environmental Management Plan (CEMP)***

Guidelines will be written into the Construction Environmental Management Plan (CEMP) for use by all construction contractors, outlining the need to avoid causing unnecessary damage to known sites.

The CEMP will set out arrangements for calling upon retained professional support in the event that buried archaeological remains of potential archaeological interest (such as building remains, human remains, artefacts, etc.) should be discovered in areas not subject to archaeological monitoring. The guidance will make clear the legal responsibilities placed upon those who disturb artefacts or human remains. These arrangements will also be explained in toolbox talks presented by the retained archaeological organisation.

## 8.9 Identification and Evaluation of Key Impacts

### 8.9.1 Construction (Direct) Impacts

The assessment of impacts was carried out with reference to the final masterplan document which accompanies the application for planning permission.

Any ground-breaking activities associated with construction works have the potential to destroy heritage assets. Other construction activities, such as vehicle movements, soil and overburden storage and landscaping also have the potential to cause direct, permanent and irreversible impacts on heritage assets.

Appendix 8.A provides details on the residual direct effects on historic environment assets as a result of the proposed development, following the implementation of the scheme of mitigation as outlined above. The proposed scheme of mitigation will offset all predicted construction (direct) impacts.

### 8.9.2 Indirect Impacts

The presence of new development can have indirect impacts on the setting of historic environment sites in the wider landscape. In particular, there is a potential for elements of the new development to be present in views of and from Scheduled Monuments, Listed Buildings and other historic environment sites and areas in the vicinity of the site.

Consideration of the baseline settings of heritage assets within the Outer Study Area concluded that the following assets have settings which could be significantly affected by the proposed masterplan. Baseline photography, along with sketches of views from these locations are presented as Figures 8.3-8.8 and as Figures 7.8 & 7.10 in Chapter 7 of this ES:

- Brunstane, enclosure 250m E of (Scheduled Monument SM4112) (Figures 8.3 & 8.4);
- Brunstane, moated site 50m NNE of (Scheduled Monument SM10580);
- Brunstane House (Category A Listed Building LB28034) (Figures 8.5 & 8.6);
- Newhailes Inventory Garden and Designed Landscape, including Newhailes House (Category A Listed Building LB10911) (Figures 7.8 & 7.10 in Chapter 7; and Figure 8.8);
- Newhailes House, Shell Grotto (Category B Listed Building LB10915) (Figures 8.7 & 8.8).

Appendix 8.B details the findings of the assessment of indirect (operational) impacts upon the setting of historic environment assets within the Outer Study Area as a result of the proposed development. Those assets which were identified as having baseline settings which could be significantly affected by the proposed development (in Section 8.7.3 above) are discussed in detail below.

Residual effects of moderate significance are predicted upon one historic environment assets: Brunstane House (Category A Listed Building LB28034).

***Significant Residual Indirect (Operational) Effects***

*Brunstane House (Category A Listed Building LB28034)*

Brunstane House is currently situated within a small area of enclosed gardens, which in turn sit among agricultural land, with a modern housing estate to the north-west, west and south-west.

There are no upstanding elements of the designed landscape formerly associated with the house that can readily be appreciated, except the Brunstane Bridge (LB27939) which is situated some distance to the north-west, but is now separated from the house due to the intervening modern housing estate. The House is situated adjacent to a Scheduled Monument (SM10580), a cropmark of a moated enclosure which enclosed the medieval defended settlement which was the predecessor of Brunstane House. The relationship between the House and the Scheduled Monument will be unaffected by the proposed development. Views out from Brunstane House north-east towards the Firth of Forth are of historic importance, as they are mentioned in letters from the Duke of Lauderdale to his architect Sir William Bruce. The existing view in this direction is shown in Figure 8.5. Figure 8.6 presents a sketch of the view towards the Firth of Forth including the proposed development. Brunstane House cannot be readily appreciated from publicly accessible locations, and does not form a landmark feature within the wider townscape. The house is best appreciated from within immediate proximity, and when viewed from the south-east, and the location of viewing mound (SM4112), a view which is maintained as a street alignment within the proposed development.

The proposed development includes street alignments and view corridors (from the House towards the Firth of Forth, and from the probable viewing mount (SM4112) towards the House) to ensure that key views to and from the house remain appreciable, and therefore that the positioning of the House within the wider landscape can still be appreciated. An area of parkland surrounding the house will ensure that it continues to sit within an immediate surrounding area of non-urbanised landscape. It is therefore considered that the proposed development will have an effect of minor magnitude upon the setting of Brunstane House, resulting in an impact of moderate significance.

***Non-Significant Residual Indirect (Operational) Effects***

*Brunstane, enclosure 250m E of (Scheduled Monument SM4112)*

This site has been designated by HES as a domestic enclosure of likely prehistoric date. However, evidence found during cartographic and historical research (Tweedie 2015) suggests that this interpretation is probably incorrect and that the cropmark should be understood as the remains of a viewing mound which formed part of the designed landscape which formerly surrounded Brunstane House (LB28034).

The possible former viewing mound is preserved as a cropmark site, and is visible on the ground only as a slight change in the topography. The viewing mound was positioned to afford views of the House, with the City of Edinburgh and Arthur's Seat visible beyond the house (as shown in Figure 8.3), and this view is maintained as a street alignment within the masterplan (as shown in Figure 8.4). The other key view from the viewing mound towards North Berwick Law is also maintained as a street alignment within the masterplan. The effect of the proposed development upon the setting of the Scheduled Monument is considered, therefore, to be of negligible magnitude, resulting in an impact of minor significance.

*Brunstane, moated site 50m NNE of (Scheduled Monument SM10580)*

The Scheduled Monument of Brunstane moated site is preserved as a cropmark site with no upstanding elements, and therefore cannot be appreciated on the ground. HES notes that the monument is considered to be of national importance due to its *"potential to contribute to an understanding of the character and dynamics of medieval high-status defended settlement sites".* The moat originally enclosed the medieval defended settlement of Brunstane, which was later superseded by Brunstane House (LB28034), and the spatial relationship between the two sites therefore forms part of their settings. The rest of the surrounding area comprises a modern housing estate to the west, and agricultural land to the east, which contribute little to understanding of the situation of the moated site.

The proposed development will have no effect upon the relationship between the Scheduled Monument and Brunstane House. The Scheduled Monument cannot be appreciated on the ground, and will remain preserved within an area of parkland. Its potential to contribute to the understanding of medieval defended settlement sites will be unaffected by the proposed development. The impact upon the setting of the Scheduled Monument is therefore considered to be of negligible magnitude, resulting in an impact of minor significance.

*Newhailes Inventory Garden and Designed Landscape, including Newhailes House (Category A Listed Building LB10911)*

Newhailes Inventory Garden and Designed Landscape is recognised as an important and rare survival of an early to mid-18th century rococo landscape garden. The Category A Listed House forms the centre of the designed landscape. HES notes the exceptional survival of the interior decoration of the house as being of special interest. The north-western edge of the garden includes the walled gardens, a managed watercourse with waterfalls and a number of built features, including the shell grotto (LB10915) and the Tea House (LB13038). A raised terrace walk, known as 'Ladies Walk', crosses the parkland to the north of the House.

Currently the designed landscape is largely an enclosed setting, due to the mature trees which form its edges. The main appreciable view out from the designed landscape is across the parkland towards the Firth of Forth. Key views out from the house are to the north-east, over the Firth of Forth and towards Fife. Views from the house to the north-west, over the flower garden and towards Edinburgh and Arthur's Seat, form an element of the house's setting, albeit the views are currently limited due to intervening mature trees. The flower garden will soon be undergoing restoration. Figure 7.8a presents the existing view from the main door (first storey) of the house, towards the proposed development. Figure 7.8b shows the same view, with the proposed development.

Views towards Arthur's Seat will not be obscured by the proposed development, although the nature of the view will be changed by the construction of the proposed development. There are also key views towards the House from Sheep Park, the area of parkland to the north-east of the house. Views out from the parkland, including towards Arthur's Seat give a sense that the house is set within a rural area. Figure 7.10a presents the existing view from Sheep Park towards the proposed development area and Arthur's Seat (obscured by mature trees). Figure 7.10b includes the proposed development, and indicates that much of it will be screened by trees within the Newhailes GDL. The proposed development will have no effect upon views from Sheep Park towards Newhailes House.

The proposed development will not affect the ability to appreciate the relationship between the different elements of the designed landscape. Key views from the House and parkland, towards the Firth of Forth will be unaffected. The masterplan includes street alignments which maintain view corridors from the shell grotto (LB10915) and from Newhailes House (LB10916) towards Edinburgh and Arthur's Seat. It is therefore assessed that the proposed development would have an effect of would be of negligible magnitude, resulting in an impact of minor significance upon Newhailes GDL and Newhailes House (Category A Listed Building LB10911).

*Newhailes House, Shell Grotto (Category B Listed Building LB10915)*

The Newhailes shell grotto forms one element of the wider Newhailes Inventory Garden and Designed Landscape. The shell grotto survives in poor condition, and the water gardens which were formerly located to the north-west of the grotto are now filled in and overgrown. It is known from bibliographic sources that the water gardens and grotto are situated to utilise a 'borrowed landscape' view of Arthur's Seat, however, the grotto is currently situated within an area of mature woodland, which screens views out to the wider landscape, as shown in Figure 8.7.

The masterplan includes a view corridor which ensures that the view line between the shell grotto and Arthur's Seat would be retained. The proposed development will have no effect upon the understanding and appreciation of the shell grotto in relation to the other features of the Newhailes Inventory Garden and Designed Landscape. The proposed development would have an effect of minor magnitude upon the setting of the Newhailes Shell grotto, resulting in an impact of minor significance.

## 8.10 Cumulative Effects

The EIA Regulations require consideration of cumulative effects, which are those effects resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed development.

Broadly, there are two types of cumulative effects considered as part of the EIA process:

- The combined effects of interrelationships between individual assessment topics (for example noise, dust and visual impacts) on an individual or group of receptors. These are termed Type 1 Cumulative Effects. No potential combined effects have been identified resulting from the proposed development;

- The combined effects resulting from the impacts of several developments, which individually may or may not be significant, but when considered together may result in significant effects. These are termed Type 2 Cumulative. As identified in Chapter 15 of this ES, there are four development sites in the vicinity of the proposed development with the potential to have cumulative effects in conjunction with the proposed development;

    - Newcraighall North;
    - Newcraighall East;
    - Wanton Walls;
    - Brunstane Steading.

For the purposes of the historic environment assessment, Newcraighall North has been considered as part of the baseline in the assessment as it is currently under construction. In combination with the proposed development, Newcraighall will increase the extent of the area which will become urbanised. However, no heritage assets have been identified where the two developments in combination will have an effect of greater significance than the proposed development in isolation.

The Newcraighall East development is separated from the proposed development by the buildings of Newcraighall Village and the old railway embankments, and will have no significant cumulative effect in combination with the proposed development.

Brunstane Steading and Wanton Walls developments involve the redevelopment of existing buildings and therefore will have a negligible effect on the baseline scenario. They will have no significant cumulative effect in combination with the proposed development.

## 8.11 Summary of Residual Effects and Statement of Significance

### 8.11.1 Residual Direct (Construction) Effects

Appendix 8.A provides details on the residual direct effects on historic environment assets as a result of the proposed development, following the implementation of the scheme of mitigation as outlined above.

The proposed programme of mitigation through preservation in situ of avoidable remains, and excavation and recording where direct impacts are unavoidable, is considered to be sufficient to avoid (through preservation in situ) or offset (through excavation and publication) the predicted direct impacts on heritage assets.

In line with the requirements of PAN 2/2011, any archaeological remains that are identified will be either preserved in situ or excavated and recorded to a standard agreed with the CEC Archaeologist, leading to the accrual of archaeological information and preservation by record.

The proposed scheme of mitigation will be appropriate to offset all direct (construction) effects resulting from the proposed development.

### 8.11.2 Residual Indirect (Operational) Effects

A residual indirect (operational) effect of moderate significance is predicated upon the setting of one historic environment asset, Brunstane House (Category A Listed Building LB28034). All other predicted residual indirect (operational) effects are not considered to be significant.

**Table 8.5: Historic Environment, Summary of Predicted Effects**

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| **Construction** | | | | | | | |
| No direct effect on:<br>**1** Brunstane rectilinear enclosure (SM10580)<br>**2** Brunstane circular mount (SM4112) | High | None | N/A | N/A | No impact | No impact | No direct effect |
| No direct effect on:<br>**18** Railway bridge / underpass | Low | None | N/A | N/A | No impact | No impact | No direct effect |
| No direct effect on:<br>**7** Wanton Walls railway bridge<br>**13** Wanton Walls buildings (former location of) | Negligible | None | N/A | N/A | No impact | No impact | No direct effect |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| Adverse direct effect on:<br>**3** coal mining related features<br>**4** possible enclosure, rig & furrow remains<br>**5** coal mining related feature<br>**6** coal mining related feature<br>**8** old shaft<br>**9** old quarry<br>**10** Well<br>**17** former location of building<br>**19** Bridge | Negligible | Major | Long Term | Permanent | Minor | Impact offset by mitigation | Minor |
| Adverse direct effect on:<br>**22** Former extent of formal gardens at Brunstane | Low | Major | Long Term | Permanent | Moderate | Impact offset by mitigation | Moderate |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| Adverse direct effect on:<br>**11** Building (former location of)<br>**12** Buildings (former location of)<br>**14** Glen Nurseries, building<br>**15** Building<br>**16** Building<br>**20** Walled garden<br>**21** Pond and Outlet | Unknown (Low) | Major | Long Term | Permanent | Unknown (Moderate) | Impact offset by mitigation | Unknown (Moderate) |
| Previously unknown buried archaeological deposits | Unknown (Low) | Major | Long Term | Permanent | Unknown (Moderate) | Impact offset by mitigation | Unknown (Moderate) |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| **Operation / Permanent** | | | | | | | |
| Indirect effect on:<br>Scheduled Monuments:<br>SM4112; SM10580;<br>Category A Listed Building<br>LB10911; LB10916<br>Newhailes Inventory GDL<br>Battle of Pinkie Inventory Historic Battlefield | High | Negligible | Long Term | Permanent | Minor | No mitigation proposed | Minor |
| Indirect effect on:<br>Category A Listed Building<br>LB28034 | High | Minor | Long Term | Permanent | Moderate | No mitigation proposed | Moderate |
| Indirect effect on:<br>Category B Listed Buildings LB10912; LB10915; LB13038 | Medium | Minor | Long Term | Permanent | Minor | No mitigation proposed | Minor |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| Indirect effect on:<br>Category B Listed Buildings<br>LB10917; LB12374; LB26724; LB26737; LB26802; LB26814; LB27011; LB27022; LB27032; LB27052; LB27073; LB27083; LB27103; LB27269; LB27278; LB27939; LB28035; LB38287; LB38389; LB43571;<br>Portobello Conservation Area | Medium | Negligible | Long Term | Permanent | Negligible | No mitigation proposed | Negligible |
| Indirect effect on:<br>Category C Listed Building: LB10914 | Low | Minor | Long Term | Permanent | Negligible | No mitigation proposed | Negligible |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| Indirect effect on:<br>Category C Listed Buildings:<br>LB27042; LB27063; LB27093; LB27113; LB27122; LB27286; LB29912; LB29913; LB29914; LB29915; LB29916; LB30286; LB43572; LB44605; LB46550; LB495210; LB52104 | Low | Negligible | Long Term | Permanent | Negligible | No mitigation proposed | Negligible |

**Table 8.6: Historic Environment, Summary of Proposed Mitigation**

| Reference | Proposed Mitigation and Management | Project Phase | | | |
|---|---|---|---|---|---|
| | | Pre-Construction | Construction | Operation | Deconstruction |
| HE1 | Geophysical (gradiometer survey). | ✓ | | | |
| HE2 | Avoidance (fencing-off) of Scheduled Monuments SM10580 and SM4112. | ✓ | | | |
| HE3 | Programme of Archaeological Recording Work (to be agreed but likely to comprise trial trenching evaluation and / or archaeological monitoring and recording (watching briefs)). | ✓ | ✓ | | |

## 8.12 References

### 8.12.1 Bibliographic Sources


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### 8.12.2 Cartographic Sources


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# 9. WATER RESOURCES, HYDROLOGY, FLOOD RISK AND DRAINAGE

## 9.1 List of Figures

- Figure 9.1 Location Plan, Showing Main Water Features of the Site;
- Figure 9.2 Site Topography.

## 9.2 List of Appendices

- Appendix 9.A Proposed Development at Brunstane: Flood Risk Assessment;
- Appendix 9.B Outline Drainage Strategy.

## 9.3 Introduction

This chapter assesses the potential impacts of the proposed development on water resources, hydrology, flood risk and drainage. This chapter was written by Kaya Consulting Limited. A Flood Risk Assessment (FRA) report was prepared by Kaya Consulting (Appendix 9.A) and an outline Sustainable Drainage Systems (SuDS) strategy for the site was prepared by IKM Consulting Limited (Appendix 9.B) to support the assessment.

## 9.4 Legislation, Policy and Guidance

The assessment of environmental impacts arising from surface water drainage and flood risk is based on the key legislation, policies and guidance documents listed in Table 9.1. It should be noted that the list presented in Table 9.1 is not exhaustive.

**Table 9.1: List of Key Legislation, Policy and Guidance**

| Type | Legislation/Policy/Guidance |
|---|---|
| Legislation | The Flood Risk Management (Scotland) Act 2009;<br>Water Environment (Controlled Activities) (Scotland) Amended Regulations 2013 (CAR) ;<br>Water Framework Directive (2000/60/EC) (WFD), and Water Environment and Water (Scotland) Act (WEWS Act) 2003;<br>Pollution Prevention and Control (Scotland) Regulations 2012;<br>Environmental Impact Assessment (Scotland) Regulations 2011;<br>Control of Pollution Act 1974 (as amended) Part II: Pollution of Water<br>Surface Waters (Fish life) (Classification) (Scotland) Directions 2007;<br>The Water Supply (Water Quality) (Scotland) Regulations 2001;<br>European Drinking Water Directive (Council Directive 98/83/EC) |

| Type | Legislation/Policy/Guidance |
|---|---|
| | Private Water Supplies (Scotland) Regulations 2006;<br>Water Environment (Drinking Water Protected Areas) (Scotland) Order 2007;<br>Groundwater Daughter Directive (2006/118/EC) (GWDD);<br>The Scotland River Basin District (Classification of Water Bodies) Directions 2009;<br>The Scotland River Basin District (Surface Water Typology, Environmental Standards, Condition Limits and Groundwater Threshold Values) Directions 2009. |
| SEPA Policies | No. 19: Groundwater Protection Policy for Scotland, Dec 2003;<br>No. 26: Policy on the Culverting of Watercourses. |
| National and Local Planning Policy and Guidelines | Scottish Planning Policy (SPP) Flooding and Drainage Section (2014);<br>City of Edinburgh Council (2013) Edinburgh Design Guidance, Section 3.7 Water Environment, 16 May 2013;<br>Edinburgh City Local Plan (adopted 2010) Policy Env 17 Flood Protection, Policy DES 6 Sustainable Design and Construction and INF6 Water and Drainage;<br>Proposed Edinburgh Local Development Plan (2014) Policy ENV 21 Flood Protection and Pollution and Air, Water and Soil Quality. |
| Scottish Government Planning Advice Notes (PANs) and Guidance | PAN 51 Planning, Environmental Protection and Regulation;<br>PAN 1/2013 Environmental Impact Assessment ;<br>PAN 61 Planning and Sustainable Urban Drainage Systems;<br>PAN 69 Planning and Building Standards Advice on Flooding;<br>PAN 79 Water and Drainage;<br>Delivering Sustainable Flood Risk Management (Scottish Government, 2011);<br>Surface Water Management Planning Guidance (Scottish Government, 2013. |
| SEPA Pollution Prevention Guidelines (PPGs) | PPG1: General Guide to the Prevention of Water Pollution;<br>PPG2: Above Ground Oil Storage Tanks;<br>PPG5: Works and Maintenance in or near Water;<br>PPG6: Working at Construction and Demolition Sites;<br>PPG8: Safe Storage and Disposal of Used Oil;<br>PPG21: Pollution Incident Response Planning. |

| Type | Legislation/Policy/Guidance |
|---|---|
| CAR Guidance | SEPA: Water Environment (Controlled Activities) (Scotland) Regulations 2011 – A Practical Guide, Version 7.1 March 2014;<br>SEPA: Position Statement to support the implementation of the Water Environment (Controlled Activities) (Scotland) Regulations 2005, WAT-PS-06-02: Culverting of Watercourses – Position Statement and Supporting Guidance, Version 2, June 2015. |
| Other Guidelines | Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 10 (HA 216/06) 'Road Drainage and the Water Environment';<br>CIRIA: Sustainable Urban Drainage Systems Design Manual for Scotland and Northern Ireland (C697) 2007;<br>CIRIA: Control of Water Pollution from Construction Sites – Guide to Good Practice (SP156), 2006;<br>CIRIA: Environmental Good Practice on Site (C692), 2010;<br>CIRIA (2010). Culvert Design and Operation Guide;<br>RSPB and WWT (2012) Sustainable Drainage Systems: Maximising the potential for people and wildlife, A guide for local authorities and developers, (authors: Andy Graham, John Day, Bob Bray and Sally Mackenzie);<br>Scottish Executive: River Crossings and Migratory Fish: Design Guidance, April 2000;<br>SEPA, WAT-SG-25, Engineering in the Water Environment Good Practice Guide – River Crossings, 2nd Edition (Nov 2010);<br>SEPA: Special Requirements for Civil Engineering Contracts for the Prevention of Pollution V2, 2006,WAT-SG-31;<br>SEPA: Guidance on the Special Requirement for Civil Engineering Contracts V2, 2006, WAT-SG-32;<br>SEPA: Technical Flood Risk Guidance for Stakeholders, version 9.1, June 2015;<br>Scottish Water (2015) Sewers for Scotland 3rd Edition, April 2015. |

## 9.5 Consultation

### 9.5.1 Scoping

In accordance with Regulation 14 of The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011, an application for scoping opinion and scoping report was submitted in February 2016 and a response from CEC received in April 2016. This assessment is consistent with the scoping report and relevant scoping responses have been taken into cognisance in the assessment. A summary of the scoping responses and how they have been addressed in the ES is provided in Appendix 4.A. and not repeated here.

### 9.5.2 Additional Consultation

During the process of this assessment, City of Edinburgh Council (CEC) and Scottish Environment Protection Agency (SEPA) were also consulted for any relevant information held by them and in relation to any concerns which they may have with the proposed development with respect to flooding, drainage and water quality. A summary of this consultation is given in Table 9.2, below.

**Table 9.2: Summary of Additional Consultation Responses**

| Consultee | Type/Date of consultation | Issue(s) raised | Response/action taken to issues raised |
|---|---|---|---|
| City of Edinburgh Council | Information response (Email 15 March 2016) | CEC (Flood Prevention) have no information on the Magdalene Burn and Brunstane Burns and there has not been any historical flooding issues in the site. | Used to inform baseline assessment |
| City of Edinburgh Council | Information response (Email 20 April 2016) | CEC has a listing of private water supplies (PWS). They do not hold any record of any private water supplies on or near the site of interest.<br><br>CEC also note that SEPA maintains records of private water supplies for abstraction rates >10 $m^3$/day and recommend contacting them to obtain this information. | PWS removed from assessment, as none present.<br><br>This data was provided by SEPA (see below) and used for baseline assessment. |
| SEPA | Response to Data Information Request (Emails dated 15 March 2016, 24 March 2016, 11 April 2016, 26 April 2016) | SEPA provided:<br>• Water quality data for Brunstane Burn and River Esk;<br>• List of CAR licensed abstractions and discharges;<br>• SEPA note that 'there are no SEPA groundwater quality or monitoring sites within a 5$km^2$ radius of the site'<br>• SEPA note that they have no records of any environmental events (contamination incidents or pollution) within the site boundary. | Used to inform baseline assessment |

| Consultee | Type/Date of consultation | Issue(s) raised | Response/action taken to issues raised |
|---|---|---|---|
| SEPA | Response to Data Information Request<br>(Email 22 March 2016) | **Flood risk information**<br>SEPA currently have no record of the site having been subject to any form of flooding. SEPA note that review of the SEPA Flood Map indicates that this area lies within the 200-year flood envelope and is potentially at medium to high risk of fluvial and surface water flooding. Fluvial flood risk is indicated from the Brunstane Burn and Magdalene Burn. SEPA note that there are uncertainties with the flood map at this location due to modifications as part of the Niddrie Burn flood scheme.<br><br>Any development within this area would require to fully assess the flood risk from both watercourses and take account of any increased risk as a result of structures and potential blockages.<br><br>The Magdalene Burn is culverted within the site and the location and condition of the culvert should be established. There should be no development on top of, or immediately adjacent to, a culverted watercourse.<br><br>The surface water flood risk should also be further investigated and there should be no increased risk to existing properties as a result of development.<br><br>SEPA recommend contacting the Roads Department of Edinburgh Council who, as Flood Prevention Authority, should be able to provide further information regarding flooding and flood alleviation in the area. | Used to inform baseline assessment and FRA (Appendix 9.A)<br><br>Assessed in FRA (Appendix 9.A) and summarised herein.<br><br>A CCTV survey of Magdalene culvert was carried out and no development is proposed on or adjacent to the culvert.<br><br>Assessed in FRA (Appendix 9.A) and summarised herein.<br><br>CEC Flood officer was contacted (response above) |

## 9.6 Assessment Methodology

### 9.6.1 Overview

The assessment has been undertaken using qualitative and quantitative analyses, and is based on professional judgement and statutory and general guidance. Relevant legislation, policies and best practice guidance (see Table 9.1) is used in the assessment and development of mitigation measures. The assessment includes the following:

- Consultation with relevant statutory and non-statutory bodies (SEPA, CEC, Scottish Natural Heritage (SNH) and Scottish Water) to obtain details on the existing hydrological conditions of the site and its surroundings;
- Desk studies and site walkover surveys to establish the existing baseline conditions on the site;
- Hydrological analysis using available information and current industry standard methodologies. This includes assessing likely effects of the development on hydrological processes;
- Flood risk assessment assessing the risk of flooding from all sources (Brunstane Burn, Magdalene Burn, surface water, groundwater and local drainage system) using industry standard methodologies;
- Evaluation of the likely impacts of the development and the effect these could have on current site conditions with respect to surface water hydrology, flood risk, water quality and water resources;
- Evaluation of the significance of these effects by considering the sensitivity of the receptor and the potential magnitude of the impact;
- Identification of possible measures to avoid and mitigate against any potential adverse impact resulting from the development;
- Assessment of residual effects taking into account mitigation measures.

### 9.6.2 Methodology for Establishing Hydrological Baseline Conditions

The baseline conditions were determined using the following information:

- Ordnance Survey mapping at 1:10,000 and 1:25,000 scales;
- Consultation with statutory and non-statutory organisations;
- Flood Estimation Handbook (FEH), CD-Rom Version 3;
- SEPA Third Generation Flood Map;
- SEPA River Basin Management Plan Interactive Map;
- SEPA water quality data;
- Scotland's Environment Website and Interactive Map;
- Scottish Natural Heritage Interactive Map;
- Topographic Survey (November 2015) and LiDAR data. A topographical survey of the site and its immediate surroundings has been carried out and was made available for use in this study. LIDAR data was also purchased for the site;
- Scottish Water Service Drawings, showing the existing fresh water and waste water services for the Site and surrounding area;
- Kaya Consulting (2016) Proposed Development at Brunstane, Edinburgh: Flood Risk Assessment (see Appendix 9.A);
- IKM Consulting (2016) Outline Drainage Strategy (Appendix 9.B);
- EEG (2016) CCTV survey of Magdalene Burn.

### 9.6.3 Assessment of Sensitivity

The criteria used to assess the sensitivity of water features is summarised in Table 9.3. The sensitivity or the vulnerability of the water features was determined in terms of the physical attributes and processes encompassed by surface water hydrology (including flood risk) and water quality.

**Table 9.3: Criteria for Determining the Importance/Sensitivity of the Water Environment**

| Sensitivity of receptor | Typical indicators |
|---|---|
| High | Receptor is of high environmental importance or of National or International value i.e. Site of Special Scientific Interest (SSSI) or Special Area of Conservation (SAC). Overall water quality classified by SEPA as high and salmonid spawning grounds present. Abstractions for public drinking water supply. The flooding of property (or land use of great value) that has been susceptible to flooding in the past. Watercourse / floodplain / hydrological feature that provides critical flood alleviation benefits. |
| Medium | Receptor is of medium environmental importance or of Regional or Local value. Overall water quality classified by SEPA as good or moderate, salmonid species may be present, and may be locally important for fisheries. Smaller watercourse lying upstream of larger river which is a SSSI or SAC. May be subject to improvement plans by SEPA. Abstractions for private water supplies. Environmental equilibrium copes well with all natural fluctuations but cannot absorb some changes greater than this without altering part of its present character. The flooding of property (or land use of great value) that may be susceptible to flooding. Watercourse / floodplain / hydrological feature that provide some flood alleviation benefits. |
| Low | Receptor is of low environmental importance (e.g. water quality classified by SEPA as bad or poor, fish sporadically present or restricted). Not subject to water quality improvement plans by SEPA. Heavily engineered or artificially modified and may dry up during summer months. Environmental equilibrium is stable and is resilient to changes which are considerably greater than natural fluctuations, without detriment to its present character. No abstractions for public or private water supplies. No flooding of property or land use of great value. Watercourse / floodplain / hydrological feature that provides minimal flood alleviation benefits. |
| Negligible | Not present in study area or not affected by the proposed development. |

### 9.6.4 Magnitude of Impact

The magnitude of impact was assessed based on the criteria presented in Table 9.4. These criteria are based on professional judgement and experience of other similar studies.

**Table 9.4: Criteria for Estimating the Magnitude of Impact**

| Magnitude | Criteria/Typical example |
|---|---|
| Major | Fundamental changes to the hydrology, water quality or hydrogeology. A >10% change in average or flood flows. The extent of 'high risk' areas (classified by the Risk Framework contained in Scottish Planning Policy (SPP) – i.e. at risk from flooding by 1 in 200-year or greater event) will be significantly increased. Change that would render water supply unusable for longer than month. |
| Moderate | Material but non-fundamental changes to the hydrology, water quality or hydrogeology. A >5% change in average or flood flows. Extent of 'high risk' areas (1 in 200-year - SPP) will be moderately increased/ or decreased. Change that would render water supply unusable for days or weeks with no alternative. |
| Minor | Detectable but non-material changes to the hydrology, water quality or hydrogeology. A >1% change in average or flood flows. Change that would render water supply unusable for short period (days) or for longer period if alternative supply put in place. |
| Negligible | No perceptible changes to the hydrology, water quality or hydrogeology. A <1% change in average or flood flows. No change in water supply or minor change (days) where alternative is put in place. |

### 9.6.5 Assessment of Significance

The significance of the effects was determined with respect to the sensitivity/importance of the receiving water environment and the magnitude of potential impact as shown on Table 9.5. Effects can either be adverse or beneficial.

**Table 9.5: Significance of Impact Matrix**

| Sensitivity of Receptor | Magnitude of impact | | | |
|---|---|---|---|---|
| | **Major** | **Moderate** | **Minor** | **Negligible** |
| **High** | Major | Major | Moderate | Minor |
| **Medium** | Major | Moderate | Minor | Negligible |
| **Low** | Moderate | Minor | Negligible | Negligible |
| **Negligible** | Minor | Negligible | Negligible | Negligible |

The assessment is based on existing, available data. With the exception of the CCTV survey of Magdalene Burn and the site topographic survey, no new data was required relating to hydrology, flood risk and water quality.

## 9.7 Baseline Conditions

The site is located in the Brunstane area of Edinburgh, Figure 9.1. The site is bounded to the north by the Brunstane Burn, to the east by the Magdalene Burn, and to the west and south by existing development. It is generally greenfield and currently in agricultural use. A detailed location plan, showing the main hydrological features of the site is shown in Figure 9.1.

### 9.7.1 Climate

The average annual temperature within East Central Scotland is around 9.0 °C (Met Office website). The average annual rainfall on the site is approximately 730mm (Flood Estimation Handbook (FEH) CD-ROM, Version 3).

### 9.7.2 Topography

The site topography is shown in Figure 9.2. The site generally slopes down from west to east and is divided in two parts by the East Coast Main Line (ECML) railway that passes through the middle of the site. The railway line is in cutting of varying depth with a bridge crossing near the mid-point of the site.

Brunstane Burn flows in a relatively deep valley along the northern boundary of the site, Photo 9.1. Light Detection and Ranging (LiDAR) sections through the burn are shown in Figure 9.2 and show that the watercourse sits in a deep valley some 10m below the level of the proposed development area.

### 9.7.3 Watercourses and Surface Water

There are two watercourses within and close to the site. These are described in the following paragraphs and also presented on Figure 9.1.

***Brunstane Burn***

The Brunstane Burn flows adjacent to the northern site boundary. It flows in an easterly direction and enters the Firth of Forth around 450m downstream of the site, although the site is elevated significantly above the coast (above 13m AOD).

The burn passes under a number of bridges at the upstream end of the site. Within the site the burn passes under the ECML, approximately in the middle of the site, Photo 9.2, and there is an existing crossing that will be upgraded during development for site access, Photo 9.3. At the crossing location, the burn is around 8m wide and has steep, heavily vegetated banks on either side (see Appendix 9.A for more details of the existing and proposed crossing location).

Upstream of the A1 road the Brunstane Burn is known as the Niddrie Burn and there have been flood management works on the Niddrie Burn upstream of the site (Niddrie Burn Restoration Scheme). The catchment of the Brunstane Burn at the site is around 23.1 $km^2$ (see Appendix 9.A for details).

***Magdalene Burn***

The Magdalene Burn is a tributary of the Brunstane Burn. The Magdalene Burn is culverted through the site, entering the site at its south-western corner and then flowing through the southern part of the site in a circular culvert 1500mm in diameter. A CCTV survey of the culverted section of the burn was carried out by EEG in April 2016. The approximate route of the culvert is shown on Figure 9.1.

As it enters the site, the culverted watercourse runs in a 1500mm diameter culvert adjacent to a 450mm Scottish Water combined sewer. It passes under the ECML in an 1800mm diameter culvert, which also houses the 450mm combined sewer, at a depth of 5.53m. Just downstream of the ECML, the culverted watercourse flows through a separate 1500mm diameter culvert and deviates to the south away from the line of the 450mm combined sewer, and the watercourse leaves the site (Figure 9.1).

The watercourse continues in a 1500mm culvert through the grounds of Newhailes House and outfalls east of the site into an open channel within the grounds (Photo 9.4). It then flows as an open watercourse until its confluence with Brunstane Burn, east of the site.

The upstream catchment of the Magdalene Burn is shown in Figure 4, Appendix 9.A and is complicated by development in the Niddrie area in the headwaters of the catchment. The catchment of the watercourse as it enters a culvert at the A1 road upstream of the site is 1.5$km^2$ (Appendix 9.A).

### 9.7.4 Existing Site Drainage

The surface water watershed boundaries within the site are shown in Figure 14, Appendix 9.A. The site drains in several directions with the northern part of the site draining towards the Brunstane Burn, the eastern part of the site draining towards the Magdalene Burn and the southern part of the site draining towards a low point in the south-east of the site, close to the culverted section of Magdalene Burn. The ECML dissecting the site acts as a barrier for surface water and splits the site into two parts: the banks running alongside the railway would collect flow and route the surface water either in a northerly or southerly direction.

Runoff from land that currently drains to the Brunstane Burn would be expected to reach the burn overland or through existing land drains. Flow pathways for runoff entering Magdalene Burn is more complex. As outlined in Figure 5, Appendix 9.A there are multiple piped inflows to the Magdalene Burn culvert within the site, many of which will come from the site.

The SEPA third generation flood map for surface water shows a risk of ponding of surface water adjacent to the railway line in the middle of the site. Post-development runoff flowing to this area will be managed by the site drainage system.

During the site walkover survey, there was evidence of wet ground in the middle of the site, adjacent to the railway line and in the south of the site along the line of the culverted Magdalene Burn. It is not clear if these areas reflect poorly drained land or locally raised perched groundwater. It will be necessary to investigate groundwater levels and soil infiltration rates as part of future ground investigation work (see Chapter 10 of the ES for details).

### 9.7.5 Hydrology and Flood Risk

The SEPA third generation flood map shows the likely extent of flooding for high, medium and low likelihood for fluvial, pluvial (surface water) and tidal flows. The SEPA maps show the northern edge of the site lies close to the 200-year floodplain of the Brunstane Burn and there are areas of the site that lie within the 200-year surface water (pluvial) floodplain.

A Stage 1 FRA was carried out for the site (Kaya Consulting, 2015) followed by a more detailed FRA, including mathematical modelling of the two watercourses (Kaya Consulting, 2016, Appendix 9.A).

As discussed above, flows in the Brunstane Burn are affected by recent flood management measures upstream in the catchment (the Niddrie Burn Restoration Scheme). The effect of the scheme was taken into account whilst estimating 200-year design flows for the Brunstane Burn at the site (see Appendix 9.A for details). Attenuated flows (i.e. with scheme in place) were estimated to be between 18.5 to 24.3$m^3$/s, and an un-attenuated flow (i.e. without scheme) of 28.5$m^3$/s was estimated for the burn.

The catchment of the Magdalene Burn is also complicated by development in the Niddrie area in the headwaters of the catchment. The catchment of the watercourse as it enters a culvert at the A1 road is 1.5$km^2$ and the 200-year flow in Magdalene Burn as it enters the site was estimated to be 2.76$m^3$/s (see Appendix 9.A).

Numerical models of the Brunstane Burn and Magdalene Burn were built using HEC-RAS software using topographical survey data, 1m LiDAR data and the CCTV survey. The main findings of the modelling and the FRA are summarised below:

- Modelling of the Brunstane Burn predicted that the proposed development does not lie within the 200-year floodplain of Brunstane Burn (see Appendix 9.A). Based on SPP, sites located outside of the 200-year floodplain would be suitable for most types of development, including residential;

- The existing culvert under the ECML is large (3.1m wide and 3.8m high) and is predicted to pass the 200-year flood event. Sensitivity analysis indicated that flood waters could reach the site if the culvert were blocked by 50%, although the area impacted would be small. Given the size of the culvert opening this would appear very unlikely. The emergency overflow for the culvert (in the case of full blockage) is the pedestrian route through the railway embankment, which is at around 23.9m AOD.

Only a small part of the site upstream of the railway crossing sits below this level and the FRA recommends there are no buildings or roads in land below 24m AOD upstream of the railway crossing (i.e. land that could be impacted by a blockage of the railway crossing) and Finished Floor Levels (FFL) of properties are set above this emergency level. The Strategic Masterplan (Figure 2.6) has no proposed building or roads in this area. However, other development such as open space or SuDS features could be in these areas;

- The existing road crossing over the Brunstane Burn will be upgraded as part of the development to provide a road link. The existing crossing is a minor structure that will be overtopped during flood events (see Section 5.2.2, Appendix 9.A). As discussed previously, the proposed development sits around 10m above the level of the burn, so there is no flooding risk of the site from overtopping of this crossing at present;

- Modelling of the Magdalene Burn culvert showed that the site is not considered at risk of flooding from the Magdalene Burn during a 200-year or 1 in 200-year + climate change event, assuming the culvert is unblocked (see Appendix 9.A). Blockage of the culvert is considered unlikely as the section under the site is significantly downstream of the culvert entrance and the CCTV survey showed the culvert to be in generally good condition;

- The indicative surface water flow pathways and catchment watershed both within and outside of the site are shown in Figure 14, Appendix 9.A. Detailed watershed analysis of LiDAR data and available topographical data for the site has shown that there is almost no catchment lying upstream of the site, which would result in surface water runoff from adjacent land entering the site boundaries. Hence, the site is not considered to be at significant risk of flooding from surface water runoff from outside the site boundaries;

- Parts of the site are shown to lie within the SEPA flood maps of the area for surface water (pluvial) flooding. Analysis of the local topography has shown that flooding is predominantly due to runoff from rainfall falling within the site. Post-development this runoff will be captured within the site drainage system and flood risk to areas identified in the SEPA maps will be reduced or removed.

### 9.7.6 Water Supplies, Discharges and Abstractions, and Services

Consultation with CEC has confirmed that they do not hold any record of any private water supplies (PWS) on or near the site of interest within their list of private water supplies.

In their scoping response, Scottish Water also noted that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive (WFD), in the area that may be affected by the proposed development.

SEPA also provided a list of discharges and abstractions, which are licenced or registered under the Controlled Activities Regulations (CAR) within a 2km radius of the site, as shown in Table 9.6 below. This includes any abstractions greater than $10m^3$/day, including PWS. National Grid References (NGR) were provided by SEPA and none of the granted CAR licences and registrations are located within the site.

There are two licenced abstractions from the Brunstane Burn for agriculture, a combined sewer overflow to Brunstane Burn, and a septic tank effluent (STE) to soakaway at Gate Lodge, Newhailes, which are located close to the site boundary.

There are no PWS that may be affected by the proposed development and this is not considered further.

**Table 9.6: Granted CAR Licences & Registrations Within a 2km Radius of the Site (source: SEPA, 2016)**

| Licence Number | Site Name | Location Description |
|---|---|---|
| CAR/L/1026086 | Edinburgh Sewerage Network | 13 emergency or combined sewer overflows to Brunstane Burn, River Esk and Firth of Forth |
| CAR/S/1013534 | Queen Margaret College Relocation, Edinburgh | Queen Margaret College, Engineering works, Pipeline/ cable crossings at 3 locations on Magdalene Burn (1) and Brunstane Burn (2) |
| CAR/L/1010066 | Skeddoway, Thornton | Skeddoway, mobile abstraction from Brunstane Burn for agriculture (irrigation) |
| CAR/L/1055700 | The Wisp Borehole, Joppa, Edinburgh | The Wisp Borehole, abstraction from groundwater, Edinburgh |

| Licence Number | Site Name | Location Description |
|---|---|---|
| CAR/L/1001361 | Edinburgh Forth Retail Park Newcraighall Road | Edinburgh Fort retail park surface water outfall (SWO) |
| CAR/S/1132647 | Brunstane Burn, Edinburgh | R&K Drysdale, Abstraction from Brunstane Burn for agriculture (irrigation) |
| CAR/S/1142571 | Millerhill, Whitehill Mains Road | Midlothian Council, Sewage treatment works final effluent to soakaway, Millerhill Zero Waste, Musselburgh |
| CAR/R/1104328 | River Esk at Olive Bank Road Bridge | Olive Bank Road Bridge engineering works, sediment management on River Esk (dredging) |
| CAR/R/1033041 | Gate Lodge, Newhailes, Musselburgh | Gate Lodge, septic tank effluent (STE) to soakaway, Newhailes |

Based on information provided by Scottish Water, there is a 450mm combined sewer, owned and operated by Scottish Water, in the east and south-east of the site. The sewer runs along the eastern edge of the site, with a combined sewer overflow discharge into the Magdalene Burn. There is also 700mm foul sewer rising main that runs parallel to the east side of the ECML. This rising main, owned and operated on behalf of Scottish Water by their Private Finance Initiative (PFI) partner Veolia, is a live, pressurised wastewater pipeline which carries flows from Wallyford wastewater pumping station.

### 9.7.7 Water Quality and Protected Areas

Under the terms of the Water Framework Directive (WFD), all river basin districts require to be characterised. The characterisation process requires SEPA to produce an initial assessment of the impact of all significant pressures acting on the water environment.

Surface water bodies are defined as being whole or parts of rivers, canals, lochs, estuaries or coastal waters. The main purpose of identifying water bodies is so that their status can be described accurately and compared with environmental objectives.

The WFD applies to all surface waters, but for practical purposes SEPA has defined a size threshold above which a river or loch qualifies automatically for characterisation. Rivers must have a catchment area of 10km$^2$ or more. In addition to these larger water bodies, smaller waters have been characterised where there is justification by environmental concerns and to meet the requirements of regulatory legislation such as for drinking water supplies.

Classification of status by SEPA considers water quality, hydromorphology, biological elements including fish, plant life and invertebrates, and specific pollutants known to be problematic. The classification grades through High, Good, Moderate, Poor and Bad status. This provides a holistic assessment of ecological health. Heavily modified waterbodies, which can no longer be considered to be natural, are classified on the basis of 'ecological potential'. A key objective of the WFD is the achievement of 'good ecological status' (as a minimum) of all natural water bodies by 2015.

In terms of the study area, Brunstane Burn was classified by SEPA in 2013 as having an overall status of Moderate ecological potential. The Magdalene Burn is not classified by SEPA. The groundwater body underlying the site was classified by SEPA in 2013 as Poor.

SEPA also provided water quality data for the Brunstane Burn at Milton Road for 2014, sampled on a monthly basis. The data is summarised in Table 9.7. Mean pH over 2014 was 8.3 and suspended solids ranged from 2 – 21.8mg/L with a mean of 5.9mg/L.

**Table 9.7: Summary of Key Water Quality Parameters for Brunstane Burn at Milton Road (NT 32615 73047) for 2014**

| Parameter | Minimum | Maximum | Mean |
|---|---|---|---|
| Alk as CaCO3 (mg/L) | 120 | 202 | 158 |
| BOD (ATU) (mg/L) | 0.97 | 2 | 1.43 |
| ElecCond-25 (µS/cm) | 516 | 851 | 643 |
| O2 - DO (mg/L) | 11 | 12.4 | 11.8 |
| pH (pH units) | 8.03 | 8.62 | 8.33 |
| SuspSolids (mg/L) | 2 | 21.8 | 5.9 |

The coastal water of the Firth of Forth adjacent to the site was classified by SEPA in 2013 as having an overall status of Poor ecological potential. The Firth of Forth coastline is part of the designated Firth of Forth Special Protection Area (SPA) and Ramsar site and Site of Special Scientific Interest (SSSI) (see Chapter 6 of this ES).

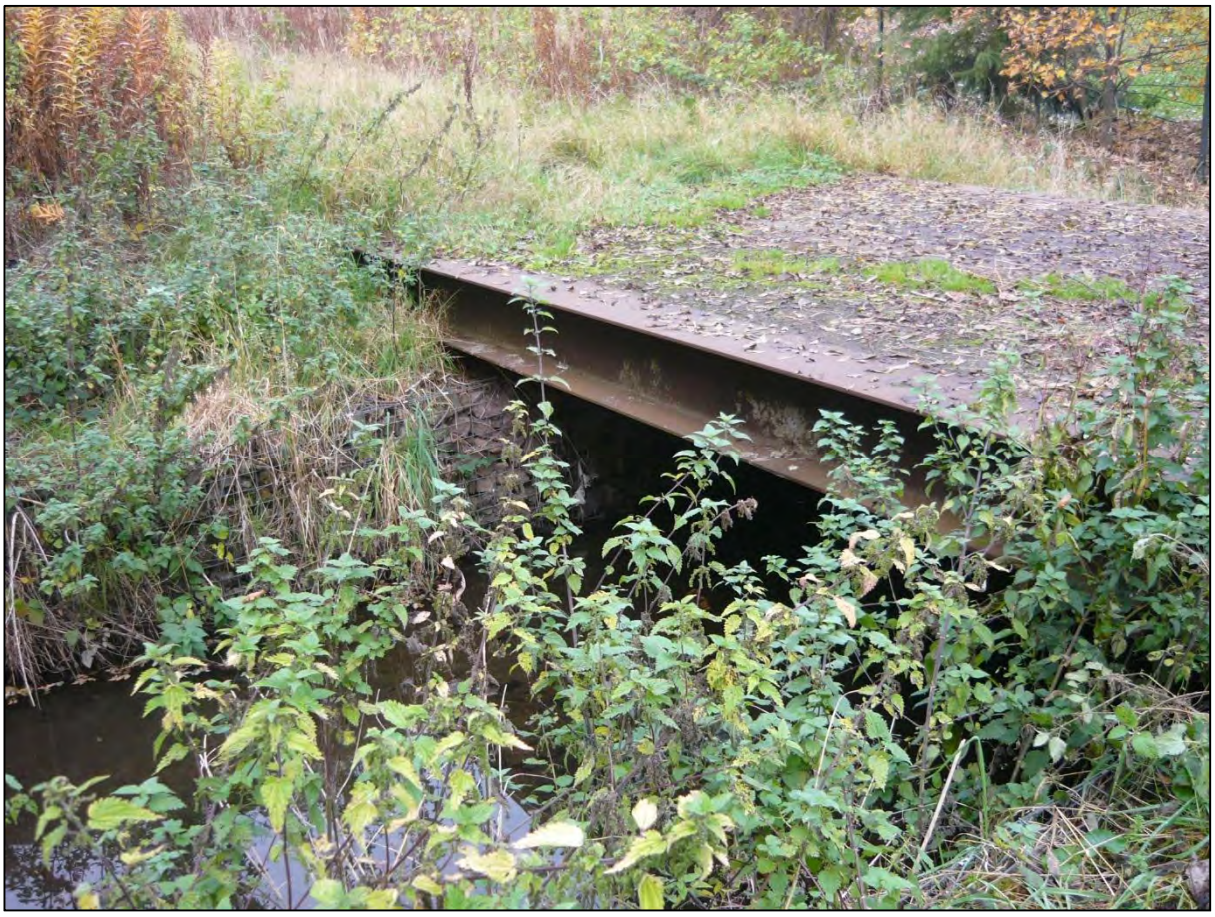
There is a history of mining in the area (see Chapter 10 of this ES). This may have implications on water quality (e.g. grouting of shallow mine workings and mining features could potentially result in pollution of the water environment). This has been assessed in Chapter 10 and appropriate mitigation measures proposed.

### 9.7.8 Groundwater Dependent Terrestrial Ecosystems (GWDTE)

No GWDTE were found within or adjacent to the site area (see Chapter 6 of this ES) and this is therefore not considered further.

**Photograph 9.1: Brunstane Burn adjacent to site**

**Photograph 9.2: Railway Bridge (Culvert) on Brunstane Burn**



**Photograph 9.3: Existing Access Crossing for Brunstane Burn**

**Photograph 9.4: Magdalene Burn in open channel through Newhailes House gardens**

## 9.8 Identification and Evaluation of Key Impacts

The following section identifies and evaluates key predicted impacts of the proposed development on hydrology (including water resources, flood risk and drainage).

Based on the baseline description and the consultation responses, the sensitivity of water features (within and close to the site) was assessed in Table 9.8. The assessment of sensitivity was based on criteria set out in Table 9.3.

**Table 9.8: Sensitivity of Receptors**

| Receptor | Sensitivity | Comment |
|---|---|---|
| Brunstane Burn | Medium | The Brunstane Burn is classified by SEPA as moderate ecological potential. The burn and adjacent areas provide some flood storage for a 200-year flood. There are flood management works upstream of the site (Niddrie Burn Restoration Scheme). There are no designated sites downstream of the site on the Brunstane Burn. |

| Receptor | Sensitivity | Comment |
|---|---|---|
| Magdalene Burn | Medium | This is unclassified by SEPA, but is a tributary of the Brunstane Burn. It is culverted through the site but flows as an open watercourse close to the southern site boundary. |
| Firth of Forth | High | The Firth of Forth, downstream of the site, is a Special Protection Area (SPA)/Ramsar site and Site of Special Scientific Interest (SSSI) of international importance for wintering birds. |
| Private water supplies | Not Sensitive | No private water supplies within or adjacent to the site |

### 9.8.1 Potential Construction Impacts

It is considered that the main potential impacts on the water environment are predicted to occur during the construction phase of the proposed development.

The proposed development comprises a mixed-use residential-led development, with a local centre, community facilities (including primary school and open space), green network, transport links, infrastructure and ancillary development. Construction will take place in a phased approach. A detailed description of the proposed development is provided in Chapter 2 of this ES.

The proposed access to the site from the north, from Milton Road, requires a new crossing over the Brunstane Burn at the location shown in Figure 9.1 (NT 32145 72932). There is an existing bridge crossing the burn here (Photo 9.3) but this was shown to be undersized for the 200-year flood event (Appendix 9.A). The new crossing to span the Brunstane Burn will be designed as part of the detailed design phase, along with more detailed modelling, calculations and consultation with SEPA and CEC. The opportunity to use bridging solutions, or bottomless or arched culverts, that minimise any effects on the bed and banks of the watercourse will be explored for the construction of the new crossing. The precise nature of the structure will be determined during the detailed design phase.

The predicted likely direct and indirect effects of the proposed development during construction are listed in Table 9.9 and described below. The table outlines the source of impact and the corresponding effect to the water environment.

**Table 9.9: Potential Effects of Construction on Water Environment**

| Potential Source of Impact | Activity and Effects | Likely effect on the water environment |
|---|---|---|
| Site Clearance and Preparation | Soil erosion and mobilisation of contaminants | Soil erosion and sedimentation of watercourses. |
| | Pollution from plant machinery | Pollution of surface water and/or groundwater. |
| | Vegetation removal. | Increased run-off to watercourses and/or overland flow causing increased flood risk. |
| Construction of the Proposed Development | Increase of hardstanding areas. | Increased run-off to watercourses and/or overland flow causing increased flood risk. |
| | Pollution from plant machinery. | Pollution of surface water and/or groundwater. |
| | Access roads and earthworks. | Alteration of natural surface water flow pathways. |
| | Construction of new crossing of the Brunstane Burn and associated landscaping. | Modification of natural flow paths, soil erosion and sedimentation of watercourse during works. Potential increase in flood risk and water quality impacts effecting aquatic life (see Chapter 6). |

The activities that will occur during the site clearance, preparation and construction phases that may have an impact on the water environment include: site clearance and vegetation removal; use of heavy plant machinery; increase of hardstanding area and construction of access roads and associated earthworks/re-profiling; construction of new crossing of the Brunstane Burn and associated landscaping (Table 9.9).

The potential effects of such activities include:

- Soil erosion and sedimentation of watercourses. There are many ways in which this can occur including:
    - Release of sediment from disturbed ground arising due to local felling and clearance of existing vegetation;
    - Vehicle movements over exposed soil and vegetation leading to erosion and high quantities of sediment entering the surrounding water environment;

    - Increased erosion within drainage channels due to high velocities within artificially created channels.

- Increased run-off to watercourses and/or overland flow causing increased flood risk;

- Pollution of surface water and groundwater. Discharges and spillages from potentially harmful pollution can occur when working with heavy machinery. Additional pollution may also occur from spillages of construction associated sources such as wet concrete, etc.;

- Alteration of natural surface water flow pathways. During the construction phase the site will have an increased amount of hardstanding areas including new access tracks, site offices, site compounds and internal roads. Such an increase in hardstanding areas will increase surface runoff and potentially alter existing drainage patterns;

- Modification of flow paths, soil erosion and increased sedimentation of watercourse during construction of new crossing of the Brunstane Burn.

The significance of the above effects on relevant receptors before mitigation is assessed in Table 9.11. It is noted that without mitigation in place, some potential effects on the water environment were assessed to be of moderate (adverse) significance. Proposed mitigation measures are described in Section 9.10 below.

### 9.8.2 Operational Impacts (i.e. Completed Development)

Once the proposed development is completed, there will be an increase in impermeable hardstanding areas (i.e. driveways, roads, parking spaces, paths, rooftops etc.), which, without mitigation measures in place, would result in effects such as reduced infiltration, increased sediment/pollution runoff, increased surface water runoff and increased flood risk (Table 9.10). The additional flows generated by the proposed development will need to be managed on-site and site surface water drainage systems, including sustainable drainage systems (SuDS), have been incorporated into the development design to mitigate these effects.

Given the vehicular traffic on the roads during operation there will be a risk of hydrocarbon pollution resulting from accidental oil or fuel leaks from vehicles and potential pollution from de-icing salts applied to roads during winter.

In addition, the new crossing on the Brunstane Burn may result in changes to hydro-morphology and changes to existing flood risk. Detailed calculations of flood levels at the crossing location were carried out as part of the FRA (Appendix 9.A), based on surveyed channel cross-sections upstream and downstream of the crossing. The predicted 200-year flood level is 11.5m AOD, with a bed level of 9.4m AOD (i.e. 2.1m depth) and the model results show flooding on either side of the crossing location, with a top floodplain width of around 30m (see Section 5.2.2, Appendix 9.A for details). Any new crossing would need to comply with SEPA CAR licensing and also be able to convey the 200-year flood flow without increasing flood risk to others. Detailed design of the crossing will be undertaken for the full planning stage, along with more detailed calculations, to limit any upstream increases in flood levels. However, some general guidance on the initial sizing of the crossing structure is provided in Section 5.2.2 of Appendix 9.A.

**Table 9.10: Potential Effects of Operation on Water Environment**

| Potential Source of Impact | Activity and Effects | Likely effect on the water environment |
|---|---|---|
| Completed Development | Increased permanent hardstanding (i.e. houses and road network), leading to increased sediment runoff/pollution (flushing effects) and reduced infiltration. | Increased sediment/pollution runoff (including hydrocarbon and de-icing salts) and reduced infiltration. |
| | Increased hardstanding areas. | Increased runoff and flood risk. |
| | New crossing of Brunstane Burn. | Changes to channel morphology and effects on flood risk. |
| | Installation of site drainage system (SuDS) etc. | Modification of natural drainage flow pathways. |

The significance of the above effects on relevant receptors before mitigation are assessed in Table 9.11; some of which were assessed to be of moderate (adverse) significance. Proposed mitigation measures are described in Section 9.10 below.

## 9.9 Cumulative Effects

The EIA Regulations require consideration of cumulative effects, which are those effects resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed development.

Broadly, there are two types of cumulative effects considered as part of the EIA process:

- The combined effects of interrelationships between individual assessment topics (for example noise, dust and visual impacts) on an individual or group of receptors. These are termed Type 1 Cumulative Effects. Grouting of shallow mine workings and mining features within the site could potentially result in pollution of the water environment. The potential impact of this activity and proposed mitigation is covered in Chapter 10 of the ES. There are considered to be no Type 1 cumulative effects in relation to the water environment;

- The combined effects resulting from the impacts of several developments, which individually may or may not be significant, but when considered together may result in significant effects. These are termed Type 2 Cumulative Effects;

- The longlist and shortlist of developments considered in Chapter 15 of the ES was reviewed in order to determine if there are likely to be any cumulative effects on the water environment with the proposed development and other sites;

- Assuming that all the other developments identified will be designed and constructed to fully comply with SPP, are not located within the functional floodplain of the Brunstane or Magdalene Burns, and are designed and operated with the appropriate levels of SuDS treatment and attenuation as identified within the planning applications/permissions for each site, there is not expected to be any significant cumulative effects of the developments on water resources, hydrology, drainage and flood risk during construction and operation of the proposed development.

## 9.10 Proposed Mitigation

Mitigation measures have been sourced from best practice guides and recognised industry standards to help avoid and minimise the potential impacts of the proposed development. It is noted that many of the mitigation measures are incorporated into the development design.

### 9.10.1 Design Evolution / In-Built Mitigation

The opportunity to use bridging solutions or bottomless or arched culverts that do not affect the river bed and banks of the watercourses will be explored for the construction of the new crossing of Brunstane Burn. The precise nature of the structure will be determined during the detailed design phase. SEPA's Construction of River Crossings - Good Practice Guide (2010) will be consulted when undertaking the detailed design of the crossing. An appropriate Controlled Activities Regulations (CAR) licence will also be obtained. Preliminary recommendations for the sizing of the crossing are provided in Section 5.2.2 of the FRA (Appendix 9.A) based on initial modelling of the watercourse. Detailed design of the crossing will be undertaken for the full planning stage, along with more detailed modelling and calculations and consultation with SEPA and CEC.

No buildings or construction work will be located on top of any sewers or culverted watercourses (i.e. Magdalene Burn), with an appropriate wayleave between the culvert and any buildings. The culvert is deep at sections within the site (>5 m), so any wayleave should take this into account and should be discussed and agreed with the CEC, Scottish Water and SEPA in advance.

Also appropriate overland flow routes will be provided through the proposed development site, so in the case of blockage, flooding from manholes or malfunctioning of the site drainage systems, flood waters are able to flow through the site without flooding properties or the ECML.

Scottish Water will require a wayleave of around 5-6m for the 450mm sewer due to its depth, and 5m for the foul sewer that parallels the ECML.

In accordance with the Risk Framework of SPP, residential development should be limited to areas outside the 200-year (0.5% AEP) functional floodplain. For critical infrastructure and sensitive buildings (such as hospitals, schools, care homes, etc.) a greater level of protection should be provided (usually 1000 year or 0.1% AEP). The proposed development area and SuDS features are outside the predicted 200-year floodplain of the Brunstane Burn and Magdalene Burn.

In addition, a strip of land along both banks of the watercourse will be left undeveloped for access and maintenance purposes and adjacent to the Magdalene culvert; the width required will be discussed and agreed with CEC.

Modelling indicated that if the Brunstane Burn culvert under the ECML became blocked there is a potential flood risk to a small area of the site upstream of the railway (see Section 6.1, Appendix 9.A and Section 9.7.5 above). This was taken into account during development design and there are no buildings or roads in land below 24m AOD, upstream of the railway line along the northern edge of the site and Finished Floor Levels of properties are set above this emergency level. However, other development such as open space or SuDS features could be in these areas.

SPP also indicates that new development should not increase the risk of flooding elsewhere and therefore careful design of SuDS will be carried out to ensure that the site storm water closely reflects the behaviour of the existing site run-off.

The proposed development will create large impermeable areas, resulting in an increase in surface water runoff and a subsequent increase in risk of fluvial flooding. To mitigate this risk, the surface water runoff from the proposed development will be collected by a positive drainage network and, where practicable, SuDS. The network will be designed to limit the discharge to the lesser of 4.5l/s/ha or the 2-year greenfield runoff rates in accordance with CEC guidance (CEC, May 2013).

A drainage strategy has been developed for the site and is included in Appendix 9.B. Given the size and topography of the site, six SuDS basins/ponds have been proposed and these are located outside the predicted 200-year floodplain. The total volume of attenuation required for the proposed development will be dependent on a number of factors, including the impermeable area that will discharge to the storm water system, the ability to infiltrate to the surrounding ground and the surface water discharge rate. The drainage network and SuDS will be designed to accommodate storm events up to and including the 1 in 200-year return period, with rainfall intensities increased by 20% to allow for the predicted impact of climate change (see Appendix 9.B). The detailed design of the proposed surface water drainage network will be developed in consultation with CEC, Scottish Water and SEPA.

To mitigate the risk of watercourse pollution, the surface water runoff from the proposed development will be subjected to appropriate levels of treatment as stipulated by SEPA and The SuDS Manual (CIRIA C697). The runoff from the roofs of the buildings will be subjected to one level of treatment and the runoff from the roads, car parks and other areas of hardstanding will be subjected to two levels of treatment (see Appendix 9.B for details). The first level of treatment will be provided at source, where possible in the form filter drains, porous paving, swales or similar systems. The second level of treatment will be provided by the SuDS detention basins and ponds located at various low points across the site to provide attenuation. In addition, catch pits will be installed at strategic locations to minimise the risk of sediment escaping into the receiving watercourses. The benefits of employing these SuDS are that the storm water is treated at source and discharged back into the ground rather than the need to provide excess attenuation storage, connection to the Scottish Water sewer or discharging all storm water to the receiving watercourses. The exact choice and extent of treatment systems will be determined in consultation with CEC, Scottish Water and SEPA.

The adoption of the proposed drainage network, including SuDS features, and the responsibility for maintenance will be agreed in consultation with CEC and Scottish Water.

It is proposed that all foul water discharge from the development shall be discharged to the existing foul sewerage network. The requirement for any upgrades to the existing network capacity will be determined as part of a Drainage Impact Assessment. Although a formal Drainage Impact Assessment has not yet been undertaken for the development, early consultation with Scottish Water has indicated that upgrading works may be limited to increasing the capacity of an existing combined sewer. This is currently being reviewed by Scottish Water as part of their Pre-Development Enquiry procedure, and will subsequently be assessed as part of a Drainage Impact Assessment, to be informed by the emerging masterplan. Alternative foul systems are also possible and will be subject to a CAR licence where required. The proposed foul water sewerage system will be designed, in accordance with the latest edition of Sewers for Scotland, to operate without surcharge and to achieve self-cleansing.

### 9.10.2 Proposed Additional Mitigation Measures

***Construction Phase***

Good practice will be followed to minimise the impact of construction activities on the receiving water environment. As a minimum, the contractor will be required to follow the guidance contained in SEPA Pollution Prevention Guidelines (PPGs), listed in Table 9.1. During the construction of each phase, it is anticipated that a detailed Construction Environmental Management Plan (CEMP) will be developed and agreed with CEC in advance of the works. The CEMP will establish a framework to ensure that health and safety and environmental best practices are adopted throughout the works. The CEMP will include the following mitigation measures.

To control the release of sediment and reduce the risk of soil erosion and mobilisation of contaminants during the site clearance, preparation and earthworks stage to an acceptable level the following mitigation measures will be implemented:

- Access tracks constructed at the initial preparation phase of construction will be prevented from discharging loose material to the local water environment. Temporary tracks should be constructed with sufficient cross-falls to reduce sediment leaving the track;

- Drainage discharging from access tracks will be directed away from watercourses and towards a silt trap. During times of dry weather, any ruts generated from tyre tracks will be smoothed. In addition, the extent of exposed topsoil will be kept to a minimum, by phasing vegetation removal and earthworks so that soil exposure and areas of open excavation are minimised and can be managed appropriately;

- Exposed soil slopes adjacent to watercourses will be minimised and seeded as soon as possible to reduce the risk of instability and sediment runoff to watercourses as well as minimising disturbance to riparian habitat (also recommended in Chapter 6 of the ES);

- Temporary silt traps, settlement lagoons and storage lagoons will be constructed to intercept and contain sediment and to attenuate surface water runoff.

The following mitigation measures will be implemented to reduce the chance of pollution from plant and machinery and the risk of a spillage occurring:

- Concrete pouring and washout activities will be closely controlled and will not take place close to a watercourse;

- Good construction practices should ensure that all harmful substances including i.e. fuel, oil, etc. would be safely stored on site using the recommended storage facilities recommended in SEPA guidance;

- All machinery will be checked regularly to identify leakages and, during winter, de-icing of plant machinery kept to a minimum;

- Spill kits, absorbent materials, and full training on their appropriate use will be available on site at all times to limit the potential impact of any accidental spillages;

- With the exception of emergency repairs, all maintenance and repair for vehicles will be undertaken offsite.

Mitigation measures to deal with increased surface runoff and potential alterations to drainage patterns will include:

- Access tracks will be designed to avoid existing surface flow pathways. If this is not possible sufficient drainage measures will be incorporated including adequately sized culverts that do not restrict flow;
- Drains servicing the access tracks will have adequate capacity to reduce the chance of water overtopping into open ground;
- Areas of impermeable and hardstanding will be kept to a minimum through strategic construction management and staged working where possible;
- All surface water drainage systems will incorporate the appropriate level of treatment with all SuDS features designed taking account of measures published by the appropriate body i.e. SEPA, CIRIA, etc. One level of treatment will be provided for roof runoff and two levels of treatment will be provided for road and driveway runoff, as per the CIRIA SuDS Manual;
- Where possible drain lengths will be limited to reduce increased discharge rates associated with artificial drains;
- Discharge of attenuated surface water runoff from the construction site into the watercourses will be limited to greenfield runoff rates entering each watercourse from the site at present.

In addition, a ground investigation (GI) survey will be carried out prior to the commencement of construction at the site, which will determine groundwater conditions and levels at the site. Details of the ground investigation is provided in Chapter 10 of the ES and is not repeated here.

***Operation Phase***

Most of the proposed mitigation for the operational phase of the development is designed into the proposed development (e.g. SuDS measures for treatment and flow attenuation and appropriate design/sizing of crossings). Additional mitigation measures would include:

- Regular maintenance programs will be required for all components of the drainage system to ensure continuous effective functioning.

All of the mitigation measures proposed are summarised in Table 9.12 below.

## 9.11 Summary of Residual Effects and Statement of Significance

With the above mitigation measures in place, the potential adverse effects of the proposed development are reduced. An assessment of the significance of residual effects (after mitigation) is shown in the last column of Table 9.11 and summarised below.

### 9.11.1 Construction

***Increased Erosion and Sedimentation***

The implementation of pollution control and SuDS measures specified in a CEMP, including silt traps, settlement lagoons and attenuation basins will mitigate against the risk of sediment and contaminants escaping to the receiving water environment. While it is not possible to entirely mitigate against soil erosion and the mobilisation of contaminants, the mitigation measures proposed are designed to greatly reduce the likelihood of such events occurring. Residual effects of construction on all watercourses within and around the site, including the Firth of Forth, is considered to be negligible.

***Pollution from Plant Machinery and Spillages***

Appropriate handling and storage of materials including chemicals, additives, fuel and oil will significantly reduce the risk of hydrocarbon or chemical contamination of the receiving water environment. Whilst the risk of hydrocarbon pollution from plant machinery cannot be completed avoided, incorporation of best practice is considered to offer the best possible opportunity to avoid spills entering the local water environment.

Mitigation measures outlined above are designed to significantly reduce the impact, and the residual effect on the receiving water environment is considered to be negligible.

***Increase of Hardstanding Areas***

The mitigation measures proposed to reduce the effect of increased hardstanding within the site are wide ranging and consider a number of effects. As with any new development there will be disruption of natural flow pathways by increasing the areas of hardstanding, some flow pathways may be temporary or not be visible during construction and this may have an adverse effect on the drainage proposals. All likely drainage paths will be identified before work begins on site and flows leaving the site or entering watercourses attenuated to greenfield runoff rates.

Increased flows due to increase in hardstanding areas would encourage sediment movement, and settlement ponds will be provided on site to minimise the volume and rate of sediments leaving the site.

Residual effects on changes to run-off rates and drainage patterns with the above mitigation in place are assessed to be of negligible significance for all receptors.

Impacts on Brunstane Burn, During Construction of New Crossing: During construction of the new crossing, the potential effects on modification of natural flow paths and flood risk and increased soil erosion/sedimentation on the burn was assessed to be of minor (adverse) significance.

However, any sedimentation effects will be temporary in nature and will be reduced (if not fully eliminated) with mitigation measures in place. Detailed design of the crossing will be undertaken for the full planning stage, along with more detailed modelling and calculations and further consultation with CEC and SEPA.

### 9.11.2 Operation

***Risk of Flooding of Development***

As per SPP no development or SuDS features are proposed within the 1 in 200-year floodplains of any of the watercourses, hence there is considered to be no risk of flooding of the development.

The development may be at risk from excess surface water runoff from storms exceeding the design storm. However, an allowance for climate change has been used in drainage system design, appropriate overland flow pathways have been incorporated into development design and the site also has sufficient gradient for surface water to run off. Hence, the potential risk is considered negligible.

***Risk of Flooding Elsewhere***

The site drainage system will be designed to attenuate surface water runoff from the development and limit discharges to watercourses to greenfield runoff rates, hence with mitigation in place the significance of increased run-off and flood risk in all downstream receptors is considered negligible (Table 9.11).

With regular maintenance of the site drainage system in place, as described in the previous section, the residual effect of the site drainage system or SuDS measures malfunctioning is considered negligible.

***Increased Sediment Runoff and Pollution from Developed Site***

The drainage and SuDS systems are designed to treat runoff from the site to appropriate levels as stipulated by SEPA and The SuDS Manual (CIRIA C697) before water is discharged from the site to the receiving environment. With mitigation, the residual effects on watercourses and the Firth of Forth was assessed to be negligible.

***Effects on Channel Morphology/Flood Risk from New Crossing of Brunstane Burn***

Detailed design of the crossing will be carried out at full planning stage in consultation with CEC and SEPA to minimise impacts on morphology and flood risk of the Brunstane Burn. The residual effects of the new crossing are considered to be of minor (adverse) significance.

***Modification of Natural Flow Pathways (due to Site Drainage System and SuDS)***

The site drainage system has been design to maintain existing flow paths as much as possible and limits runoff to watercourses to greenfield rates. Installation of the site drainage system is considered to have a minor (beneficial) effect, as the existing areas of pluvial flood risk on the site will be reduced or removed as surface water will be diverted into the drainage/ SuDS system and will not pond on site.

**Table 9.11: Water Resources, Hydrology, Flood Risk and Drainage, Summary of Predicted Effects**

| Potential Impact | Impact Adverse / Beneficial | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|---|
| **Construction / Temporary** | | | | | | | | |
| Site clearance and earthworks causing soil erosion and sedimentation of watercourses | Adverse | Medium | Moderate | Short Term | Temporary | Moderate | Negligible | Negligible |
| Site clearance and earthworks causing soil erosion and sedimentation of Firth of Forth | Adverse | High | Minor | Short Term | Temporary | Moderate | Negligible | Negligible |
| Pollution from plant machinery and spillages causing pollution of watercourses | Adverse | Medium | Moderate | Short Term | Temporary | Moderate | Negligible | Negligible |
| Pollution from plant machinery and spillages causing pollution of Firth of Forth | Adverse | High | Minor | Short Term | Temporary | Moderate | Negligible | Negligible |

| Potential Impact | Impact Adverse / Beneficial | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|---|
| Vegetation removal and increase of hardstanding areas causing increased run-off to watercourses and/or overland flow causing increased flood risk | Adverse | Medium | Moderate | Short Term | Temporary | Moderate | Negligible | Negligible |
| Increase of hardstanding areas, access tracks etc. leading to alteration of natural surface water flow pathways | Adverse | Medium | Moderate | Short Term | Temporary | Moderate | Negligible | Negligible |
| Construction of new crossing of Brunstane Burn causing modification of natural flow paths and changes to flood risk in Brunstane Burn | Adverse | Medium | Moderate | Long Term | Permanent | Moderate | Minor | Minor |
| Construction of new crossing of Brunstane Burn causing soil erosion and sedimentation of watercourse during works. | Adverse | Medium | Moderate | Short Term | Temporary | Moderate | Minor | Minor |

| Potential Impact | Impact Adverse / Beneficial | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|---|
| **Operation / Permanent** | | | | | | | | |
| Increased permanent hardstanding causing increased runoff and fluvial flood risk | Adverse | Medium | Moderate | Long Term | Permanent | Moderate | Negligible | Negligible |
| Increased permanent hardstanding causing increased surface water runoff and pluvial flood risk | Adverse | Medium | Moderate | Long Term | Permanent | Moderate | Negligible | Negligible |
| Increased permanent hardstanding causing increased sediment runoff/pollution (flushing effects) – effects on watercourses | Adverse | Medium | Moderate | Long Term | Permanent | Moderate | Negligible | Negligible |
| New crossing of Brunstane Burn causing changes to channel morphology and effects on flood risk | Adverse | Medium | Moderate | Long Term | Permanent | Moderate | Minor | Minor |

| Potential Impact | Impact Adverse / Beneficial | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|---|
| Installation of site drainage system (SuDS) etc. causing modification of natural drainage flow pathways | Beneficial | Medium | Minor | Long Term | Permanent | Minor | Minor | Minor (Beneficial) |

**Table 9.12: Water Resources, Hydrology, Flood Risk and Drainage, Summary of Proposed Mitigation**

| Reference | Proposed Mitigation and Management | Project Phase | | | |
|---|---|---|---|---|---|
| | | Pre-Construction | Construction | Operation | Deconstruction |
| HY1 | Construction Environment Management Plan (CEMP) detailing good site practices, pollution prevention and SuDS during site preparation and construction. | ✓ | ✓ | | |
| HY2 | Use of SuDS measures as per CIRIA manual and agreed with SEPA and local council. e.g. Silt traps, Erosion control measures, Buffer zone between infrastructure and watercourses. Discharge of attenuated surface water runoff from the site into the watercourses should be limited to greenfield runoff rates and treated to appropriate levels before discharge. | ✓ | ✓ | ✓ | |
| HY3 | Detailed design of new crossing of Brunstane Burn will be undertaken at detailed planning stage, along with more detailed modelling and calculations, and consultation with CEC and SEPA. | | ✓ | ✓ | |

| Reference | Proposed Mitigation and Management | Project Phase | | | |
|---|---|---|---|---|---|
| | | Pre-Construction | Construction | Operation | Deconstruction |
| HY4 | No buildings or construction work located on top of any sewers or culverted watercourses (i.e. Magdalene Burn), with an appropriate wayleave between the culvert and any buildings. | ✓ | ✓ | ✓ | |
| HY5 | Appropriate overland flow routes provided to enable any flood waters to flow through the site without flooding properties or the ECML. | | ✓ | ✓ | |
| HY6 | Residential development and SuDS are limited to areas outside the 200-year functional floodplain of the watercourses. | | ✓ | ✓ | |
| HY7 | Due to potential flood risk as a result of blockage of the Brunstane Burn culvert under the ECML, there will be no buildings or roads in land below 24m AOD, upstream of the ECML along the northern edge of the site and Finished Floor Levels of properties in this part of the site are set above this emergency level. However, other development such as open space or SuDS features could be in these areas. | | ✓ | ✓ | |
| HY8 | Regular maintenance programs for all components of the drainage system to ensure continuous effective functioning. | | ✓ | ✓ | |

## 9.12 References


- CEH, Flood Estimation Handbook (FEH) CD-ROM3;
- CIRIA (2007) Sustainable Urban Drainage Systems Design Manual for Scotland and Northern Ireland (C697);
- CIRIA (2006) Control of Water Pollution from Construction Sites – Guide to Good Practice (SP156);
- CIRIA (2010) Environmental Good Practice on Site (C692);
- CIRIA (2010) Culvert Design and Operation Guide (C689);
- City of Edinburgh Council (CEC) (2013) Edinburgh Design Guidance, Section 3.7 Water Environment, 16 May 2013;
- Control of Pollution Act 1974 (as amended) Part II: Pollution of Water;
- Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 10 (HA 216/06) 'Road Drainage and the Water Environment';
- Environmental Impact Assessment (Scotland) Regulations 1999;
- European Drinking Water Directive (Council Directive 98/83/EC);
- Kaya Consulting Ltd (2015) Proposed Development at Brunstane, Edinburgh Stage 1; Flood Risk Assessment;
- Kaya Consulting (2016) Proposed Development at Brunstane, Edinburgh: Flood Assessment;
- Pollution Prevention and Control (Scotland) Regulations 2000;
- Private Water Supplies (Scotland) Regulations 2006;
- RSPB and WWT (2012) Sustainable Drainage Systems: Maximising the potential for people and wildlife, A guide for local authorities and developers, (authors: Andy Graham, John Day, Bob Bray and Sally Mackenzie);

- Scottish Executive (2000) River Crossings and Migratory Fish: Design Guidance, April 2000;
- Scottish Government (2006) PAN 51 Planning, Environmental Protection and Regulation;
- Scottish Government (2013) PAN 1/2013 Environmental Impact Assessment;
- Scottish Government (2001) PAN 61 Planning and Sustainable Urban Drainage Systems;
- Scottish Government (2004) PAN 69 Planning and Building Standards Advice on Flooding;
- Scottish Government (2006) PAN 79 Water and Drainage;
- Scottish Government (2011) Delivering Sustainable Flood Risk Management;
- Scottish Government (2013) Surface Water Management Planning Guidance;
- Scottish Planning Policy (SPP) (June 2014);
- SEPA (1998) No. 26: Policy on the Culverting of Watercourses;
- SEPA (2003) No. 19: Groundwater Protection Policy for Scotland;
- SEPA (2004) PPG8: Safe storage and disposal of used oil;
- SEPA (2006) WAT-SG-31, Special Requirements for Civil Engineering Contracts for the Prevention of Pollution V2;
- SEPA (2006) WAT-SG-32, Guidance on the Special Requirement for Civil Engineering Contracts V2;
- SEPA (2007) PPG5: Works and maintenance in or near water;
- SEPA (2009) PPG21: Pollution incident response planning;
- SEPA (2010) WAT-SG-25, Engineering in the Water Environment Good Practice Guide – River Crossings, 2nd Edition, Nov 2010;

- SEPA (2011) PPG2: Above ground oil storage tanks;
- SEPA (2012) PPG6: Working at construction and demolition sites;
- SEPA (2013) PPG1: General guide to the prevention of water pollution;
- SEPA (2014) Water Environment (Controlled Activities) (Scotland) Regulations 2011 – A Practical Guide, Version 7.1 March 2014;
- SEPA (2014) Water body information sheet for Brunstane Burn;
- SEPA (2015) Technical Flood Risk Guidance for Stakeholders, version 9.1, June 2015;
- SEPA (2015) Position Statement to support the implementation of the Water Environment (Controlled Activities) (Scotland) Regulations 2005, WAT-PS-06-02: Culverting of Watercourses – Position Statement and Supporting Guidance, version 2, June 2015;
- Surface Waters (Fish life) (Classification) (Scotland) Directions 2007;
- The Flood Risk Management (Scotland) Act (2009);
- The Water Supply (Water Quality) (Scotland) Regulations 2001;
- Water Environment (Drinking Water Protected Areas) (Scotland) Order 2007;
- Water Environment (Controlled Activities) (Scotland) Amended Regulations 2013 (CAR);
- Water Environment and Water (Scotland) Act (WEWS Act) 2003;
- Water Framework Directive (2000/60/EC) (WFD).

# 10. GROUND CONDITIONS, HYDROGEOLOGY, GEOLOGY AND SOILS

## 10.1 List of Figures

- Figure 10.1 Desk Study Summary Plan;
- Figure 10.2 Mining Summary Plan;
- Figure 10.3 Mining Zone Plan.

## 10.2 List of Appendices

- Appendix 10.A Geo-Environmental Baseline Summary (15105-REP-003);
- Appendix 10.B Records of Consultations.

## 10.3 Introduction

This chapter assesses the potential impacts of the proposed development on geological and groundwater resources in and around the proposed development area. It also considers potential sources of ground contamination and ground gas that will need to be assessed and incorporated into the design of the proposed development. This chapter was written by IKM Consulting Ltd.

Detailed consideration of potential impacts on surface watercourses in and around the proposed site and potential impacts associated with existing and proposed drainage is presented in Chapter 9 of this ES. Detailed consideration of the potential for subsurface archaeology and the archaeological significance of historical mining features is presented in Chapter 8 of this ES.

## 10.4 Legislation, Policy and Guidance

Details of the planning policy have been outlined by GVA in Chapter 5 of this ES.

The assessment of geology, hydrogeology and contamination effects will take account of relevant legislation, policy and guidance from SEPA, Scottish Government City of Edinburgh Council, British Standards Institute and CIRIA. A full list of the key documents is included at the end of this chapter.

## 10.5 Consultation

In preparation of this chapter, consultation was undertaken with the following authorities:

- The Coal Authority (CA);
- British Geological Survey (BGS);
- The City of Edinburgh Council (CEC);
- The Scottish Environment Protection Agency (SEPA).

Details of the findings of the various consultation exercises are presented in Section 10.7 Baseline Conditions.

## 10.6 Assessment Methodology

The following section sets out the methodology used to collect the relevant baseline information and undertake an assessment of impacts to determine the significance of predicted effects.

This involved the review and collation of all existing data for the site, identification of data gaps, requests for new information, identification of receptors, and assessment of impacts on receptors.

### 10.6.1 Baseline Assessment Methodology

A Phase 1 Desk Study Report was undertaken by IKM in 2013 (13553-REP-001) and has been summarised within the 2016 Geo-environmental Baseline Summary Report (15105-REP-003, included as Appendix 10.A).

The Baseline Summary has been produced using information from a number of sources, including OS maps and aerial photographs of the site and surrounding area, historical maps, published geological maps, memoirs, mine abandonment plans, and existing site investigation data for the site and the immediately surrounding area. In addition, consideration was given to regulatory data, and SEPA and BGS information for relevant groundwater bodies, and aquifer classification and vulnerability. A number of site walkovers have also been undertaken by IKM.

The report was undertaken to establish the potential for soil and groundwater contamination at the site and the likely contamination risk posed to a range of sensitive receptors including humans and the water environment. The report was carried out in accordance with current UK guidance on the assessment of contaminated land, including the Model Procedures for the Management of Land Contamination (CLR 11). As such, the Baseline Summary includes a conceptual site model of the potential sources of contamination, migration pathways and sensitive receptors. The likely risks and potential impacts of ground contamination upon human health, the water environment and property (buildings, public utilities and vegetation) have been assessed within the Baseline Summary using this source-pathway-receptors approach.

The findings of the 2013 Phase 1 Desk Study Report have been used to inform the qualitative assessment of likely significant impacts from any potential contamination that may exist at the site.

The Baseline Summary also includes an assessment of potential mineral instability at the site. This assessment has taken place over a period of approximately five years and has involved numerous consultations with the CA and BGS.

In order to assess the impact of historical mining at the site, reference was made to readily available published data sources and historical ground investigation information, and a digital 3D ground model was developed. The model summarised all available information and has identified gaps or areas of unknowns, where future investigation will be required.

The Baseline Summary included additional information obtained for the EIA, with data from CEC, SEPA and others, as discussed in Section 10.7 Baseline Conditions.

The findings of the 2013 Phase 1 Desk Study Report and 2015 Ground Model are reported in detail in the IKM Baseline Summary in Appendix 10.A. Key findings of the 2015 report are reproduced in Section 10.7 Baseline Conditions. The baseline conditions indicated by the available information are summarised in Section 10.7 Baseline Conditions.

As part of the current assessment, the construction and operational effects of the proposed development have been considered. These have been assessed based upon the Conceptual Site Model (CSM) developed for the site. The CSM is discussed further in Section 10.7.7 of this Chapter.

Construction effects are temporary effects that may arise during the construction of the proposed development. The assessment has considered the nature and form of the proposed development in assessing the effects of the interactions of the development with the underlying ground conditions. The level of risk posed by the proposed development to human health and safety and the wider environment during construction has been based upon the CSM.

The level of risk posed by the underlying ground conditions on the proposed development has been based upon the 2015 Ground Model and the 2016 Baseline Summary.

An assessment of potential post-construction effects that may occur over the operational life of the development, arising as a result of the interaction of the proposed development with the ground conditions, has been carried out in accordance with CLR11 and various CIRIA guidance documents.

### 10.6.2 Assessment of Potential Effect Significance

There is currently no formal guidance associated with the selection of significance criteria in relation to ground conditions. Therefore, the significance criteria for the site have been based upon professional judgement and experience in dealing with similar sites, where the proposed development may be affected by issues associated with contaminated land or mining legacy.

The criteria for assessing receptor sensitivity and the magnitude of impact are detailed in Tables 10.1 and 10.2 below.

**Table 10.1: Criteria for Assessing Receptor Sensitivity**

| Sensitivity | Description | Examples |
|---|---|---|
| High | Natural features or characteristics that are of regional or national importance, or are sensitive to small scale changes. | Areas containing geological or geomorphological features considered to be of national interest, for example, SSSIs.<br>Highly permeable superficial deposits allowing free transport of contaminants to groundwater.<br>Land capable of supporting Arable Agriculture i.e. Class 1, 2 and 3.1.<br>Highly sensitive or vulnerable receptors to contaminants, e.g. schools, fragile habitat or ecosystem etc.<br>Site users, including construction workers and future residents and site users. |
| Medium | Natural features or characteristics that are deemed to be of local importance. | Areas containing features of designated regional importance, for example, Regionally Important Geological and Geomorphological Sites (RIGS).<br>Moderately permeable superficial deposits allowing some limited transport of contaminants to groundwater and surrounding surface waters.<br>Land capable of supporting Mixed Agriculture i.e. Class 3.2, 4.1 and 4.2.<br>Sensitive or vulnerable receptors to contaminants, e.g. houses with gardens, arable fields etc. |

| Sensitivity | Description | Examples |
|---|---|---|
| Low | Characteristics and features of the water environment and local ground conditions that do not make a significant contribution to the local area, or have already been significantly altered from the natural conditions. | Geological features not currently protected and not considered worthy of protection.<br>Low permeability superficial deposits likely to inhibit the transport of contaminants.<br>Land capable of supporting improved grassland or rough grazing only i.e. Class 5.1 to 7.<br>No sensitive or vulnerable receptors, e.g. pasture land, woodland etc., or protection provided by barrier effects such as hardstanding. |

**Table 10.2: Criteria for Impact Magnitude**

| Magnitude | Description |
|---|---|
| Major | A total alteration to key elements of the baseline environment resulting in fundamental changes to the environment. |
| Moderate | Alteration to the existing baseline of the Development Site resulting in partial changes to the baseline environment. |
| Minor | Minor changes to the baseline of the area, the impacts (both adverse and beneficial) would be discernible but the underlying character of the baseline would be similar to that of the baseline environment. |
| Negligible | Barely distinguishable changes from the existing baseline environment. |

The assessment of the predicted effects associated with the proposed development, during both construction and operational phases, has used the significance of impact criteria detailed in Table 10.3 below.

**Table 10.3: Significance of Impact Matrix**

| Sensitivity of Receptor | Magnitude of Impact | | | |
|---|---|---|---|---|
| | **Major** | **Moderate** | **Minor** | **Negligible** |
| **High** | Major | Major | Moderate | Minor |
| **Medium** | Major | Moderate | Minor | Negligible |
| **Low** | Moderate | Minor | Negligible | Negligible |
| **Negligible** | Minor | Negligible | Negligible | Negligible |

For the purposes of this assessment, the impacts defined as being major or moderate in significance have been considered to represent a significant environmental effect, in terms of the EIA Regulations.

In assessing the significance of an impact, and the associated effects that may result, consideration has been given both to positive (beneficial) effects and negative (adverse) effects. This matrix has been used as a basis for the assessment, which is presented in Section 10.8 Identification and Evaluation of Key Impacts.

### 10.6.3 Limitations to Assessment

It should be noted that the assessment carried out has been based upon the site history, ground and contamination conditions indicated by the desk study and ground investigation works to date. It is possible that actual conditions may vary from those assumed.

The ground investigation works undertaken to date have focussed on the bedrock geology with a view to providing a 3D model of the coal seams beneath the site. No investigation of the superficial deposits has taken place. No gas or groundwater monitoring wells were installed as part of these works, and no gas or groundwater monitoring or sampling has been undertaken to date.

Further ground investigation will be carried out prior to development in order to further characterise the site conditions.

## 10.7 Baseline Conditions

This section summarises the baseline conditions at the site, identified from the available existing desk study and ground investigation information, together with the outcome of recent consultations. More detailed information is presented in the IKM Baseline Summary in Appendix 10.A.

### 10.7.1 Site History/Land Use

Since the earliest available published map of 1852, the site has largely been used for agricultural purposes. Other site uses have included railway lines, mining, a small quarry and an isolated area of worked or potentially infilled ground. A summary of the historical development of the site is presented in Table 1 of the Baseline Summary (Appendix 10.A).

### 10.7.2 Soils

According to Soils Scotland interactive viewer, the Land Capability for Agriculture (LCA) (1:50,000) map (accessed 2016) classified the site as partly Class 1 (Land Capable of producing a very wide range of crops) and partly Class 3.1 (Land Capable of producing a moderate range of crops).

Land in these classes is prime agricultural land which is able to produce a moderate to very wide range of crops due to its physical characteristics such as soil, climate and relief. This land is also favourable for other uses, for example biofuel crops and woodland.

### 10.7.3 Geology

BGS maps for the area show that the superficial geology underlying the site is likely to comprise raised marine and glacial till deposits.

Bedrock geology is indicated to comprise sequences from the Lower and Upper Carboniferous Group. The far west of the site is underlain by the Upper Limestone Group, which is overlain by the Passage Group and the Lower Coal Measures, with bedrock of the Middle Coal Measures present to the east of the site.

Further details are presented in the IKM Baseline Summary in Appendix 10.A.

### 10.7.4 Mining

BGS maps indicated that up to 18 coal seams sub-crop beneath the site. The various sources of information indicated the presence of a number of shafts and adits located across the site.

A review of the mine abandonment plans indicated that several coal seams were mined at depth beneath the site and the surrounding area. Some areas of shallow workings may be present.

Two Coal Authority Non-Residential Mining Reports were obtained for the site. These reports were purchased by IKM on behalf of EDI in 2005 and again in 2016, due to a change in the proposed site boundary. A copy of the reports and details of the past underground coal mining and mine entries information are provided in the IKM Baseline Summary in Appendix 10.A. Some of the pertinent details are summarised below.

According to the 2016 Mining Report:

- "*Reserves of coal exist in the local area which could be worked at some time in the future*";
- *"No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence";*
- "*The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining*";
- "*The Coal Authority* has *no record of a mine gas emission requiring action*";
- "*The property has been subject to remedial works, by or on behalf of The Coal Authority, under its Emergency Surface Hazard Call Out procedures*".

A Coal Authority Hazard Report was obtained for the site to confirm details regarding the Emergency Surface Hazard Call Out works associated with the site.

Three hazards were identified at the site. One was rejected as a coal mining feature, following investigation by The Coal Authority. Another was repaired, but deemed not to be a mining feature. Hazard call out H1112, dated September 1997, was located in approximately the same location as water holes and sits indicated on historical maps and plans.

The various claims and hazards detailed in the Coal Authority mining reports are summarised in Table 10.4 below.

**Table 10.4: Summary of Subsidence Claims and Surface Hazards**

| Date | Claim or Hazard | Report disclosed | Outcome |
|---|---|---|---|
| October 1985 | Claim (location unknown) | 2005 Coal Mining Report | Rejected |
| October 1985 | Claim (location unknown) | 2005 Coal Mining Report | Repaired |
| November 1996 | Claim | 2016 Coal Mining Report | Rejected |
| September 1997 | Claim / Hazard H1112 | 2005 Coal Mining Report & 2016 Surface Hazard Report | Repaired |
| October 2003 | Claim | 2016 Coal Mining Report | Rejected |
| April 2009 | Hazard H6294 | 2016 Surface Hazard Report | Repaired, non-mining |
| December 2009 | Hazard E2384 | 2016 Surface Hazard Report | Rejected following investigation |

For full details of the mining assessment, reference should be made to the IKM Baseline Summary in Appendix 10.A. A summary of the published mining information is included as Figure 10.3.

Assessment of the mining has identified three stages of historical mining; bell-pitting and day levels (pre-1800), stoop and room, and shortwall methods in the mid to late 1800s and early 1900s, and longwall methods as recent as the 1980s.

The collapse of mine workings associated with bell pitting, shortwall and longwall methods are likely to have completed by now. However, mine working collapse associated with stoop and room methods may still be a risk.

The mine abandonment plans which indicate stoop and room workings also indicate the depths of these workings to be in excess of 169m below ground level. Therefore, these have not been considered as shallow mining.

The mining evidence and understanding of stability is summarised in Table 10.5 below. The mining zones are illustrated in Figure 10.4.

**Table 10.5: Summary of Mining Information**

| Zone | Historical Borehole Information | Coal Present at Shallow Depth? | Records of Workings | Evidence of Workings |
|---|---|---|---|---|
| 1 | None | Possible Wood Coal at depths from sub-crop to >100m. | None found. | None found. |
| 2 | None | Unlikely due to Passage Group. | None found. | None found. |
| 3 | Some (21 BH) | Yes: Sub-crops from the Lower Coal Measures. | Pits indicated on historical maps.<br>Mining plans indicate workings at depth. No records of shallow workings found. | Possible packed waste recorded in one historical borehole by open-hole methods.<br>Aerial photography indicates possible historical mine working features. |
| 4 | Some (6 BH) | Yes: Sub-crops from the Middle Coal Measures. | Mining plans indicate workings at depth. No records of shallow workings found. | None found in boreholes. |
| 5 | Limited (2 BH) | Yes: Sub-crops from the Middle Coal Measures. | None found. | Water holes and sits associated with mine working collapse noted on historical maps. |
| 6 | Limited (1 BH) | Possible. | None found. | None found. |

The lack of evidence of workings in known coal seams implies that it may be possible for coal to be present as a mineral resource beneath the site.

The Coal Authority reports detailed above indicate 21 mine entries within or on the boundary of the site. The Coal Authority reports and website did not provide detail on whether these were air shafts, adits or pit entries. Mine entry 332672-010, in the north-west portion of the site, has been remediated. The Coal Authority was unable to provide additional information with respect to the condition of the rest of the mine entries identified within the site. This is not uncommon as records are rarely made or kept.

On inspection it can be deduced that a few of the Coal Authority pits are in fact different locations of the same pit. Therefore, the total number of mine entries on the site is likely to be less than the 21 stated in the Coal Authority report.

All the mine entry locations are indicated on Figure 10.3.

### 10.7.5 Hydrogeology

Bedrock of the Upper Limestone Group is classified as being of low permeability with small yields.

The rocks of the Passage Group, Lower and Middle Coal Measures are classified as being of moderate permeability. However, mine workings and quarrying in the area are likely to impose local control on the groundwater flow regime, with mine workings potentially acting as high permeability conduits for the flow of groundwater. Groundwater quality within the coal bearing strata is generally expected to be poor.

Further details are presented in the IKM Baseline Summary in Appendix 10.A.

For hydrology, reference should be made to Chapter 9 of this ES.

### 10.7.6 Contamination

The site has largely been agricultural land, but other site uses have included railway lines and mining. It is therefore possible some form of contamination is present. Any made ground, associated with mining or railways, may contain waste products and chemical contaminants. A review of historical maps and memoirs indicates that there were no mine head works, processing plants or stockpiles located on the site. It is therefore anticipated that works (and therefore made ground) were likely restricted to the construction of isolated shafts or other minor works.

In addition, minor depressions appear to have been infilled and it is possible that localised areas of contamination may be associated with the fill material.

Other potentially contaminative historical land uses in the wider area include refuse tips, electrical sub-stations, fuel stations and vehicle repair facilities.

Consultation with the CEC Contaminated Land Officer has been undertaken with regards to: historical contamination issues on or in the vicinity of the site (within 250m of the site boundary), buried or above ground storage tanks on the site, or within 250m of the site boundary, and details of any private water supplies (PWS) on or near the site. The records of consultation are provided in Appendix 10.B. The response from CEC stated that they were not aware of any specific issues relating to contamination at the site, however highlighted railway land as being potentially contaminative. CEC had no records of derelict underground or above ground storage tanks, and there were no records of any PWS on or near the site.

SEPA was consulted with regard to environmental information relating to contamination incidents or pollution to the water environment. The records of the consultation are again provided in Appendix 10.B. In summary, SEPA stated that there are "*no records of environmental events*".

Scottish Water responded to IKMs request for an EIA Scoping Opinion from CEC on the 13th April 2016. It stated that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking-Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed development.

The findings of consultations with the CEC, SEPA and Scottish Water have been incorporated into the revised Conceptual Site Model (CSM), as presented in the Baseline Summary in Appendix 10.A.

### 10.7.7 Conceptual Site Model

A CSM has been developed based on the current development proposals and the findings of the Baseline Summary.

The residential-led mixed-use masterplan incorporates a range of land uses and related development, including:

- Up to 1,330 residential units in a mix of housing types and sizes, with 25% of the units being affordable;
- A new primary school;
- A new local centre including retail, commercial and community uses;
- The formation of three new site accesses, one from the north and two from the south, as well as a network of internal roads and paths, a replacement bridge over the East Coast Main Line (ECML) railway and other associated infrastructure;
- A green network, including open space, parkland, planting buffers to the railway and existing services within the site, and protection for the setting of listed buildings and the on-site Scheduled Monuments;
- Other structural and amenity landscaping and planting.

The results of the desk study, walkover surveys and existing intrusive investigations undertaken to date have not identified any significant sources of soil or groundwater contamination on the site. However, it is considered possible that some made ground/localised contamination may be present on the site associated with the construction of railway lines, and areas of worked ground including those associated with historic mining and quarrying activities. These areas have not yet been fully investigated. Such localised contamination could potentially include metals, inorganic contaminants such as sulphates, nitrates and ammonium, organic compounds including fuel hydrocarbons, polyaromatic hydrocarbons and polychlorinated biphenyls. In addition, asbestos containing materials may be associated with made ground across the site.

The key potential receptors identified as part of the CSM are people (construction workers and future site users), the water environment (and any associated ecological receptors), construction materials and vegetation. The baseline study has not identified any geological features of local, regional or national importance on or in the vicinity of the site. The potential receptors identified by the CSM are listed below, together with a summary of the potential pathways associated with them:

- Construction Workers may be exposed by direct dermal contact, ingestion or inhalation of soils, dust or groundwater or through the inhalation of soil gas during construction. Exposure is most likely to occur during the earthworks phase of the project, particularly in the area immediately around the old infilled quarry and minor depressions, and in the area of worked or potentially infilled ground. The most significant risks associated with exposure are likely to occur if construction workers become exposed to any asbestos that could be present within the soils on the site;

- Future Site Users may be exposed by direct dermal contact, ingestion or inhalation of soils, dust or groundwater or through the inhalation of soil gas. Exposure to any localised contamination is most likely to occur should such contamination be present at shallow depth corresponding to areas of soft landscaping. Based on the currently available information, it is considered that such contamination is unlikely to be widespread. Those involved in maintenance and landscaping through the operational life of the development are most likely to be exposed to any contamination. Soil gas could potentially accumulate in confined spaces within buildings on the site;

- Adjacent Site Users could potentially be exposed to dust generated by the site works or to any soils tracked off of the site. Pathways by which they could be exposed are dermal contact, ingestion or inhalation. Due to the likely very localised nature of any contamination present, it is considered that the degree of such exposure to contaminated material is likely to be very limited;

- The Water Environment could potentially be exposed to any localised contamination through leaching of contaminants from soils and lateral and vertical migration of contaminants in the groundwater. Based on the indicated ground and groundwater conditions, however, it is considered that vertical contaminant migration to the aquifer is likely to be limited by the presence of low permeability glacial till overlying the bedrock as well as the anticipated depth to groundwater. The aquifer beneath the site is also considered to be relatively low sensitivity, due to the mining legacy in the area and the lack of abstraction points in the vicinity of the site. The surface watercourses (and any associated ecological receptors) could potentially be affected by any contaminated run-off during the site works;

- Building Materials including buried concrete and water supply pipes could potentially be exposed by direct contact to any localised aggressive materials within the ground. The levels of such contaminants are anticipated to be very low;

- Plants in Soft Landscaping could potentially be exposed to any contaminants through direct contact and plant root uptake in areas of soft landscaping. However, no distress of existing vegetation has been noted on the site during various site walkovers, and the levels of such contaminants are anticipated to be very low.

## 10.8 Identification and Evaluation of Key Impacts

The potential receptors susceptible to contaminated land issues at the site have been summarised in Section 10.7.7 above. Other receptors at the site include the mineral resource beneath the site (if coal remains unworked) and ecological receptors (fauna) associated with the water environment.

The potential impacts on ground conditions, hydrogeology, geology and soils resulting from the proposed development and impacts on sensitive receptors from transport of contaminants are detailed below. Impacts have been separated into those which occur during construction and operational phases.

### 10.8.1 Construction

Construction activities at the site have the potential to result in wide ranging impacts to the ground conditions, human health and the water environment at both the site and in the surrounding area. In the absence of any mitigation measures, impacts could potentially result from:

- Collapse of shallow mining or mine entries;
- Grouting of shallow mine workings and mining features;
- Undertaking earthworks, including stockpiling and re-use of soils;
- Disposal of contaminated excavated material;
- Construction of new roads;
- Construction of temporary construction compounds (and the storage of pollutant materials such as concrete, fuels and oils/discharge of untreated foul drainage);
- The excavation of foundations/piling;
- Compaction of soils;
- Soil contamination from plant, fuel spillages, chemical leaks etc.

Historical mine workings are anticipated beneath the site. There is therefore considered to be a risk that ground subsidence could occur in the future, irrespective of site proposals. In the absence of mitigation, the potential impact of ground subsidence on construction activities is considered to be short term, permanent and of major adverse significance.

Grouting of shallow mine workings and mining features could potentially result in pollution of the water environment. Whilst groundwater is anticipated to be present at depth beneath the site (>30m bgl), grouting of the mine workings results in direct injection of grout into potentially flooded mining cavities, which may displace mine water if present.

The bedrock flow is anticipated to be low to medium permeability controlled by fissures and discontinuities. In the absence of mitigation, therefore, potential impacts are considered to be medium term, permanent and of moderate adverse significance.

Stockpiling and reworking of soils during earthworks activities could potentially generate dust during dry and windy conditions. Under these conditions, construction workers and users of neighbouring sites could temporarily be exposed to contamination via the inhalation of potentially contaminated dust. In the absence of mitigation, potential impacts to construction workers are considered to be short term, temporary and of moderate adverse significance.

By contrast, in the absence of mitigation and with consideration of distance, potential impacts to adjacent site users are considered to be short term, temporary and of minor adverse significance.

Re-use of materials on-site, such as cut and fill activities, reduce the movement of waste off-site. Potential impacts to the site are considered to be short term and of negligible beneficial significance.

The receptors at most risk from ground contamination are considered to be construction workers during the earthworks phase of the project. Construction activities, such as the development of new roads, construction compounds and the excavation of new foundations, drainage routes and piling will disturb ground and therefore has the potential to expose construction workers to any residual contamination associated with the soils or groundwater. Based on the baseline information, it is considered that the impacts on construction workers are considered to generally be short term, temporary and of moderate adverse significance.

Should asbestos or other more significant contamination be encountered during the works, the risk to construction workers would be short term, permanent, with major adverse significance.

Earthworks on the site may potentially result in increased leaching of any localised contamination from soils, whilst also increasing sediment contamination of site run-off. Based on the baseline information, the impact of these on the surface water quality within the burns on the site is considered to be short term, temporary, and of minor adverse significance. The impact of these activities on groundwater is considered to be negligible.

At present, it is considered unlikely that piling will be required at the site. However, should piled foundations be required, these could act as a preferential pathway for the migration of contamination to the water environment. During the installation of piles, mobilisation of any localised contamination from soils associated with increased leaching and the potential for any piling to create enhanced migration pathways, is considered to potentially have a short term, temporary, negligible adverse impact on the water environment.

Should any significant contamination be present which is unsuitable to remain on site, offsite disposal of such materials is likely be required. Based on the currently available information, it is anticipated that the impact associated with export of materials to the site represents a short term, permanent, negligible beneficial impact.

Potential sources of ground gas at the site include made ground and mine gas. Consequently, there is considered to be a potential for ground gas to accumulate within poorly ventilated confined spaces such as excavations, thereby presenting a potential risk to construction workers. Whilst such exposure can be easily mitigated, in the absence of mitigation, potential impacts to construction personnel are considered to be short term, temporary and of major adverse significance.

Compaction of soils may alter the groundwater regime. Under such circumstances, the receptor would be considered to be the superficial deposits for perched groundwater. However, as groundwater (proper) is anticipated to be present within the bedrock, and at some depth beneath the site, the impact associated with the compaction of soils is anticipated to be negligible.

Potentially polluting substances and activities will be introduced to site during construction. These include concrete pouring, storage of fuels and chemicals within site compounds and leaks of fuel and oil from construction vehicles. In the absence of any mitigation measures, the potential for accidental spillages may lead to contamination of the underlying soils, the adjacent Brunstane and/or Magdalene burns and the underlying groundwater aquifer, although the low permeability of the glacial till should offer some protection against the vertical migration of contaminants. Accordingly, potential impacts are predicted to be short term, temporary, and of moderate adverse significance.

### 10.8.2 Operation

The Baseline Summary has identified the potential for contamination to be present within the soils and groundwater at the site, although the degree and extent of any contamination present will require to be determined via future ground investigation. The proposed development includes private garden areas, communal garden areas and areas of soft landscaping and consequently potential pollutant linkages are considered with regards to future site users (including residents and visitors). In the absence of site-specific ground investigation data, potential impacts associated with soil and groundwater contamination are considered to be, at worst, long term, temporary, and of minor significance.

As above, the presence of phytotoxic contaminants (those harmful to plants) cannot be discounted and consequently, in the absence of mitigation, potential impacts on future plants and landscaped areas are considered to be, at worst, long term, temporary and of negligible adverse significance.

Post-construction, it is considered that the potential impact on adjacent site users by any contamination present is negligible.

Contamination may be encountered at the site that could potentially impact upon future buried foundations or water supply pipes if in direct contact. The extent and degree of any contamination would be confirmed by ground investigation, however in the absence of mitigation, potential impact are predicted to be long term, permanent, and of negligible adverse significance.

Long term mobilisation of any localised contamination from soils associated with increased leaching and the potential for any piling to create enhanced migration pathways, is considered to potentially have a long term, negligible adverse impact on the water environment, with the risks of contaminant pathways existing being lower than during construction of the piles.

The Baseline Summary has identified the potential for ground gas generation at the site associated with made ground and underlying mine workings. Ground gases have the potential to migrate and accumulate within confined spaces and buildings, presenting a potential risk of asphyxiation and explosion. A targeted intrusive investigation followed by a programme of ground gas monitoring will be required at the site to quantify potential risks. In the meantime, and in the absence of such data, potential impacts on future site users are considered to be, at worst, long term, permanent, and of moderate adverse significance.

As highlighted above, potential sources of ground gas have been identified at the site which could potentially migrate and accumulate within future built development leading to a potential risk of explosion. In the absence of mitigation, potential impacts on future built development are considered to be, at worst, long term, permanent, and of major adverse significance.

The site is proposed for residential development which is not considered to represent a significant source of potential contamination. Consequently, a negligible impact is considered with regards to soils and water environment receptors.

The Baseline Summary has highlighted a potential high risk of localised surface instability due to mine workings beneath the site. In the absence of mitigation, the potential impact on the future built development is considered to be long term, permanent, and of major adverse significance.

No evidence of acid mine water has been identified at the site or in the surrounding area to date. Therefore, the potential impact on the future built development is considered to be negligible.

In the areas of development, soils will be lost or buried for example during the construction of roads, foundations and new drainage. This work will be undertaken in a phased approach, in line with the Indicative Phasing Plan presented in Figure 2.7. In the absence of mitigation, the potential impact in terms of the loss of agricultural soils on the site is considered to be long term, permanent and of moderate adverse significance.

The lack of evidence of workings in known coal seams implies that it may be possible for coal to be present as a mineral resource beneath the site. This means that in some areas of the site, the development will preclude the future extraction of any intact coal. The viability of extracting coal beneath the site has not yet been assessed in detail. However, taking into consideration the ground model for the site, as discussed in the Baseline Summary in Appendix 10.A, the current value of coal, the closure of many large (and previously viable) open cast sites, and the recent closure of Longannet Power Station, the potential impact is considered to be negligible.

## 10.9 Cumulative Effects

As identified in Chapter 15 of this ES, there are four development sites in the vicinity of the proposed development with the potential to have cumulative effects in conjunction with the proposed development:

- Newcraighall North;
- Newcraighall East;
- Wanton Walls;
- Brunstane Steading.

No cumulative or interactive effects with these developments have been identified with respect to ground and groundwater conditions.

## 10.10 Proposed Mitigation

### 10.10.1 Design Evolution / In-Built Mitigation

The development has so far been designed with a view to minimising any earthworks operations. Where earthworks are required, the works will be managed to maximise materials re-use on site, in order to limit the requirements for off-site disposal as far as possible. Based on the currently available information, it is anticipated that it should be possible to limit the volumes requiring offsite disposal. Current estimates suggest that up to 80% of material generated but earthworks operations could be retained on site.

Where contaminated materials may be required to be disposed of, this activity is anticipated to be beneficial to the site baseline.

### 10.10.2 Proposed Additional Mitigation Measures During Construction

It is considered that additional mitigation measures will be adopted during both the construction and operational phases of the development.

***Ground Investigation***

As the first stage of understanding the level of additional mitigation required, intrusive environmental, geotechnical and mineral-stability investigations will be carried out prior to the commencement of construction at the site. The scope of investigation will be agreed in advance in consultation with the local authority and other regulatory bodies, including SEPA and The Coal Authority. The project archaeologist will also be consulted during the design of the investigation scope. The objectives of the investigation are:

- To determine the presence, nature and thickness of made ground; to quantify and the levels of any contamination; to enable delineation of any areas of contamination that are encountered, and identify any impact that contaminated soils and/or water may have on groundwater resources, future site users or the built environment. This may highlight the requirement for more detailed contamination risk assessments;

- To characterise gas and groundwater conditions across the site, by installation and monitoring, in particular in the vicinity of the area or worked or potentially infilled ground. This may highlight the requirement for specialist assessment of soil gas risks;

- Determine the engineering properties of soil and rock to aid with the design of new roads, structures and housing foundations;

- Confirm the presence or absence of any shallow mineral workings and determine the presence and condition of former mine entries.

The findings of the investigations and risk assessments will be used to develop remediation, grouting and earthworks strategies for the site, if required. The strategies will be agreed with the CEC and SEPA in advance of the works.

***Construction Environmental Management Plan (CEMP)***

During the construction of each phase, and in order to ensure that the works are appropriately managed, it is anticipated that a detailed Construction Environmental Management Plan (CEMP) will be developed and agreed with CEC in advance of the works. The CEMP will establish a framework to ensure that health and safety and environmental best practices are adopted throughout the works. The CEMP will include:

- A plan for handling excavation arisings and groundwater, controlling airborne dust emissions and ensuring the health and safety of site users and the general public. This will include the provision of appropriate protective clothing, the implementation of dust suppression measures, confined space best practice and provision of a watching brief to identify any areas of unexpected contamination;

- Method statements for the remediation of any areas of contamination identified by future intrusive investigations;

- A plan for the transport and disposal of any materials requiring offsite disposal, to ensure that materials do not present a risk to the public or wider environment;

- A plan to minimise the potential for contamination of the underlying soils and groundwater and the adjacent Brunstane and Magdalene burns through procedures for the storage and management of materials, spillage clean-up, use of best practice construction methods and monitoring;

- A plan to minimise the impact of PFA grouting (if required) on the water environment and associated ecological receptors. The risk assessment and mitigation would be based on BRE 509.

The above measures will be carried out in accordance with the Health and Safety Executive (HSE) publication 'Protection of workers and the general public during the development of contaminated land' and CIRIA report 132 'A guide for safe working on contaminated sites'.

In respect of public safety, boundaries would be hoarded and secured during all stages of the construction works in order to minimise the likelihood of materials migration from the site and members of the public gaining unauthorised access.

***Confined Spaces***

Risks to construction workers in confined spaces from ground gas cannot be fully assessed until completion of the ground investigation and any subsequent grouting of mine workings (due to the potential for these works to displace or change the soil gas regime beneath the site). Therefore as a standard precaution, safe procedures for entry into excavations would be developed in line with HSE and CIRIA guidance and, where necessary, adequate respiratory protective equipment (RPE) and ventilation would be provided.

***Mining Instability***

The potential for surface instability at the site as a result of mine workings would be determined by the proposed ground investigation. Initially, a stand-off from anticipated shaft locations would be adopted. Where necessary a programme of drilling and grouting would be undertaken to reduce the risk of mineral instability across the site. In addition, during the construction process, ground conditions would be continually monitored and assessed for further indications of past mine workings.

There is the potential for grouting of mine workings to alter the groundwater regime. Following ground investigation, an assessment of the groundwater regime will be made and this will be considered in the choice of grout and the control of grouting activities in accordance with BRE 509. The control of grouting activities will also be included in the CEMP.

### 10.10.3 Proposed Additional Mitigation Measures During Operation

During the operational phase, consideration could be given to the following additional mitigation measures:

- Excavation of contaminated soils from proposed garden areas and areas of soft landscaping with subsequent disposal at an appropriate facility, or the retention of soils on-site with encapsulation beneath new areas of hardstanding/building footprint or clean imported soils, thus breaking pollutant linkages. This could include the adoption of a clean capping layer as a growing medium in areas where residual, phytotoxic contamination is identified within proposed garden areas and areas of soft landscaping;

- Incorporation of ground gas mitigation measures into future buildings, such as the installation of protective membranes and/or sub-floor ventilation. Alternatively, confined spaces could be designed out of the proposed structures;

- Design of buried services and structures in accordance with the prevailing ground conditions and contaminant concentrations present at the site to ensure that the integrity of the materials are maintained at all times.

The proposed mitigation measures are summarised in Table 10.7.

## 10.11 Summary of Residual Effects and Statement of Significance

Based upon the indicated baseline conditions, it is considered that, with the adoption of the mitigation measures outlined in Section 10.10, the residual effects during both construction and operational phases of the development will be negligible, with the exception of land quality in terms of the loss of agricultural soils. There is also the potential that, for some potential risks, the mitigation works may reduce risks below those that are presented by the current condition of the site, resulting in a minor beneficial effect.

The predicted effects of the proposed development, both before and after mitigation, are summarised in Table 10.6.

**Table 10.6: Ground Conditions, Hydrogeology, Geology and Soils, Summary of Predicted Effects**

| Potential Impact | Impact Adverse / Beneficial | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | | | |
| Ground subsidence impacts on construction activities | Adverse | High | Moderate | Short term | Permanent | Major | Negligible | Negligible |
| Grouting shallow mineworkings and impact on the water environment | Adverse | Medium | Moderate | Medium term | Permanent | Moderate | Negligible | Negligible |
| Dust (caused by stockpile) and impact on construction workers | Adverse | High | Minor | Short term | Temporary | Moderate | Negligible | Negligible |
| Dust (caused by stockpile) and impact on adjacent site users | Adverse | Medium | Minor | Short term | Temporary | Minor | Negligible | Negligible |
| Re-use of material on site and impact on the site | Beneficial | Low | Negligible | Short term | Permanent | Negligible | N/R | Negligible |
| Mobilisation of contaminants (earthworks, dermal contact and ingestion) and impact on construction workers | Adverse | High | Minor | Short term | Temporary | Moderate | Negligible | Negligible |

| Potential Impact | Impact Adverse / Beneficial | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|---|
| Mobilisation of asbestos and impact on construction workers | Adverse | High | Moderate | Short term | Permanent | Major | | Negligible |
| Mobilisation of contaminants (leaching from soils) and impact on surface water quality | Adverse | Medium | Minor | Short term | Temporary | Minor | Negligible | Negligible |
| Mobilisation of contaminants (leaching from soils) and impact on the water environment | Adverse | Low | Negligible | Short term | Temporary | Negligible | N/R | Negligible |
| Mobilisation of contaminants (earthworks/piling) and impact on groundwater | Adverse | Low | Negligible | Short term | Temporary | Negligible | N/R | Negligible |
| Disposal of contaminated excavated material offsite and impact on the site | Beneficial | Low | Minor | Short term | Permanent | Negligible | N/R | Negligible |

| Potential Impact | Impact Adverse / Beneficial | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|---|
| Ground gas and impact on construction workers | Adverse | High | Moderate | Short term | Temporary | Major | Negligible | Negligible |
| Compaction of soils and impact on groundwater | Adverse | Low | Negligible | Short term | Permanent | Negligible | N/R | Negligible |
| Construction activities and impact on the soils and groundwater | Adverse | Medium | Moderate | Short term | Temporary | Moderate | Negligible | Negligible |
| **Operation Phase** | | | | | | | | |
| Residual contamination and impact on future site users | Adverse | High | Negligible | Long term | Temporary | Minor | Negligible | Negligible |
| Residual contamination and impact on vegetation | Adverse | Medium | Negligible | Long term | Temporary | Negligible | Negligible | Negligible |
| Residual contamination and impact on adjacent site users | Adverse | Low | Negligible | Short term | Temporary | Negligible | N/R | Negligible |

| Potential Impact | Impact Adverse / Beneficial | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|---|
| Residual contamination and impact on buried foundations and water supply pipes | Adverse | Low | Negligible | Long term | Permanent | Negligible | Negligible | Negligible |
| Mobilisation of contaminants (leaching from soils) and impact on the water environment | Adverse | Low | Minor | Long term | Temporary | Negligible | N/R | Negligible |
| Ground gas and impact on future site users | Adverse | High | Minor | Long term | Permanent | Moderate | Negligible | Negligible |
| Ground gas and impact on future properties | Adverse | High | Major | Long term | Permanent | Major | Negligible | Negligible |
| Contamination from new development and impact on the soils and water environment | Adverse | Low | Negligible | Long term | Permanent | Negligible | N/R | Negligible |
| Subsidence or collapse of abandoned mine workings and impact on future properties | Adverse | High | Major | Long term | Permanent | Major | Negligible | Negligible |

| Potential Impact | Impact Adverse / Beneficial | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|---|
| Mine water and impact on future properties | Adverse | Medium | Negligible | Long term | Permanent | Negligible | Negligible | Negligible |
| Loss of agricultural soils | Adverse | High | Minor | Long term | Permanent | Moderate | Moderate | Moderate |
| Loss of coal resource | Adverse | Low | Minor | Long term | Permanent | Negligible | Negligible | Negligible |

**Table 10.7: Ground Conditions, Hydrogeology, Geology and Soils, Summary of Proposed Mitigation**

| Reference | Proposed Mitigation and Management | Project Phase | | | |
|---|---|---|---|---|---|
| | | Pre-Construction | Construction | Operation | Deconstruction |
| GC1a | GI to determine made ground and contaminants. | ✓ | ✓ | | |
| GC1b | GI to facilitate gas and groundwater monitoring. | ✓ | ✓ | | |
| GC1c | GI to inform geotechnical design. | ✓ | ✓ | | |
| GC1d | GI to determine risk of subsidence. | ✓ | ✓ | | |

| Reference | Proposed Mitigation and Management | Project Phase | | | |
|---|---|---|---|---|---|
| | | Pre-Construction | Construction | Operation | Deconstruction |
| GC2 | Construction Environment Management Plan (CEMP) detailing the good site practices to: prevent or control dust; deal with unexpected ground conditions; mitigate against the migration of contaminants; undertake remediation and off-site disposal works and manage installation of grout to prevent pollution of groundwater. | | ✓ | | |
| GC3 | Good ventilation; gas monitoring prior to entering confined spaces; confined spaces training. | | ✓ | | |
| GC4a | Creation of exclusion zones around shafts (if required). | ✓ | ✓ | | |
| GC4b | Grouting of mine workings. | ✓ | | | |
| GC4c | Choice of grout and site control of grouting activities. | ✓ | ✓ | | |
| GC5 | Relocate contamination off-site or provide a barrier to break pathways. | ✓ | ✓ | | |
| GC6 | Gas membranes and/or design-out confined spaces. | | ✓ | | |
| GC7 | Selection of construction materials to resist any aggressive ground conditions. | | ✓ | | |

## 10.12 References


- BRE 509, Stabilising Mine Workings with PFA grouts, Environmental Code of Practice, 2nd Edition, 2009;
- BS EN 1997-1:2004 – Eurocode 7: Geotechnical design – Part 1: General rules;
- BS EN 1997-1:2007 – Eurocode 7: Geotechnical design – Part 2: Ground investigation and testing;
- CIRIA. Report 132, A Guide for Safe Working on Contaminated Sites, January 1996;
- CIRIA. Report C532 Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (CIRIA, 2001);
- CIRIA. Report C552, Contaminated Land Risk Assessment. A Guide to Good Practice, January 2001;
- City of Edinburgh Council, Edinburgh Local Development, Second Proposed Plan (2014);
- Environment Agency. Model Procedures for the Management of Land Contamination, Contaminated Land Report 11, September 2004;
- Health and Safety Executive (HSE). Protection of Workers and the General Public during the Development of Contaminated Land (Health and Safety Guidance), December 1991;
- IKM Consulting Ltd. Brunstane East, Development Appraisal, 13553-REP-001, February 2013;
- IKM Consulting Ltd. New Brunstane, Geoenvironmental Baseline Summary, 15105-REP-003, May 2016;
- Kaya Consulting Ltd. Proposed Development at Brunstane, Edinburgh, Stage 1; Flood Risk Assessment, December 2015;
- PAN 33 Development of Contaminated Land (Scottish Executive, 2000);

- PAN 51 Planning, Environmental Protection and Regulation (Scottish Executive, 2006);
- Part 11A of the Environmental Protection Act 1990 (EPA);
- PPG1: General Guide to the Prevention of Pollution (SEPA, 2001);
- PPG6: Working at Construction and Demolition Sites (Environment Agency, 2010 – 2nd Edition, 2012);
- Scottish Planning Policy (Scottish Government, 2010);
- SEPA Policy 19 Groundwater Protection Policy for Scotland (Version 3, 2009);
- Special Requirements for Civil Engineering Contractors for the Prevention of Pollution v2 (SEPA, 2006);
- The Contaminated Land (Scotland) Regulations 2000 (as amended);
- The Control of Pollution Act 1974 (COPA), as amended;
- The EC Groundwater Directive (Directive 2006/118/EC);
- The EC Water Framework Directive (WFD) (Directive 2001/60/EC);
- The Environmental Act 1995;
- The Environmental Protection (Duty of Care) (Scotland) Regulations 2014;
- The Private Water Supplies (Scotland) Regulations 2006;
- The Waste (Scotland) Regulations 2011;
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR);
- The Water Environment and Water Services (Scotland) Act 2003 (WEWS A).

# 11. TRAFFIC, TRANSPORTATION AND ACCESS

## 11.1 List of Figures

- Figure 11.1 Location of specific committed developments;
- Figure 11.2 Road links in the study area;
- Figure 11.3 Proposed vehicular site access locations;
- Figure 11.4 Connectivity.

## 11.2 Introduction

This chapter assesses the likely significant environmental impacts of the proposed development on the surrounding road network, public transport, cyclists and pedestrians.

The assessment methodology and impact significance criteria used are explained, prior to setting out baseline conditions. An assessment of potential impacts for both the construction and operational phases of the proposed development is then set out, with mitigation measures prescribed to offset any potential impacts as far as reasonably practicable. Residual effects are then assessed, taking into account all of the proposed mitigation measures.

This chapter has been prepared by Transport Planning Ltd and is based on a Transport Assessment (TA), also by Transport Planning, which is submitted separately in respect of the application for planning permission in principle.

The residential-led mixed-use masterplan incorporates a range of land uses and related development, including:

- Up to 1,330 residential units in a mix of housing types and sizes, with 25% of the units being affordable;
- A new primary school;
- A new local centre including retail, commercial and community uses;

- The formation of three new site accesses, one from the north and two from the south, as well as a network of internal roads and paths, a replacement bridge over the East Coast Main Line (ECML) railway and other associated infrastructure;

- A green network, including open space, parkland, planting buffers to the railway and existing services within the site, and protection for the setting of listed buildings and the on-site Scheduled Monuments;

- Other structural and amenity landscaping and planting.

## 11.3 Legislation, Policy and Guidance

Planning policy matters surrounding the site are fully described in Chapter 5 of this ES.

The traffic impacts associated with the proposed development were assessed with reference to published guidance and baseline studies. The following guidance documents have formed the basis of the assessment in this chapter of the Environmental Statement:

- Institution of Highways and Transportation (IHT): 'Guidelines for Traffic Impact Assessment', October 1994 ('the IHT Guidelines);

- Scottish Government: 'Transport Assessment Guidance', 2012 ('the Scottish Government Guidelines');

- Institute of Environmental Assessment (IEA): 'Guidelines for the Environmental Assessment of Road Traffic' 1993, (the IEA Guidelines) (updated 2003).

The 'Guidelines for the Environmental Assessment of Road Traffic' recommend that *inter alia* the following list of environmental impacts should be considered:

- Severance;

- Driver delay;

- Pedestrian delay;

- Pedestrian amenity;

- Accidents and safety.

In addition to the possible impacts, the lEA Guidelines recommend particular groups and special interests which should be considered when reviewing the traffic related environmental impacts associated with development. These can include:

- People at home;
- People in work places;
- Sensitive groups including children, elderly and disabled;
- Sensitive locations, e.g. hospital, churches, schools, historical buildings;
- People walking;
- People cycling;
- Open spaces, recreational sites, shopping areas;
- Sites of ecological/nature conservation value;
- Sites of tourist/visitor attraction.

The IHT Guidelines recommend that reference should be made to the IEA Guidelines in the production of Environmental Statements for large developments.

The methodology utilised for this assessment was taken from a combination of approaches from the above documents and was selected to best represent current views and policy trends. The main focus is the impact on the local road network and associated users.

## 11.4 Assessment Methodology

To assess the impacts of additional traffic generated by the proposed development during the construction phases, as well as during the operational phase, the following was undertaken:

- The road sections likely to be affected were identified;
- The existing character of the road network was determined;
- The existing traffic levels on the road network were determined;

- The year of assessment was identified;
- The future base traffic levels were predicted;
- The additional traffic generated by the proposed development was estimated;
- The potential impacts of the additional traffic were assessed.
- Residual effects were assessed;
- Summary and conclusions were provided.

In addition, a review of existing public transport provision has been carried out, and a qualitative assessment of the likely impacts of the proposed development made. The IEA guidelines do not include any definition in relation to the effect on public transport users. However, changes in passenger numbers can affect delay and journey performance for non-development passengers, although the impacts are only likely to be significant when the system is predicted to be at or close to capacity; typically during commuter peak periods, and when increases are sufficiently great as to result in perceptible changes to performance.

The approach to the assessment of road traffic is to establish baseline traffic patterns and project these traffic patterns into the future using standard growth factors, then estimate the likely traffic associated with the development proposals thereby enabling consideration of the significance of the percentage changes in traffic in both 'with' and 'without' development scenarios with regard to the advice contained in the published guidance.

### 11.4.1 Significance Criteria

The criteria utilised in determining the significance level of traffic associated with the proposed development were firstly sourced from the Scottish Government Guidelines. This document states the following regarding perceived traffic impacts:

*"The significance of a traffic impact depends not only on the percentage increase of traffic but the available capacity. A 10% increase on a lightly trafficked route may not be significant, whereas a 1% increase on a congested motorway will be".*

The IHT Guidelines state the following in paragraph 3.3.5:

*"In general, the impact of marginal changes in traffic on the perceptible environment is less sensitive than changes in traffic flows at junctions in the surrounding network. It is recommended that the following criteria should be adopted to assess whether particular links in the network should be subject to environmental assessment:*

- *Include traffic links where traffic flows will increase by more than 30% in the opening year as a result of development traffic;*
- *Include any other sensitive areas affected by traffic increases of at least 10%, or similar changes in HGV movements".*

Similarly, the IEA Guidelines make reference to the above as two broad rules that can be used as a screening process to delimit the scale and extent of the assessment. Increases in traffic flow which amount to less than 10% of the baseline are generally considered to have a negligible impact on the road network given that daily fluctuations equal to this figure can occur.

For the purposes of this assessment, the significance of impacts was assessed on the basis of the above guidance and also on the specific local characteristics of the road network using professional judgement and experience of similar developments.

### 11.4.2 Assessment of Magnitude

The magnitude of traffic impacts is a function of base traffic volumes at the year of opening, the percentage increase due to the proposed development and the changes in type of traffic. The IEA Guidelines identify thresholds for impact magnitude based on percentage change in traffic levels. The magnitude of impacts arising from the increase in traffic volumes (taken as being either the traffic flow including all vehicles, or the Heavy Goods Vehicle (HGV) traffic flow, whichever is higher) is categorised as follows:

- Substantial: above 90% increase in traffic levels;
- Moderate: between 60% and 90% increase in traffic levels;

- Slight: between 30% and 60% increase in traffic levels;
- Negligible: under 30% increase in traffic levels.

The determination of the magnitude of the impacts was undertaken by reviewing the proposed development, establishing the parameters of the road traffic that have the potential to cause an impact, and quantifying these impacts against the criteria set out above.

Consideration was given to the composition of the traffic on the road network under both existing and predicted conditions. For example, cars and Light Goods Vehicles (LGVs) have less impact on traffic and the road system than HGVs.

### 11.4.3 Assessment of Significance

The assessment of the significance of impacts was based on the categories of sensitivity and magnitude in accordance with the approach outlined above, as shown in Table 11.1.

**Table 11.1: Significance of Impacts**

| Magnitude | Sensitivity | | | |
|---|---|---|---|---|
| | **High** | **Medium** | **Low** | **Very Low** |
| **Substantial** | Substantial | Substantial | Moderate | Negligible |
| **Moderate** | Substantial | Moderate | Minor | Negligible |
| **Slight** | Moderate | Minor | Minor | Negligible |
| **Negligible** | Negligible | Negligible | Negligible | Negligible |

Impacts are identified as being adverse where there is an increase in predicted traffic flow associated with the proposed development and beneficial where there is a predicted decrease. Impacts are also assessed as being temporary or permanent, and a spatial significance is assigned where appropriate (i.e. site-wide, local, district, regional etc.).

### 11.4.4 Consultation

Consultation with City of Edinburgh Council (CEC) was carried out via a pre-application meeting and a written response on EIA matters dated 27th April 2016. A summary of consultation responses relevant to this chapter is as follows:

- This chapter needs to include pedestrians and cyclists not just vehicles' access and movements;
- Transport requirements are set out in the Edinburgh Local Development Plan Second Proposed Action Programme (May 2015);
- The scope of any transport impact assessment should be based on sound assumptions - on car parking and on the modal spilt which will also be significantly influenced by pedestrian/cycle infrastructure;
- Whilst the proposed survey sites [for the Transport Assessment] are acceptable, substantial additional assessment is required. Threshold sensitivity needs to be considered in the context of the actual numbers not just percentages; and committed sites list should include those set out in the Council's documents, including the Local Development Plan;
- The EIA needs to include the potential for green network linkages between the Brunstane site and sites and proposals nearby, including clearly cycle and path connections through the development to the proposed East Lothian strategic route, other nearby existing routes, the East Lothian Segregated Active Travel Corridor;
- The phasing of infrastructure will also be critical to environmental impact – particularly in relation to transport infrastructure like the bridges and bus links.

A complete response to all EIA Scoping comments raised is presented in Appendix 4.B of this ES.

### 11.4.5 Limitations and Assumptions

The TA and hence this ES chapter, has been based on an assessment of up to 1330 residential units being developed at the site.

In line with best practice, the calculation of existing and future traffic flows in the vicinity of the site, as reported in the TA, has included a number of 'committed developments', comprising the nearby housing proposals at Newcraighall North and Newcraighall East. The location of these committed developments is indicated on Figure 11.1. There is a distinction between 'committed developments' assessed for the purposes of TA and 'cumulative developments' assessed for the purposed of the Cumulative Effects Assessment presented in Chapter 15 of this ES.

Additional development in and around the area has been accounted for in this assessment by applying National Road Traffic Forecast 'High' growth factors to surveyed traffic rather than the more commonly used 'Low' or 'Central' factors. Application of 'High' growth therefore accounts for the effects of wider committed development in the area. This approach has also been used by CEC in modelling for cross-county border traffic impacts, as confirmed by CEC at the Local Development Plan hearing sessions.

Where existing traffic levels are exceptionally low, any increase in traffic flow is likely to result in traffic levels which exceed the percentage thresholds for magnitude outlined in the Assessment of Magnitude section above. On the other hand, where existing traffic flows are already very high, a further increase in traffic may only result in a very small percentage increase, which could nonetheless be significant, as roads operating near or at capacity become more sensitive to an increase in traffic.

Assessment of percentage impact magnitude is of less relevance to this ES chapter, which is based around all day traffic flow, but of more relevance to the consideration of percentage impacts at peak hours which are subject to different impact thresholds (typically 5 - 10%). These peak time traffic impacts are assessed in more detail in the Transport Assessment that accompanies thee application.

A detailed capacity study on local bus services has not been undertaken and professional judgement has therefore been used to determine the likely impact of the proposed development on public transport services. Any adverse impact on public transport performance should be considered in the context where increased demand should be viewed as an environmental benefit, as it reduces the adverse effects associated with private car use (e.g. noise, pollutant emissions, etc.).

## 11.5 Baseline Description

To establish the study area, a threshold assessment was undertaken for the TA in accordance with the IHT Guidelines, which state the following:

*"It is recommended that the threshold approach should be used to establish the area of influence of the development. Hence the area should include all links and associated junctions where traffic to and from the development will exceed 10% of the existing 2-way traffic (or 5% in congested or other sensitive locations)".*

The results of the threshold assessment based on the above criteria indicated that the area of influence beyond the new site accesses that should be considered in the TA, and hence this ES Chapter, comprises the road links listed below and identified on Figure 11.2:

- Newcraighall Road West of site;
- Newhailes Road East of site;
- A1 South of Milton Road;
- Milton Road West of site;
- Milton Road East of site;
- Eastfield Road South of Milton Road East;
- Newcraighall Road West of A1;
- Newcraighall Road West of retail park roundabout;
- Newcraighall Road West of Fort Kinnaird roundabout;

- Milton Road West of A1 junction;
- Duddingston Park at Milton Road;
- Brunstane Road;
- Gilberstoun;
- Eastfield Road North of Milton Road East;
- Internal Development Road;
- Newcraighall Road between site access points.

### 11.5.1 Existing and Consented Access Arrangements

The site will connect into the approved housing roads (and hence Newcraighall Road) currently under construction to the southwest of the site as part of Newcraighall North. Additionally, a new access link is proposed to Milton Road East, emerging from the site alongside the eastern side of the existing cemetery.

The approximate positions of the proposed vehicular site access locations are indicated on Figure 11.3.

Newcraighall Road and Milton Road East afford connections with the A1 to the west and A199 to the east, these roads assisting with distribution of traffic throughout the area, providing links between, for example, the wider strategic road network of the A720 and nearby residential roads.

### 11.5.2 Baseline Traffic Assessments

Baseline (2015) traffic flows have been established from traffic survey data collected by a specialist traffic survey company for the TA and consideration of committed development traffic, and these were used to produce Annual Average Daily Traffic (AADT) flows at the road links identified above and in Table 11.2 below.

Potential trip generation for the proposed development was estimated using the established trip rates for the adjoining Gilberstoun development (refer to the TA for further detail) and applying these rates to 1330 dwellings.

For the purposes of assessment, it has been assumed that construction would commence in 2017/18 with the initial phase of development completed in 2022. This phasing has been developed on a robust build out programme assuming multiple land parcels being developed at one time.

This assumes that there could be in the region of 425 dwellings constructed in the western part of the site together with 200 in the eastern part but no internal road bridge connection over the East Coast Main Line (ECML).

The later phase (i.e. full build out) has been assumed to occur in 2025 with the internal road bridge connection in place.

The assessment base years have therefore been set as 2020 and 2025 and the base year traffic data does not include the proposed development but does include committed developments. Base year AADT flows for road traffic have been calculated and are summarised in Table 11.2 below.

**Table 11.2: Base Year (2020 / 2025) AADT Flows**

| Road Link | 2020 Base Including Committed | 2025 Base Including Committed |
|---|---|---|
| Newcraighall Road West of site | 11,308 | 11,987 |
| Newhailes Road East of site | 10,146 | 10,791 |
| A1 South of Milton Road | 33,214 | 35,359 |
| Milton Road West of site | 6,209 | 6,611 |
| Milton Road East of site | 6,209 | 6,611 |
| Eastfield Road S of Milton Road East | 14,932 | 15,900 |
| Newcraighall Road West of A1 | 19,712 | 20,952 |
| Newcraighall Road West of retail park roundabout | 14,104 | 14,994 |
| Newcraighall Road West of Fort Kinnaird roundabout | 13,639 | 14,503 |

| Road Link | 2020 Base Including Committed | 2025 Base Including Committed |
|---|---|---|
| Milton Road West of A1 junction | 6,015 | 6,404 |
| Duddingston Park at Milton Road | 7,409 | 7,889 |
| Brunstane Road | 1,810 | 1,927 |
| Gilberstoun | 1,401 | 1,491 |
| Eastfield Road North of Milton Road East | 9,530 | 10,148 |
| Internal Development Road | 0 | 0 |
| Newcraighall Road between site access points | 9,707 | 10,324 |

***Note: Combined AADT flows were calculated using network peak hour traffic flows and represent two-way traffic movements on individual road links.***

### 11.5.3 Access by Pedestrians and Cyclists

***Pedestrian Access***

There are pedestrian facilities on Milton Road and Newcraighall Road where there are links to the wider pedestrian network and public transport facilities.

Save for an existing link under the railway bridge at Newcraighall Road, the available footways provide good access to local public transport links, with the nearest bus stops located on Newcraighall Road and Milton Road East. Railway services are also reachable on foot at Newcraighall and Brunstane stations with Musselburgh also lying within walking distance.

Footpath connections also exist alongside the Brunstane Burn to the north of the site.

The existing footway networks around the application site are mainly provided to a modern standard with most crossing points benefiting from dropped kerbs and tactile paving.

Lighting is also in place throughout the existing developed area. The existing connections provide access to a number of local everyday services.

Other destinations within walking distance of the site are shown on Figure 11.4 which illustrates the surrounding site connectivity.

An existing major retail area at The Fort / Kinnaird Park is located approximately 1km (approximately 15 minutes walking time) from the centre of the site, within the identified walking distance threshold set out in Scottish Government Transport Assessment Guidance.

***Cycle Access***

Cycle access in the vicinity of the site is also available with National Cycle Route (NCR) 1 easily accessible. Cycle provision is also shown on the 'Explore Edinburgh by Bike Map (North East)' produced by CEC.

***Core Path Linkages***

The cycle route described above also forms one of the core paths in the area (CEC5) and this path (Innocent Railway) allows links with the wider core path network.

### 11.5.4 Public Transport

***Bus Service Provision***

Public transport access in the vicinity of the site is principally provided by bus services along Newcraighall Road and Milton Road East. These routes carry frequent, regular services between the site area and the City Centre.

***Rail***

Brunstane, Newcraighall and Musselburgh stations are all within walking distance of the site. Travel by heavy rail also offers a real travel alternative for residents of the area, particularly given the short journey times to reach Edinburgh City Centre.

### 11.5.5 Proposed Site Access and Circulation

Pedestrian and cycle permeability of the site is high with connections achievable on every compass point. From the south connections are available towards the under construction Newcraighall North development and hence to Newcraighall Road. Linkages to the north and onto Milton Road East can be attained at the proposed access point alongside the existing cemetery.

East and westwards the Brunstane Burn path enables connectivity and the Gilberstoun and Daiches Braes areas will also be reachable by foot/cycle. Available links also offer integration with the core path network.

The site will also be developed to be permeable to Public Transport services enabling bus accessibility from Milton Road East into the site, across the railway and onto Newcraighall Road. Services could then benefit from the protected route southwards via Newcraighall East into East Lothian and Queen Margaret University.

Three points of vehicular access are proposed for the site. The site would connect into access roads being constructed to serve the adjacent Newcraighall North development permitting two access options onto Newcraighall Road. The site would take a third access point directly from Milton Road East and across the Brunstane Burn.

The combination of these vehicular and pedestrian/cycle access points together with the public transport penetration opportunity and the network of internal streets proposed for the site is intended to result in a connected, permeable development maximising opportunities for connectivity.

## 11.6 Assessment of Potential Effects

The proposed development will result in a change in the volume and composition of traffic accessing the site parcel(s), both during the construction and operational phases.

As noted in Section 11.5.2, potential trip generation for the proposed development was estimated using the established trip rates for the adjoining Gilberstoun development (refer to the TA for further detail) and applying these rates to 1,330 dwellings.

This section therefore considers the potential impacts of the development on the surrounding road network.

It should be noted that traffic capacity testing carried out as part of the TA has illustrated capacity pressures at peak times, prior to development occurring, particularly at the Newcraighall Road / A1 junctions and at Milton Link.

Development of the application site parcels would add traffic to those points on the road network that are already projected to be under capacity pressure at peak times.

Therefore, as part of the TA and Local Development Plan Action Plan process, the means of dealing with peak time capacity pressures on the surrounding road network has been investigated.

### 11.6.1 Proposed Development

***Public Road Network***

To assess the potential impact of predicted operational traffic upon phased completion of the proposed development in 2020 and 2025, consideration was given to total final year (i.e. with the proposed development) AADT flows.

Projected traffic flow associated with the proposed development was added to the data contained in Table 11.2 in order to provide the 2020 and 2025 total final year traffic flows presented in Table 11.3.

**Table 11.3: Future Year (2020 / 2025) AADT Flows Including Proposed Development**

| Road Link | 2020 Base Including Committed from Table 11.2 | 2020 Total Traffic Including Development | 2020 % Change | 2025 Base Including Committed from Table 11.2 | 2025 Total Traffic Including Development | 2025 % Change |
|---|---|---|---|---|---|---|
| Newcraighall Road West of site | 11,308 | 12,461 | 10.2% | 11,987 | 13,563 | 13.15% |
| Newhailes Road East of site | 10,146 | 10,365 | 2.16% | 10,791 | 11,100 | 2.86% |
| A1 S of Milton Road | 33,214 | 33,462 | 0.75% | 35,359 | 35,774 | 1.17% |
| Milton Road West of site | 6,209 | 6,609 | 6.44% | 6,611 | 7,380 | 11.63% |
| Milton Road East of site | 6,209 | 6,451 | 3.89% | 6,611 | 7,093 | 7.30% |
| Eastfield Road S of Milton Rd East | 14,932 | 15,151 | 1.46% | 15,900 | 16,330 | 2.70% |
| Newcraighall Road West of A1 | 19,712 | 20,504 | 4.02% | 20,952 | 22,052 | 5.25% |
| Newcraighall Road West of retail park roundabout | 14,104 | 14,625 | 3.69% | 14,994 | 15,711 | 4.78% |
| Newcraighall Road West of Fort Kinnaird roundabout | 13,639 | 14,084 | 3.26% | 14,503 | 15,099 | 4.11% |
| Milton Road West of A1 junction | 6,015 | 6,241 | 3.76% | 6,404 | 6,834 | 6.71% |

| Road Link | 2020 Base Including Committed from Table 11.2 | 2020 Total Traffic Including Development | 2020 % Change | 2025 Base Including Committed from Table 11.2 | 2025 Total Traffic Including Development | 2025 % Change |
|---|---|---|---|---|---|---|
| Duddingston Park at Milton Road | 7,409 | 7,424 | 0.20% | 7,889 | 7,919 | 0.38% |
| Brunstane Road | 1,810 | 1,818 | 0.42% | 1,927 | 1,950 | 1.17% |
| Gilberstoun | 1,401 | 1,416 | 1.08% | 1,491 | 1,514 | 1.52% |
| Eastfield Road North of Milton Road East | 9,530 | 9,553 | 0.24% | 10,148 | 10,193 | 0.45% |
| Internal Development Road | 0 | North end flow 641 South end flow 1,365 | n/a | 0 | North end flow 1,252 South end flow 1,877 | n/a |
| Newcraighall Road between site access points | 9,707 | 10,477 | 7.92% | 10,324 | 11,380 | 10.22% |

Consideration was then given to the percentage increase in AADT between traffic levels that would exist in 2020 and 2025 with and without the proposed development, in order to establish the magnitude and level of significance of change. This is also shown in Table 11.3.

Table 11.3 shows that the percentage increase in AADT between the final year (2025) base plus committed and total traffic scenarios on all modelled road-links would be of negligible magnitude according to the IEA Guidelines (i.e. less than 30%), which indicates that, in line with the criteria presented in Table 11.1, the significance of potential impacts at these locations would be negligible.

It is anticipated that some development traffic (approximately an additional 850 vehicles AADT) would travel south via the A1 towards the Old Craighall Interchange, equating to approximately 65 trips at peak times. Given the existing level of traffic travelling through the Old Craighall Interchange, this development traffic would cause a negligible impact to its operation.

Quantification of development traffic percentage impacts on the internal development link road cannot be made as no road currently exists. However, the maximum projected level of traffic of 1,877 trips is in line with projected future levels on essentially residential roads such as Gilberstoun and Brunstane Road.

***Accidents and Safety***

With regard to operational traffic, the junction capacity assessments undertaken demonstrate that, with the addition of development-related traffic, the network would continue to operate in keeping with its present operational characteristics. It is therefore considered that the predicted increase in operational traffic would have a potential impact of negligible significance on accidents and safety on the local road network. The TA submitted separately in respect of the planning application contains a detailed assessment of junction operation and development impacts during peak hours.

***Disruption and Driver Delay***

With reference to the IEA Guidelines, the potential impact from disruption and driver delay resulting from operational traffic is considered to be of negligible significance.

***Fear, Intimidation and Pedestrian / Cyclist Amenity***

Traffic increases related to operation of the proposed development are expected to have a potential impact of negligible significance on pedestrian or cyclist amenity and levels of fear and intimidation. Indeed, the development's layout has been designed to ensure full permeability for both pedestrians and cyclists, and would link into existing networks, which would further serve to minimise potentially adverse impacts.

***Severance***

With reference to the IEA Guidelines, increases in traffic flows on surrounding roads are not expected to be significant once the proposed development is operational. The potential impact of severance is therefore considered to be of negligible significance.

***Public Transport***

Existing public transport services offer an attractive travel option for occupiers of the proposed development. It is considered that additional public transport demand can be readily accommodated by existing provision. Additionally, the link road through the site enables the introduction of a bus route and discussion with Lothian Buses has revealed a willingness to divert / provide services once this link becomes available. As such, the significance of impacts on public transport capacity arising from the proposed development is anticipated to be negligible or even slightly positive.

### 11.6.2 Summary of Traffic Impacts - Operation

It is not considered that the increased levels of operational traffic will have a significant impact upon pedestrian severance, pedestrian delay, or driver delay. The traffic profiles associated with the proposed development illustrate percentage uplifts that fall within the negligible criteria as set out in the IEA guidelines.

It is considered that the additional effect of operational traffic on pedestrian amenity, fear and intimidation will be negligible. Adequate footways, crossing points etc. exist within the area and the development proposals will result in further improvements to connectivity for those on foot or cycle in the area.

Newcraighall Primary School has been identified as a potentially sensitive location. Pedestrian amenity / crossing of Newcraighall Road has been more fully considered in the TA that accompanies the planning application. During construction, measures will be required to keep the routes to and from school secure. These are set out in Section 11.7 of this report.

### 11.6.3 Future Traffic Associated with Construction

***Public Road Network***

The total period of construction for the proposed development in its entirety would be around 9 years, with enabling works anticipated to commence in 2017 and physical construction likely to commence in 2018. Construction related traffic would comprise HGVs and light traffic associated with personnel travelling to the site. These would use the road network for the duration of construction related activities.

It is expected that construction of the proposed development would create additional traffic on the A1, Milton Road and Newcraighall Road.

The assessment now considers a forecast of the anticipated levels of construction traffic during the construction phase.

Traffic movements associated with the construction phase will include cars and light goods vehicles together with heavy goods vehicles (HGVs) delivering construction materials and plant to the site.

As indicated in Section 11.7 below, a Construction Traffic Management Plan (CTMP) will be required to address the detailed elements of construction traffic management. The plan will include proposals for temporary traffic and environmental management measures to be adopted during construction where necessary and provide supplementary information on good practice (such as communication with residents groups) that will be adhered to during the development of each phase.

Detailed information regarding the number of construction vehicle movements is dependent on the phasing of development, the number of house builders on site at one particular time etc. This information is not currently available and in the absence of this information, the number of construction vehicle movements associated with the application site has been estimated as shown in Table 11.4 below.

**Table 11.4: Summary of Construction Traffic Estimates**

| Vehicle Type | Function | Approximate Two-way Vehicle Movements per Day | Notes |
|---|---|---|---|
| Car / small van (LGV) | Staff travel / small deliveries | 200 | Assumed 100 staff arrive / leave at peak times (200 trips daily) plus a further 100 trips in / out combined for small deliveries etc. |
| HGV | Plant and machinery | 20 | Larger plant requirements / timber frame etc. assumed as 10 in / out per day. |
| Total | | 220 | |

The table assumes a worst case scenario as it assumes 100 staff arrive in separate vehicles. In reality, some car-pooling or bussing of staff is likely which would reduce these numbers.

It is also the case that within each phase of development, construction will follow a number of stages which will generate a range of traffic impacts. These can be broken down generally as outlined below:

- Site formation - earthworks plant will be delivered to site on low-loaders during this phase plus temporary accommodation will be required for any site compounds;

- Enabling Works - these will require heavy earthmoving plant including excavators, dump trucks, together with other items of plant and machinery. A degree of large plant is likely to be delivered to site by low loader, however, once that plant is on site the enabling works will be relatively well contained within the site boundary. There will be regular though infrequent deliveries of consumables during this period;

- Site infrastructure and Drainage - drainage pipework, ducting, kerbs etc. will be delivered to site over this period. These materials are likely to arrive from a range of sources most likely being stockpiled on site for use as and when required. Road laying will require spreaders, rollers and tippers to surface the site circulation roads;

- Foundation and Dwelling Construction - the commencement of the main construction works will require additional plant and craneage, although some other plant can be taken off site. Regular deliveries of ready-mixed concrete may take place during these works, though this could be limited if batching takes place on site;

- Housing and Road Construction - excavations will generate cut and fill processes which may require tipper transport to and from the site. Drainage materials such as pipes etc. will also require delivery as will any aggregates and bituminous materials.

Final estimates of construction traffic will only be known in detail following appointment of the main contractor, sub-contractors and letting of supply contracts for materials.

It is not expected that heavy construction traffic would use local roads other than Milton Road and Newcraighall Road for the distance between the A1 and the site access points. Newcraighall Road and Milton Road are already used by HGVs and it is considered that they have sufficient reserve capacity to accommodate the additional HGV traffic associated with the construction phases with minimal impact. While estimates of construction traffic flows cannot be finalised at this stage, it is expected that the increase in traffic due to construction would be insignificant, within the expected day-to-day variation in traffic on these roads, and would be unlikely to have any detrimental impact in terms of operational capacity.

It is not anticipated that any roads will require temporary closure during the construction of the project though there is possibility that temporary traffic management may be required during works to form the access junctions which may introduce some temporary delays to traffic. However, in the event of any such works (or indeed the requirement for any closure), the extent, and duration of works (along with any alternative routes) will be agreed in advance with the Council and notified to local residents.

The potential impacts of construction traffic on operational capacity would, therefore, be of negligible significance.

***Accidents and Safety***

Professional judgement and discretion is required in order to determine any detrimental impacts associated with increased traffic on accidents and safety. Given the relatively minor increases in construction traffic anticipated for the proposed development, it is considered that there would be an insignificant impact on the capacity and operation of the local road network.

Accordingly, construction traffic flows would also have a potential impact of negligible significance on accidents and safety on the local road network.

***Disruption and Driver Delay***

The potential for traffic delay to occur on routes used by construction traffic was considered. However, the IEA Guidelines note that:

*"…these delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system"*

There are currently peak-time capacity issues on some junctions surrounding the site, particularly those at Newcraighall Road / A1 and Milton Link. In the absence of mitigation, the potential impact from disruption and driver delay resulting from construction traffic is likely to be temporary, local, adverse and of minor significance.

***Fear, Intimidation and Pedestrian / Cyclist Amenity***

Traffic volume, composition, speeds, pedestrian footways and crossings all contribute to the level of general pleasantness, fear and intimidation experienced by pedestrians and other vulnerable road users, including cyclists.

Adequate footways, crossing points etc. exist within the area and any temporary management arrangements that may be required to manage crossing points during, for example, abnormal load delivery, can be managed and addressed as part of the CTMP.

The roads in the immediate vicinity of the Site would be subject to only a slight increase in traffic during construction, but any increase would be small enough in volume to result in potential impacts of negligible significance upon pedestrian amenity and levels of fear and intimidation.

***Severance***

The IEA Guidelines note that:

*"Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery".*

Construction traffic would generally use established primary radial routes, such as the A1, Newcraighall Road or Milton Road. The potential impact of severance is therefore considered to be of negligible significance.

***Public Transport***

It is expected that the number of construction personnel travelling to the site by public transport (i.e. bus) would be relatively low, and that the significance of impacts on the capacity of existing bus services would therefore be negligible.

### 11.6.4 Summary of Traffic Impacts - Construction

It is not considered that the increased levels of construction traffic will have a significant impact upon pedestrian severance or pedestrian delay nor on driver delay. The traffic profiles associated with the application site parcels are against peak time flow (i.e. construction workers are inbound at a time when residents are outbound and vice versa).

Construction traffic levels are also low when considered against background traffic flows.

It is not anticipated that any roads will require temporary closure. However, in the event of such a closure, alternative vehicle routing and diversion will be agreed in advance with the Council and notified to local residents.

## 11.7 Mitigation Measures

As described above, construction and operational traffic flows would not be expected to lead to significant potential impacts in terms of accidents, disruption and driver delay, pedestrian amenity or severance. Nevertheless, in line with relevant guidance, policy and best practice, mitigation measures are proposed for the construction and operational phases in order to ensure that the proposed development delivers an appropriate level of environmental amenity in terms of transportation and access issues.

***Construction***

A Construction Traffic Management Plan (CTMP) will assist in the control of traffic during construction. The CTMP would include:

- Routeing of excavation and construction vehicles including plans illustrating same;
- Routeing of vehicles to consider material origin / destination and seek access to strategic road network (A1 / A720) by direct routes;
- Details of links to the strategic road network;
- Whether time restrictions are proposed on vehicle movements to avoid conflicts with, for example, schools on proposed routes;
- Direct access arrangements to the Site which may require plans and phasing details;
- Any particular information on abnormal vehicles (e.g. cranes);
- Hours of working for operational traffic;
- Operation and staffing of any access controls;
- Policy for vehicle reversing if turning is not possible (use of banksmen);
- HGVs to only move in a forward direction onto the public road;
- The estimated number of vehicles per day/week;
- Breakdown of vehicle type e.g. HGVs, vans, cars, minibuses;
- Staff compound locations and arrangements for staff parking;
- Arrangements for waiting vehicles;
- Details of the vehicle call up procedure if any;
- Arrangements for slot times for vehicles and on-site coordination of vehicles;
- Responsibility for supervising and controlling vehicle movements to/from the Site;

- Arrangements for ensuring the Site is clear before arriving;
- Estimates for the number and type of parking suspensions and/or temporary Traffic Regulation Orders that may be required;
- Details of any diversion, disruption or other abnormal use of the public road during excavation and construction works;
- Measures to protect vulnerable road users, including cyclists and pedestrians;
- Details of safety, signage and accessibility (by mobility impaired) measures for footway diversions;
- Liaison with CEC Waste Management Service to ensure no conflict with refuse collections;
- Liaison with utility companies been contacted to ensure no conflict with utility works in the area;
- Evidence of contact with the utilities and their responses provided as an appendix;
- Work programme and/or timescale for each phase of the excavation and construction works;
- Provision of total timescale;
- Details regarding vehicle sheeting / wheel cleaning etc.;
- A drivers' code of practice.

Other considerations may include:

- Procedures for monitoring and review of the CTMP;
- Coordination of arrangements with other existing/planned development sites in the area;

- Procedure for dealing with any direct or indirect complaints from local residents, businesses etc.;

- Details of how contractors, deliverers, visitors etc. would be made aware of routeings and on-site restrictions prior to undertaking the journey e.g. information leaflets / webpage.

***Completed Development***

In line with good practice, a 'Travel Pack' will be provided to new residents of the proposed development in order to encourage more sustainable travel choices. The Travel Pack will include information on alternative travel options (e.g. public transport), car sharing, the health benefits of 'active travel' (e.g. walking and cycling) etc. The TA should be referred to for further detail on the Travel Pack.

A number of sustainable travel initiatives will also be developed through the site, including the incorporation into the development of new directional signage to identify key walking and cycling routes / linkages, as well as the development of main spine road and bridge link which will permit bus access to the site.

## 11.8 Residual Effects

***Construction***

### 11.8.1 Public Road Network

With the implementation of a CTMP during the construction phase, and where necessary the provision of appropriate traffic management and/or alternative route plans the residual impacts of construction traffic on local road network capacity would be of negligible significance.

### 11.8.2 Accidents and Safety

Construction traffic flows would have a residual impact of negligible significance on accidents and safety.

### 11.8.3 Disruption and Driver Delay

The residual impact from disruption and driver delay resulting from construction traffic is considered to be of negligible significance.

### 11.8.4 Fear, Intimidation and Pedestrian / Cyclist Amenity

The predicted increase in construction traffic is expected to have a residual impact of negligible significance on pedestrian or cyclist amenity and levels of fear and intimidation.

### 11.8.5 Severance

The residual impact of severance is considered to be of negligible significance.

### 11.8.6 Public Transport

Residual impacts on public transport capacity during construction are considered to be negligible.

***Completed Development***

### 11.8.7 Public Road Network

The significance of residual impacts on the public road network would be negligible.

### 11.8.8 Accidents and Safety

Operational traffic would have a residual impact of negligible significance on accidents and safety.

### 11.8.9 Disruption and Driver Delay

The residual impact from disruption and driver delay resulting from operational traffic is considered to be of negligible significance.

### 11.8.10 Fear, Intimidation and Pedestrian / Cyclist Amenity

Operation of the proposed development is expected to have a residual impact of negligible significance on pedestrian or cyclist amenity and levels of fear and intimidation.

### 11.8.11 Severance

The residual impact of severance from the operational development is considered to be of negligible significance.

### 11.8.12 Public Transport

The residual impact of the operational development on public transport capacity is considered to remain negligible if not slightly positive.

### 11.8.13 Summary and Conclusions

This chapter has considered the construction and operational phases of the proposed development at New Brunstane in terms of its vehicular traffic impacts.

Construction impacts will be temporary and can be managed through the auspices of a Construction Traffic Management Plan.

No significant environmental impacts are likely as a direct result of construction vehicles (e.g. HGVs) accessing the site, and the implementation of the Construction Traffic Management Plan will provide a mechanism to manage the implementation and enforcement of appropriate control measures.

Once the proposed development is operational, there are predicted to be no significant impacts on the surrounding road network. Furthermore, no significant impacts are likely in terms of accidents and safety, disruption and driver delay, fear, intimidation and pedestrian / cyclist amenity, or severance during both the construction and operational phases of the proposed development.

**Table 11.5: EIA Summary Table**

| Issue | Potential Impact | Predicted Effect |
|---|---|---|
| **Construction** | | |
| Public Road Network | Negligible | Negligible |
| Accidents and Safety | Negligible | Negligible |
| Disruption and Driver Delay | Negligible | Negligible |
| Fear, Intimidation and Pedestrian / Cyclist Amenity | Negligible | Negligible |

| Issue | Potential Impact | Predicted Effect |
|---|---|---|
| Severance | Negligible | Negligible |
| Public Transport | Negligible | Negligible |
| **Operational** | | |
| Public Road Network | Negligible | Negligible |
| Accidents and Safety | Negligible | Negligible |
| Disruption and Driver Delay | Temporary, Local, Minor Adverse | Negligible |
| Fear, Intimidation and Pedestrian / Cyclist Amenity | Negligible | Negligible |
| Severance | Negligible | Negligible |
| Public Transport | Negligible | Negligible / Slight Positive |

**Table 11.5: Mitigation Summary**

| Reference | Issue | Mitigation Measure | Likely Residual Impact |
|---|---|---|---|
| **Construction** | | | |
| TT1 | Public Road Network | Construction Traffic Management Plan | Negligible |
| | Accidents and Safety | | Negligible |
| | Disruption and Driver Delay | | Negligible |
| | Fear, Intimidation and Pedestrian / Cyclist Amenity | | Negligible |
| | Severance | | Negligible |
| | Public Transport | | Negligible |

| Reference | Issue | Mitigation Measure | Likely Residual Impact |
|---|---|---|---|
| **Operational** | | | |
| | Public Road Network | None Required | Negligible |
| | Accidents and Safety | | Negligible |
| | Disruption and Driver Delay | | Negligible |
| | Fear, Intimidation and Pedestrian / Cyclist Amenity | | Negligible |
| | Severance | | Negligible |
| | Public Transport | | Negligible / Slight Positive |

## 11.9 References


- Institution of Highways and Transportation (IHT): 'Guidelines for Traffic Impact Assessment', October 1994;
- Scottish Government: 'Transport Assessment Guidance', 2012;
- The City of Edinburgh Council: 'Explore Edinburgh by Bike Map (North East)', 2015;
- The City of Edinburgh Council: 'Core Paths Plan', 2008;
- Institute of Environmental Assessment (IEA): 'Guidelines for the Environmental Assessment of Road Traffic' 1993 (updated 2003).

# 12. Air Quality

## 12.1 List of Figures

- Figure 12.1 Air Quality Dispersion Modelling Domain;
- Figure 12.2 Receptor Locations Musselburgh;
- Figure 12.3 Receptor Locations South West of the Proposed Brunstane Development;
- Figure 12.4 Receptor Locations North of the Proposed Brunstane Development;
- Figure 12.5 Monitoring Locations used for Model Verification;
- Figure 12.6 Location of Musselburgh Air Quality Management Area.

## 12.2 List of Appendices

- Appendix 12.A Meteorological Data;
- Appendix 12.B Traffic Data;
- Appendix 12.C IAQM/EPUK Guidance;
- Appendix 12.D Model Verification.

## 12.3 Introduction

This chapter assesses the potential impacts of the proposed development, as described in Chapter 2 of this ES, on air quality. The air quality impact assessment has three main aims:

- Quantify the existing and future baseline air quality at the proposed development; and establish whether locating residential properties within the proposed development could introduce new human exposure to locations where there is poor air quality;
- Describe and assess the potential air quality impacts associated with the increased road traffic attributable to the proposed development;
- Assess the risk of fine particulate/dust emissions during the construction phases of the proposed development to human health or amenity, and propose best practice dust mitigation measures where required.

This assessment considers the atmospheric pollutants Nitrogen Dioxide ($NO_2$) and fine particulates ($PM_{10}$).

This chapter was written by Ricardo Energy and Environment Ltd.

## 12.4 Legislation, Policy and Guidance

### 12.4.1 National and Local Policy Background

The UK Air Quality Strategy (AQS) was developed by Government in 1997 and has subsequently been revised in 2003 and 2007. This sets out the national policy approach to air quality across the UK. The AQS sets out a series of air quality objectives which Local Authorities must work towards achieving. The UK air quality objectives are derived from legally binding limit values set in EU legislation.

Council obligations in this regard are laid down in the Environment Act 1995 which prescribes a system called Local Air Quality Management (LAQM). Although the objectives are policy targets (the Council are not legally obliged to achieve them), all of the UK objectives are at least as stringent as the European Limit Values for the various pollutants. The European Limit Values carry legal standing and have been written into UK law through the successive Air Quality Standards Regulations. Scottish Government has adopted a $PM_{10}$ annual mean objective that is more demanding than the UK or EU standard. The Scottish $PM_{10}$ standard is written into regulation and therefore carries equivalent weight to the Limit Value based standards.

The LAQM framework requires that Local Authorities who find exceedances of air quality objectives within their geographical area must designate Air Quality Management Areas (AQMAs) and produce an Air Quality Action Plan setting out measures they intend to take to work towards the objectives. The proposed development does not lie within an AQMA, but there are AQMAs located in the vicinity of the proposed development within the administrative boundaries of City of Edinburgh Council (CEC) and East Lothian Council (ELC).

### 12.4.2 Air Quality and Planning Policy

The Scottish Government's air quality policy guidance (LAQM.PG (16)(S)) sets out the relationship between air quality management and planning in Scotland. Scottish Government advice is that air quality is likely to be a material consideration for large scale proposals or if they are likely to be occupied by sensitive groups, such as the elderly or young children, or are likely to have cumulative effects. A study of air quality may be warranted, particularly for proposals which are likely to have a significant impact on air quality (this guidance sets out requirements for such studies).

### 12.4.3 Planning Advice Note- PAN 51 (Revised 2006)

Planning Advice Note 51 (PAN 51) advises on the policies and practices that should be adopted by planning authorities and others involved in planning new developments and redevelopments. It explains the role of the planning system in relation to the LAQM and environmental protection regimes.

### 12.4.4 Cleaner Air for Scotland – The Road to a Healthier Future

In November 2015 the Scottish Government published a national strategy on air quality, which sets out how the Government, and its partner organisations, aim to achieve further reductions in air pollution. Cleaner Air for Scotland (CAFS) sets out six key objective areas, including transport, health, legislation & policy, place-making, communication and climate change, and introduces the proposed National Modelling Framework (NMF) and the National Low Emission Framework (NLEF).

### 12.4.5 Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) Development Control guidance

The magnitude of change in pollutant concentrations predicted by this assessment have been compared with the relevant impact magnitude descriptors as defined in the recently published (May 2015) update to the EPUK and IAQM Development Control guidance. This guidance enables the categorisation of air quality impacts, ranging from 'negligible' to 'substantial'.

### 12.4.6 IAQM Construction dust guidance

The IAQM has published guidance on the assessment of dust impacts associated with construction activities (IAQM, 2014). This method enables the potential for impacts on health, amenity and natural habitats to be assessed. Based on this evaluation, the guidance enables appropriate mitigation measures to be identified which enables impacts of construction dust to be controlled to an insignificant level.

## 12.5 Consultation

CEC was consulted on the proposed study methodology, and commented that an air quality impact assessment must be submitted at the earliest stage. This should include details of any combined heat and power plants, energy plants and/or commercial cooking vents.

SEPA made the following comments in relation to air quality:

- SEPA welcomed the decision to undertake an air quality assessment using the ADMS Roads atmospheric dispersion model;
- The air quality assessment should identify locations where an increase in traffic may lead to increased congestion, particularly at locations where there may be sensitive receptors;
- Cumulative effects should be fully taken into account, using the EPUK/IAQM guidance for assessment of cumulative impacts;
- SEPA also highlighted the importance of considering greenhouse gas emissions.

A complete set of EIA scoping comments including full responses to each is presented in Appendix 4.B of this ES.

## 12.6 Assessment Methodology

The air quality impact assessment addresses both the construction and operational phases of the proposed development. All pollutants covered in the AQS have been considered, but in common with many other developments of this type, attention has been focused on nitrogen dioxide ($NO_2$) and particulate matter ($PM_{10}$).

Based on our current understanding of the proposed development and emissions from road traffic, industrial and other sources in the area, there is no requirement to consider the other AQS pollutants benzene, 1,3-butadiene, carbon monoxide (CO), lead, sulphur dioxide ($SO_2$), poly-aromatic hydrocarbons and ozone ($O_3$).

Current and future baseline air quality and the impact of increased road traffic emissions on concentrations of $NO_2$ and $PM_{10}$ have been quantified using atmospheric dispersion modelling of road traffic emissions. Annual mean concentrations of $NO_2$ and $PM_{10}$ have been modelled within the study area using the atmospheric dispersion model ADMS Roads version 4.

This assessment methodology section identifies the assessment criteria applicable to the potential air quality impacts of the operational and construction phases of the development, then provides a description of the methods and data used in the assessment.

### 12.6.1 Assessment Criteria – Air Quality Objectives

An outline of the current UK and Scottish Air Quality Objectives that are relevant to this study are presented in Table 12.1. $NO_2$ and $PM_{10}$ are considered in this report in relation to the annual mean objectives for each pollutant. The $NO_2$ objectives are the same across the UK, whereas Scotland has much more stringent objectives for $PM_{10}$.

**Table 12.1: Scottish Air Quality Objectives Relevant to the Study**

| Pollutant | Concentration | Measured As |
|---|---|---|
| Nitrogen Dioxide | 200 µg.m$^{-3}$ not to be exceeded more than 18 times a year | 1-hour mean |
| | 40 µg.m$^{-3}$ | Annual mean |
| Particles ($PM_{10}$) (gravimetric) Authorities in Scotland only | 50 µg.m$^{-3}$ not to be exceeded more than 7 times a year | 24 hour mean |
| | 18 µg.m$^{-3}$ | Annual mean |

The locations where the air quality objectives apply are defined in the AQS as locations outside buildings or other natural or man-made structures above or below ground where members of the public are regularly present and might reasonably be expected to be exposed over the relevant averaging period of the objectives.

Typically, these include residential properties, hospitals and schools for the longer averaging periods (i.e. annual mean) pollutant objectives and the above locations plus workplaces, shopping areas etc. for short-term (i.e. 1-hour and 24-hour) pollutant objectives. Examples of where the AQS objectives should and should not apply are presented in Table 12.2.

**Table 12.2: Examples of where Air Quality Objectives Should and Should Not Apply**

| Averaging Period | Pollutant | Objectives Should Apply At… | Objectives Should Not Generally Apply At… |
|---|---|---|---|
| Annual Mean | $NO_2$, $PM_{10}$ | All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc. | Building facades of offices or other places of work where members of the public do not have regular access.<br>Hotels, unless people live there as their permanent residence.<br>Gardens of residential properties.<br>Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term |
| 1-Hour mean/ 24-hour mean | $NO_2$, $PM_{10}$ | All locations where the annual mean and 24-hour mean objectives apply. Kerbside sites (e.g. pavements of busy shopping streets).<br>Those parts of car parks and railway stations etc. which are not fully enclosed.<br>Any outdoor locations to which the public might reasonably be expected to have access. | Kerbside sites where the public would not be expected to have regular access. |

### 12.6.2 Assessment Criteria – IAQM/EPUK Planning for Air Quality Guidance

Qualitative impact descriptors are required to assist with determining a level of significance to the results of the air quality assessment for the operational phase of the proposed development.

The approach to determining impact descriptors developed by the IAQM, which has been incorporated into the latest IAQM and Environmental Protection UK (EPUK) guidance document on planning and air quality[1] has been used for the operational phase assessment. This approach is widely used throughout the UK.

In summary, the approach involves quantifying the magnitude of change in annual mean $NO_2$ and $PM_{10}$ concentrations attributable to the proposed development, then expressing the magnitude of incremental change as a proportion of each respective air quality standard, and then examining this change in the context of the new total concentration relative to the air quality objectives applicable in Scotland. An impact descriptor can then be assigned. The impact descriptors from the latest guidance are presented in Table 12.3, and an extract from the IAQM/EPUK guidance is presented in Appendix 12.C. These impact descriptors are applicable for both adverse and beneficial impacts.

**Table 12.3: IAQM/EPUK Impact Descriptors for Individual Receptors**

| Long term average Concentration at receptor in assessment year | % Change in concentration relative to Air Quality Assessment Level (AQAL) | | | |
|---|---|---|---|---|
| | 1 | 2-5 | 6-10 | >10 |
| 75% or less of AQAL | Negligible | Negligible | Slight | Moderate |
| 76-94% of AQAL | Negligible | Slight | Moderate | Moderate |
| 95-102% of AQAL | Slight | Moderate | Moderate | Substantial |
| 103-109% of AQAL | Moderate | Moderate | Substantial | Substantial |
| 110% or more of AQAL | Moderate | Substantial | Substantial | Substantial |

**Institute of Air Quality Management and Environmental Protection UK, *'Land-Use Planning & Development Control: Planning For Air Quality'*, London, May 2015, p23**

The significance of impacts associated with emissions to air from construction activities are described using the risk assessment approach outlined in the IAQM Guidance on the assessment of dust from demolition and construction. Dust risks are categorised as either high, medium or low for the various stages of the construction phase.

[1] Institute of Air Quality Management and Environmental Protection UK, *'Land-Use Planning & Development Control: Planning For Air Quality'*, London, May 2015, p17-24.

Where a requirement for mitigation is identified based on the outcome of the risk assessment, appropriate demolition/construction phase mitigation measures are proposed. These mitigation measures would be implemented and monitored via a site specific dust management plan during construction.

### 12.6.3 Road Traffic Emissions Calculations

***Average Flow, Speed and Fleet Split***

Three sources of road traffic data have been used for the assessment:

- Traffic flow data from junction counts conducted in 2015. The counts were provided as annual average daily traffic (AADT) for each count point with a basic light/heavy fleet split provided i.e. specified as percentage Heavy Goods Vehicle (HGV);

- Where recent junction data was not available, 2014 traffic count data from the Department for Transport (DfT) were accessed for various A Class Road links within the study area. This count data contains both AADT flows and HGV percentage split;

- Trip generation and distribution data for the projected future traffic associated with proposed development and other committed developments was provided by Transport Planning Ltd. The appointed transportation consultant for the project.

Where required, AADT flows for each road using DfT traffic counts were factored forward for the future years of 2020 and 2025 using the National Road Traffic Forecasts (NRTF)2 "High" growth factor; this growth factor corresponds with the growth factor applied in the Transport Assessment (TA). The roads included in the modelling assessment are presented in Figure 12.1.

[2] NRTF- National Road Traffic Forecasts- available at: http://webarchive.nationalarchives.gov.uk/+/http:/www.dft.gov.uk/pgr/economics/ntm/ntmdatasources/nrtf1997/onalroadtrafficforecasts3014.pdf

No measured speed data were available for the roads being modelled, vehicle speeds for road links were assumed based on local speed limits and professional judgement; average speeds were reduced at road sections approaching junctions or traffic lights.

It should be noted that traffic patterns in urban locations are complex and it is not possible to fully represent these in atmospheric dispersion models. By attempting to describe these complex traffic patterns using quite simple metrics (AADT, average speed and vehicle split composition) a degree of uncertainty is introduced into the modelling.

Further detailed information on the traffic data used in the assessment, including tables with projected baseline and development traffic flows are presented in Appendix 12.B.

***Traffic Generated by the Proposed Development***

Projected future traffic flows associated with proposed development were provided by Transport Planning Ltd.

The trip generation and distribution data within the TA indicates that the proposed development will result in an increase in traffic predominantly on the surrounding roads to the south of the site at Newcraighall Road west of the site towards the A1. Based on the expected future traffic flows, the TA for the proposed development does not include trip distribution data for Musselburgh.

***Congestion***

During peak periods average vehicle speed is reduced compared to the daily average. The combination of slower average vehicle speeds and more vehicles leads to higher pollutant emissions during peak hours, it is therefore important to account for this when modelling vehicle emissions to estimate pollutant concentrations.

The TG(16) guidance states that the preferred approach to representing the resulting increase in vehicle emissions during these peak periods is to calculate the emission rate for the affected roads for each hour of the day or week, on the basis of the average speeds and traffic flows for each hour of the day.

The hourly specific emission rates can then be used to calculate a 24-hour diurnal emission profile which can be applied to that section of road. In this case an annual average diurnal profile of traffic flow across the study area was estimated from the latest DfT national statistics for traffic distribution by time of day, but no speed measurement data were available. Peak periods in traffic flow were therefore accounted for in the model by applying the typical diurnal traffic flow profile to the average hourly emission rate.

Real time traffic flows were observed by examining the historical traffic layer on Google maps[3] captured during normal working weekdays. The Google traffic data can be considered reliable given that it is derived from many on board vehicle GPS measurements that are collected in real time to enable the web interface to be updated with the latest conditions. To account for speed reductions during peak traffic periods, assumed average speeds were reduced at road sections where slow moving traffic was observed to occur regularly e.g. at locations approaching busy junctions.

***Vehicle Emission Factors***

The latest version of the Emissions Factors Toolkit (EFT V6.0.2 November 2014 release) was used in this assessment to calculate pollutant emission factors for each road link modelled. The calculated emissions factors were then imported into the ADMS-Roads model.

Parameters such as traffic volume, speed and fleet composition are entered into the EFT, and an emissions factor in grams of pollutant/kilometre/second is generated for input into the dispersion model.

In the latest version of the EFT, NOx emissions factors previously based on DfT and Transport Research Laboratory (TRL) functions have been replaced with factors from the COPERT 4 v10 European vehicle emissions tool. These emissions factors are widely used for the purpose of calculating emissions from road traffic in Europe.

[3] Google (2013) www.maps.google.co.uk:

Defra recognises these as the current official emission factors for road traffic sources when conducting local, regional and national scale dispersion modelling assessments.

Vehicle emissions projections include an assumption that emissions from the fleet will fall as newer vehicles are introduced at a renewal rate forecast by the DfT. As with any similar study, any inaccuracy in the projections or the COPERT 4 emissions factors contained in the EFT will be carried forward into this modelling assessment.

### 12.6.4 Atmospheric Dispersion Modelling

Annual mean concentrations of $NO_2$ and $PM_{10}$ for the years of interest have been modelled within the study area using the atmospheric dispersion model ADMS-Roads Extra version 4.

***Meteorology***

Hourly sequential meteorological data (wind speed, direction etc.) for 2014 from Edinburgh Airport was used for the modelling assessment. A wind rose for the dataset is presented in Appendix 12.A. The meteorological measurement site is located approximately 14km west of the study area and has good data quality for the period of measurement. Meteorological measurements are subject to their own uncertainty which will unavoidably carry forward into this assessment.

A surface roughness of 0.5m was used in the modelling to represent a large suburban area in the model domain. A limit for the Monin-Obukhov length of 30m was applied to represent a large town. A surface roughness of 0.02 was used for the meteorological measurement site at Edinburgh Airport to represent open grassland.

***Treatment of Modelled NOx Road Contribution***

It is necessary to convert modelled $NO_x$ concentrations to $NO_2$ for comparison with the relevant objectives. The latest version of the Defra and devolved administrations $NO_x/NO_2$ model was used to calculate $NO_2$ concentrations from the $NO_x$ concentrations predicted by ADMS-Roads.

The model requires input of the background $NO_x$, the modelled road contribution and accounts for the proportion of NOx released as primary $NO_2$. For the East Lothian area in 2014 with the "All other UK Urban Traffic" option in the model, the $NO_x/NO_2$ model estimates that 22.8% of $NO_x$ is released as primary $NO_2$ in 2014. This value is predicted to reduce to 19.2% in 2025.

***Validation of ADMS-Roads***

Validation of the model is the process by which the model outputs are tested against monitoring results at a range of locations and the model is judged to be suitable for use in specific applications; this is usually conducted by the model developer.

Model developer Cambridge Environmental Research Consultants (CERC) have carried out extensive validation of ADMS applications by comparing modelled results with standard field, laboratory and numerical data sets, participating in EU workshops on short range dispersion models, comparing data between UK M4 and M25 motorway field monitoring data, carrying out inter-comparison studies alongside other modelling solutions such as Design Manual for Roads and Bridges (DMRB) and CALINE4, and carrying out comparison studies with monitoring data collected in cities throughout the UK using the extensive number of studies carried out on behalf of local authorities and Defra.

***Model Verification***

The model performance was verified by comparing the modelled predictions of road NOx with the available 2014 local diffusion tube measurements and automatic site data in Musselburgh. Following initial comparison of the modelled concentrations with the available monitoring data, some refinements were made to the model input. A primary adjustment factor (PAdj) of **1.2772** was applied to all modelled Road NOx data prior to calculating an $NO_2$ annual mean.

Model uncertainty can be estimated by calculating the root mean square error (RMSE). In this case the calculated RMSE was 2.74 $\mu g.m^{-3}$ after adjustment which is within the suggested value of 10% as recommended in LAQM.TG(16). The model has therefore performed sufficiently well for use within this assessment.

The automatic monitoring site at Musselburgh North High Street measuring $PM_{10}$ was used to verify the model's performance when predicting $PM_{10}$ concentrations, a primary adjustment factor of **3.239** was applied to all modelled road $PM_{10}$ concentrations before adding the background concentration.

Linear regression plots for the model verification of NOx are presented in Appendix 12.D.

For $PM_{10}$ as there is only one monitoring location available for the verification of $PM_{10}$ no linear regression plots have been presented.

***Sensitive Receptor Locations***

$NO_2$ and $PM_{10}$ concentration have been predicted at a wide selection of specified receptor locations across the study area.

The receptor locations have been selected to represent locations where relevant human exposure may occur close to the roads where there is increased traffic attributable to the proposed development. The receptors included in the assessment are at locations where the annual mean objective for each pollutant will apply. They include existing residential properties, proposed residential properties, community facilities including recreation areas and existing and proposed schools. The locations of the proposed housing and new primary school were provided in the draft masterplan drawing for the proposed development.

The selected receptor locations are considered worst case as they are the closest residential properties to the road sources being modelled. Some have been placed at locations close to junctions where average traffic speeds are likely to be lower and pollutant emissions will be higher.

A height of 1.5m has been specified for ground level residential properties to represent relevant exposure at ground level where pollutant concentrations attributable to road traffic emissions are likely to be greatest. Where relevant exposure is present at 1st floor level above commercial properties, a receptor height of 4m has been modelled. Details of the specified receptor locations are presented in Table 12.4**,** the locations are annotated on Figure 12.2 to Figure 12.4.

**Table 12.4: Specified Receptor Locations**

| Receptor | Easting | Northing | Height (m) | Description |
|---|---|---|---|---|
| 137 High Street | 334,425 | 672,663 | 4 | Residential |
| 69 High Street | 334,580 | 672,713 | 4 | Residential |
| 86 High Street | 334,578 | 672,695 | 4 | Residential |
| Bridge Street 1st floor | 334,188 | 672,690 | 4 | Residential |
| Bridge St ground floor | 334,189 | 672,689 | 1.5 | Residential |
| 154 N High St | 333,792 | 672,821 | 1.5 | Residential |
| 4 Edinburgh Rd | 333,120 | 672,955 | 1.5 | Residential |
| 238 Milton Rd E | 332,191 | 673,097 | 1.5 | Residential |
| 221 Milton Rd E | 331,934 | 673,059 | 1.5 | Residential |
| 2 Milton Rd E | 331,327 | 672,901 | 1.5 | Residential |
| 3 Milton Rd E | 331,349 | 672,926 | 1.5 | Residential |
| Brunstane Primary school | 331,163 | 672,692 | 4 | School |
| Milton Rd 1 | 330,990 | 672,922 | 1.5 | Residential |
| Milton Rd 2 | 330,880 | 672,923 | 1.5 | Residential |
| 1 Newcraighall Rd West | 330,865 | 671,733 | 1.5 | Residential |
| Niddrie Cottages 1 | 331,206 | 671,690 | 1.5 | Residential |
| Niddrie Cottages 3 | 331,180 | 671,683 | 1.5 | Residential |
| 16 Newcraighall Rd | 331,997 | 671,891 | 1.5 | Residential |
| 104 Newcraighall Rd | 332,330 | 672,088 | 4 | Residential |
| Olivebank Flats 1 | 333,815 | 672,405 | 4 | Residential |
| 302 Milton Rd East | 332,620 | 673,122 | 1.5 | Residential |
| 301 Milton Road East | 332,544 | 673,160 | 1.5 | Residential |
| 44 Eastfield Rd | 332,616 | 673,172 | 1.5 | Residential |
| 86 Brunstane Rd | 331,296 | 672,957 | 1.5 | Residential |
| 81 Brunstane Rd | 331,313 | 672,973 | 1.5 | Residential |
| 1 Brunstane Rd South | 331,335 | 672,865 | 1.5 | Residential |
| 147 High Street | 334,390 | 672,651 | 4 | Monitoring |
| 167 High Street | 334,354 | 672,643 | 4 | Monitoring |
| New housing 1 | 332,136 | 672,118 | 1.5 | Proposed Residential |

| Receptor | Easting | Northing | Height (m) | Description |
|---|---|---|---|---|
| New housing 2 | 332,118 | 672,863 | 1.5 | Proposed Residential |
| New housing 3 | 331,757 | 672,588 | 1.5 | Proposed Residential |
| New housing 4 | 332,462 | 672,911 | 1.5 | Proposed Residential |
| New housing 5 | 332,441 | 672,404 | 1.5 | Proposed Residential |
| 21 - 23 High Street | 334,704 | 672,769 | 1.5 | Residential |
| 161 High St | 333,874 | 672,834 | 4 | Residential |
| Barratt House 1 | 331,888 | 671,870 | 1.5 | Residential |
| New Primary School | 332,123 | 672,551 | 1.5 | Proposed School |

***Modelled Scenarios***

Annual mean $NO_2$ and $PM_{10}$ concentrations have been modelled for five assessment scenarios:

- Baseline year 2014, year for which most recent monitoring data is available;
- Future 2020 baseline in the area including traffic from other committed developments only;
- 2020 including surrounding committed developments and proposed developments at interim progress stage where the proposed bridge within the development site is not operational;
- Future 2025 baseline in the area including traffic from other committed developments only;
- 2025 including surrounding committed developments and proposed developments completed, with all related infrastructure in place.

Modelling of future scenarios assumes increased traffic volumes based on NRTF growth factors where the DfT traffic counts were used (as outlined in Section 12.6.3). Reductions in vehicle and industrial atmospheric pollutant emission are projected for future years; this leads to reduced background $NO_2$ and $PM_{10}$ concentrations as reported in the Scottish background maps (described in Section 12.7.1 above).

Projected reductions in vehicle emissions for future years are accounted for when using the EFT, and projected changes to primary $NO_2$ emissions from vehicles are calculated using the NOx to $NO_2$ calculator.

### 12.6.5 Construction Phase Method of Assessment

The potential impact of construction activities on local air quality and potential dust soiling nuisance has been assessed using the method described in the IAQM Guidance on the assessment of dust from demolition and construction (IAQM, 2014). This guidance is currently regarded as best practice in the UK.

The outcome of the assessment characterises the potential risk of impacts from the proposed demolition, earthworks and construction activities at nearby sensitive locations. Based on the risk category assigned, appropriate mitigation measures are recommended to ensure that there are no significant adverse impacts.

The construction phase risk assessment process is described in full in Section 12.10.

### 12.6.6 Operational Phase Method of Assessment

The assessment of the operational phase of the assessment is primarily concerned with the potential impact of road traffic emissions on local air quality. This aims to assess air quality at the new housing development and at nearby locations where residential properties or other sensitive receptors may be affected by emissions from additional road traffic. The air quality impact of traffic attributable to the proposed development has been assessed for all roads where projected traffic data was available.

Two elements of air quality impacts when the proposed development is occupied have been assessed:

- The potential for introducing new human exposure into a location with poor air quality. This requires prediction of future baseline pollutant concentrations at the locations of the proposed residential properties, and requires consideration of projected growth in existing road traffic in the study area and traffic generated by the proposed development and other committed developments;

- The air quality impact of additional road traffic attributable to the proposed development at locations of relevant exposure. This includes sensitive receptors within the proposed development and existing and proposed sensitive receptor locations in the area surrounding the site;

- The baseline conditions and the impact of increased road traffic emissions on concentrations of NO2 and PM10 have been quantified using atmospheric dispersion modelling of road traffic emissions. The general approach taken was:

    - Collect and analyse recent traffic, pollutant monitoring, meteorological and background pollutant concentration data for use in a dispersion modelling study;

    - Model baseline road traffic emissions in 2014 using the ADMS-Roads atmospheric dispersion model and verify the model to achieve good agreement with recent (2014) NO2 and PM10 measurements;

    - Use the verified dispersion model to predict annual mean NO2 and PM10 concentrations at specified receptor locations within the study area for the following future year scenarios:

        - 2020 Future baseline including committed developments;

        - 2020 with the proposed development operational - 'No bridge' scenario (includes other committed developments);

        - 2025 Future baseline including committed developments;

- 2025 With the proposed development operational - 'Full Development' (includes other committed developments).

- Describe the predicted impacts of the proposed development using the method described in the latest IAQM/EPUK guidance.

The air quality modelling methods outlined in the Defra Technical Guidance LAQM. TG (16)[4] were used throughout the study.

## 12.7 Baseline Conditions

Baseline air quality at the site and across the wider area has been quantified using measurement data from the Scottish Air Quality Database, supplemented by data from the LAQM review and assessment programmes for CEC and ELC. This has been supplemented with data from the pollutant background maps provided by the Scottish Government as part of the Scottish Air Quality Database. Baseline roadside $NO_2$ and $PM_{10}$ concentrations have been quantified using atmospheric dispersion modelling of road traffic emissions.

Consideration has also been given to the potential for contributions to the baseline from other nearby emission sources, including the biomass boiler at the Queen Margaret University campus. Further details on cumulative impacts are provided in Section 12.9.

### 12.7.1 Background Pollutant Concentrations

Background pollutant concentrations for a modelling study within an urban environment in Scotland can be sourced from either a local urban background monitoring location, or the background maps produced by Ricardo-AEA for the Scottish Government[5]. The background maps provide estimates of annual mean background concentrations of key pollutants at a resolution of 1 x 1km for Scotland projected from a base year of 2011 and can be projected forward to future years up to 2030.

[4] Defra and The Devolved Administrations, *'Technical Guidance LAQM. TG (16)'*, London, April 2016

[5] Ricardo Energy & Environment, 'Maps of Annual Concentrations', 2015, http://www.scottishairquality.co.uk/data/mapping

These annual mean pollutant maps combine Scottish pollutant measurement data with the emissions information from the UK's National Atmospheric Emissions Inventory (NAEI) to provide estimated pollutant concentrations for the whole of Scotland. Both NOx and $PM_{10}$ emissions are projected to decline over time as national policy measures are implemented.

The air quality impact assessment covers an area of approximately 16 square kilometres (8 by 2) between Edinburgh and Musselburgh. Due to the varied land use, background $NO_x$ and $PM_{10}$ concentrations are likely to vary across the entire study area. It was therefore considered most relevant to use the mapped background concentrations for the nine 1km squares covering the receptors modelled across the study area. Seven of these background squares are within the CEC boundary and two are within the ELC boundary.

In this case, no nearby background pollutant measurements were available; therefore the Scottish background maps were used as the best available estimate of current and future background pollutant concentrations. For the baseline year of 2014, the future year of the interim development scenario 2020, and the future year of the proposed development being completed 2025, the Scottish background maps were used to calculate NOx and $PM_{10}$ annual mean concentrations. A CSV file containing concentrations across the ELC and CEC area was downloaded and the background NOx concentrations and $PM_{10}$ for the appropriate grid squares extracted. The sector contributions from road traffic emissions on A Class Roads were subtracted from the total background concentrations to avoid double counting of Road NOx and $PM_{10}$ from the road sources being explicitly modelled. The brake and tyre wear and road abrasion sector contributions were also subtracted from the mapped $PM_{10}$ background concentrations as these particulate emissions are included in the emission factors toolkit (EFT) road traffic emission calculations for the dispersion model. The corrected background concentrations are presented in Table 12.5 for NOx and Table 12.6 for $PM_{10}$.

**Table 12.5: Projected Background Annual Mean NOx Concentrations**

| Background Map Square (Approx. location) | Background NOx Concentration (µg.m$^{-3}$) | | | Projected Decrease from 2014 to 2025 (%) |
|---|---|---|---|---|
| | 2014 | 2020 | 2025 | |
| 333500, 672500 (Olivebank) - ELC | 30.1 | 24.7 | 23.5 | 22% |
| 334500, 6725**0**0 (Musselburgh High Street) – ELC | 27.0 | 22.2 | 21.0 | 22% |
| 330500,671500 (Newcraighall Rd) - CEC | 20.2 | 16.3 | 15.1 | 25% |
| 330500, 672500 (Milton Rd)- CEC | 22.7 | 18.3 | 17.0 | 25% |
| 331500, 671500 (Niddrie Cottages) - CEC | 19.1 | 15.5 | 14.5 | 24% |
| 331500, 672500 (Brunstane Rd ) - CEC | 21.7 | 17.6 | 16.5 | 24% |
| 331500, 673500 (Milton Rd E) -CEC | 24.0 | 19.1 | 17.7 | 26% |
| 332500, 672500 (Proposed Development) - CEC | 20.4 | 16.4 | 15.4 | 25% |
| 332500, 673500 (Eastfield Rd) - CEC | 25.8 | 20.8 | 19.3 | 25% |

**Table 12.6: Projected Background Annual Mean $PM_{10}$ Concentrations (µg.m$^{-3}$)**

| Background map square (Approx. location) | Background $PM_{10}$ Concentration (µg.m$^{-3}$) | | | Projected decrease from 2014 to 2025 (%) |
|---|---|---|---|---|
| | 2014 | 2020 | 2025 | |
| 333500, 672500 (Olivebank) - ELC | 13.8 | 13.0 | 12.9 | 7% |
| 334500, 6725**0**0 (Musselburgh High Street) - ELC | 13.4 | 12.7 | 12.5 | 7% |
| 330500,671500 (Newcraighall Rd) - CEC | 12.6 | 12.1 | 11.9 | 6% |
| 330500, 672500 (Milton Rd)- CEC | 12.3 | 11.7 | 11.6 | 6% |
| 331500, 671500 (Niddrie Cottages) - CEC | 13.9 | 13.4 | 13.2 | 5% |
| 331500, 672500 (Brunstane Rd ) - CEC | 12.8 | 12.2 | 12.1 | 6% |
| 331500, 673500 (Milton Rd E) -CEC | 12.1 | 11.6 | 11.4 | 6% |
| 332500, 672500 (Proposed Development) - CEC | 13.1 | 12.5 | 12.4 | 5% |
| 332500, 673500 (Eastfield Rd) - CEC | 12.5 | 11.9 | 11.7 | 6% |

### 12.7.2 Air Quality Monitoring

CEC measures $NO_2$ and $PM_{10}$ concentrations across a network of automatic analysers and $NO_2$ diffusion tube samplers. There are no CEC monitoring sites within the immediate area surrounding the development site.

ELC also currently measures $NO_2$ concentrations at a number of locations, using both a continuous automatic analysers and a network of diffusion tubes. There are no ELC $NO_2$ diffusion tubes or automatic monitoring sites within the immediate area surrounding the development site.

The closest operational automatic $NO_2$ and $PM_{10}$ monitoring site is at Musselburgh North High Street, which is approximately 1.7km east of the proposed development.

The nearest diffusion tube sites are the CEC $NO_2$ sampler located at Portobello High Street, and the ELC $NO_2$ samplers located at North High Street, Bridge Street and High Street in Musselburgh. The CEC and ELC roadside samplers are located approximately 1.5 km North West and 1.4 km to 1.7 km east of the site respectively.

The nearby $NO_2$ and $PM_{10}$ monitoring locations are presented in Figure 12.4. The annual mean $NO_2$ and $PM_{10}$ concentrations measured at these sites over the last five years are presented in Table 12.7 and Table 12.8. The measured $NO_2$ annual mean concentrations at all of these diffusion tube sites have been within the 40 $\mu g.m^{-3}$ annual mean UK air quality objective over recent years at all locations except those located on Musselburgh High Street.

**Table 12.7: $NO_2$ Monitoring Results 2010-2014 ($\mu g.m^{-3}$)**

| Monitoring Location | X | Y | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|
| 137 High Street | 334,427 | 672,664 | N/A | N/A | 34 | 30 | 32 |
| North High Street Auto Site | 333,941 | 672,837 | 29 | 24 | 24 | 24 | 23 |
| 45 Bridge Street | 334,105 | 672,750 | 33 | 26 | 27 | 26 | 28 |
| 150 North High Street | 333,800 | 672,822 | 34 | 35 | 33 | 34 | 34 |
| 167 High Street | 334,354 | 672,643 | N/A | N/A | 42 | 38 | 39 |
| 69 High Street | 334,580 | 672,713 | N/A | N/A | 47 | 43 | 44 |
| 86 High Street | 334,578 | 672,695 | N/A | N/A | 32 | 34 | 37 |

| Monitoring Location | X | Y | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|
| 87 High Street | 334,526 | 672,700 | 28 | 26 | 25 | 25 | 25 |
| 147 High Street | 334,392 | 672,652 | 49 | 40 | 43 | 42 | 43 |
| 183 High Street | 334,301 | 672,632 | 40 | 36 | 39 | 37 | 38 |
| 15 Bridge Street | 334,164 | 672,708 | N/A | N/A | 29 | 26 | 26 |
| Newbigging Junction | 334,659 | 672,720 | 32 | 30 | 30 | 30 | 30 |

**Table 12.8: $PM_{10}$ Monitoring Results 2010-2014 ($\mu g.m^{-3}$)**

| Monitoring Location | X | Y | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|
| N High Street | 333,941 | 672,837 | 12 | 13 | 12 | 16 | 17 |

*Air Quality Management Areas (AQMA)*

CEC has five AQMAs in place for $NO_2$ and has prepared an Air Quality Action Plan (AQAP) which aims to help address the exceedances in the City. The closest of these, the Central AQMA, is situated approximately 4km North West of the site at its nearest point.

ELC has also declared an AQMA for $NO_2$ along the High Street in Musselburgh (A199), which is situated approximately 1.7 km east of the site at its nearest point. The location of the Musselburgh AQMA is presented in Figure 12.6.

## 12.8 Operational Phase Impact Assessment

### 12.8.1 NO2 Annual Mean Concentrations

The predicted annual mean $NO_2$ concentrations for the 2020 and 2025 assessment scenarios are presented in Table 12.9 and Table 12.10 respectively. The percentage change in annual mean concentrations as a result of the proposed development have been rounded to the nearest percent as prescribed in the IAQM/EPUK guidance.

Annual mean $NO_2$ concentrations in excess of the 40 $\mu g.m^{-3}$ air quality objective are predicted at 154 N High Street in the baseline year of 2014. There are two sites close to the annual mean objective located within the current Musselburgh AQMA, these are 69 High Street and 86 High Street.

Annual mean $NO_2$ concentrations are predicted to reduce over time as vehicle emissions and background concentrations are projected to decline. This is reflected in the results for $NO_2$ for the 2020 and 2025 baselines where $NO_2$ concentrations decrease from the 2014 baseline.

The results from the future baseline scenarios and the future scenarios with development all comply with the Annual Mean Objective of 40 $\mu g.m^{-3}$**.** This includes the concentrations predicted for the proposed housing receptors.

**Table 12.9: Modelled Annual Mean Concentrations $NO_2$ 2020**

| Receptor | 2014 Baseline ($\mu g.m^{-3}$) | 2020 Without Development ($\mu g.m^{-3}$) | 2020 With Development ($\mu g.m^{-3}$) | % of AQL With Development | % Magnitude of Change (rounded to nearest 1 %) | Impact Significance Descriptor |
|---|---|---|---|---|---|---|
| 137 High Street | 28.0 | 21.8 | 21.9 | 55% | 0% | Negligible |
| 69 High Street | 37.8 | 29.0 | 29.1 | 73% | 0% | Negligible |
| 86 High Street | 38.4 | 29.4 | 29.5 | 74% | 0% | Negligible |
| Bridge Street 1st floor | 23.9 | 18.5 | 18.5 | 46% | 0% | Negligible |
| Bridge St ground floor | 31.6 | 23.2 | 23.2 | 58% | 0% | Negligible |
| 154 N High St | 40.0 | 28.8 | 28.9 | 72% | 0% | Negligible |
| 4 Edinburgh Rd | 24.0 | 18.8 | 18.8 | 47% | 0% | Negligible |
| 238 Milton Rd E | 19.1 | 15.1 | 15.2 | 38% | 0% | Negligible |
| 221 Milton Rd E | 18.8 | 14.7 | 14.7 | 37% | 0% | Negligible |
| 2 Milton Rd E | 20.6 | 15.8 | 15.9 | 40% | 0% | Negligible |
| 3 Milton Rd E | 21.2 | 16.1 | 16.2 | 41% | 0% | Negligible |
| Brunstane Primary school | 16.7 | 13.4 | 13.4 | 33% | 0% | Negligible |
| Milton Rd 1 | 17.8 | 14.0 | 14.1 | 35% | 0% | Negligible |
| Milton Rd 2 | 17.7 | 14.0 | 14.0 | 35% | 0% | Negligible |
| 1 Newcraighall Rd West | 21.5 | 16.3 | 16.5 | 41% | 0% | Negligible |
| Niddrie Cottages 1 | 20.8 | 15.9 | 16.0 | 40% | 0% | Negligible |
| Niddrie Cottages 3 | 20.8 | 15.9 | 16.0 | 40% | 0% | Negligible |
| 16 Newcraighall Rd | 23.0 | 17.0 | 17.3 | 43% | 1% | Negligible |
| 104 Newcraighall Rd | 19.4 | 14.9 | 15.2 | 38% | 1% | Negligible |
| Olivebank Flats 1 | 22.6 | 18.1 | 18.1 | 45% | 0% | Negligible |
| 302 Milton  Rd East | 22.2 | 17.0 | 17.1 | 43% | 0% | Negligible |

| Receptor | 2014 Baseline ($\mu g.m^{-3}$) | 2020 Without Development ($\mu g.m^{-3}$) | 2020 With Development ($\mu g.m^{-3}$) | % of AQL With Development | % Magnitude of Change (rounded to nearest 1 %) | Impact Significance Descriptor |
|---|---|---|---|---|---|---|
| 301 Milton Road East | 21.8 | 16.7 | 16.8 | 42% | 0% | Negligible |
| 44 Eastfield Rd | 26.3 | 19.5 | 19.5 | 49% | 0% | Negligible |
| 86 Brunstane Rd | 18.0 | 14.2 | 14.3 | 36% | 0% | Negligible |
| 81 Brunstane Rd | 17.5 | 14.0 | 14.0 | 35% | 0% | Negligible |
| 1 Brunstane Rd South | 17.5 | 13.9 | 14.0 | 35% | 0% | Negligible |
| 147 High Street | 32.2 | 24.8 | 24.9 | 62% | 0% | Negligible |
| 167 High Street | 34.7 | 26.6 | 26.7 | 67% | 0% | Negligible |
| New housing 1 | 14.9 | 12.1 | 12.1 | 30% | n/a | n/a |
| New housing 2 | 13.9 | 11.5 | 11.5 | 29% | n/a | n/a |
| New housing 3 | 14.9 | 12.3 | 12.3 | 31% | n/a | n/a |
| New housing 4 | 14.1 | 11.6 | 11.6 | 29% | n/a | n/a |
| New housing 5 | 14.2 | 11.7 | 11.7 | 29% | n/a | n/a |
| 21 - 23 High Street | 21.8 | 17.6 | 17.6 | 44% | 0% | Negligible |
| 161 High St | 35.5 | 26.0 | 26.0 | 65% | 0% | Negligible |
| Barratt House 1 | 20.7 | 15.6 | 15.9 | 40% | 1% | Negligible |

**Table 12.10: Modelled Annual Mean Concentrations $NO_2$ 2025**

| Receptor | 2014 Baseline ($\mu g.m^{-3}$) | 2025 Without Development ($\mu g.m^{-3}$) | 2025 With Development ($\mu g.m^{-3}$) | % of AQL With Development | % Magnitude of Change (rounded to nearest 1 %) | Impact Significance Descriptor |
|---|---|---|---|---|---|---|
| 137 High Street | 28.0 | 19.2 | 19.3 | 48% | 0% | Negligible |
| 69 High Street | 37.8 | 24.7 | 24.9 | 62% | 0% | Negligible |
| 86 High Street | 38.4 | 25.0 | 25.2 | 63% | 0% | Negligible |
| Bridge Street 1st floor | 23.9 | 16.5 | 16.6 | 41% | 0% | Negligible |
| Bridge St ground floor | 31.6 | 19.9 | 20.0 | 50% | 0% | Negligible |
| 154 N High St | 40.0 | 24.2 | 24.4 | 61% | 0% | Negligible |
| 4 Edinburgh Rd | 24.0 | 17.1 | 17.2 | 43% | 0% | Negligible |
| 238 Milton Rd E | 19.1 | 13.8 | 14.0 | 35% | 0% | Negligible |
| 221 Milton Rd E | 18.8 | 13.2 | 13.3 | 33% | 0% | Negligible |
| 2 Milton Rd E | 20.6 | 14.1 | 14.2 | 35% | 0% | Negligible |
| 3 Milton Rd E | 21.2 | 14.2 | 14.4 | 36% | 0% | Negligible |
| Brunstane Primary school | 16.7 | 12.3 | 12.3 | 31% | 0% | Negligible |
| Milton Rd 1 | 17.8 | 12.8 | 12.8 | 32% | 0% | Negligible |
| Milton Rd 2 | 17.7 | 12.7 | 12.8 | 32% | 0% | Negligible |
| 1 Newcraighall Rd West | 21.5 | 14.3 | 14.5 | 36% | 0% | Negligible |
| Niddrie Cottages 1 | 20.8 | 13.9 | 14.0 | 35% | 0% | Negligible |
| Niddrie Cottages 3 | 20.8 | 13.9 | 14.0 | 35% | 0% | Negligible |
| 16 Newcraighall Rd | 23.0 | 14.6 | 15.0 | 37% | 1% | Negligible |
| 104 Newcraighall Rd | 19.4 | 13.3 | 13.6 | 34% | 1% | Negligible |
| Olivebank Flats 1 | 22.6 | 16.6 | 16.7 | 42% | 0% | Negligible |

| Receptor | 2014 Baseline ($\mu g.m^{-3}$) | 2025 Without Development ($\mu g.m^{-3}$) | 2025 With Development ($\mu g.m^{-3}$) | % of AQL With Development | % Magnitude of Change (rounded to nearest 1 %) | Impact Significance Descriptor |
|---|---|---|---|---|---|---|
| 302 Milton Rd East | 22.2 | 15.1 | 15.2 | 38% | 0% | Negligible |
| 301 Milton Road East | 21.8 | 14.9 | 15.1 | 38% | 0% | Negligible |
| 44 Eastfield Rd | 26.3 | 16.9 | 17.0 | 42% | 0% | Negligible |
| 86 Brunstane Rd | 18.0 | 12.9 | 13.0 | 32% | 0% | Negligible |
| 81 Brunstane Rd | 17.5 | 12.7 | 12.8 | 32% | 0% | Negligible |
| 1 Brunstane Rd South | 17.5 | 12.7 | 12.7 | 32% | 0% | Negligible |
| 147 High Street | 32.2 | 21.5 | 21.6 | 54% | 0% | Negligible |
| 167 High Street | 34.7 | 22.9 | 23.0 | 58% | 0% | Negligible |
| New housing 1 | 14.9 | 11.2 | 11.9 | 30% | n/a | n/a |
| New housing 2 | 13.9 | 10.8 | 11.0 | 27% | n/a | n/a |
| New housing 3 | 14.9 | 11.5 | 11.5 | 29% | n/a | n/a |
| New housing 4 | 14.1 | 10.8 | 10.9 | 27% | n/a | n/a |
| New housing 5 | 14.2 | 10.9 | 11.0 | 27% | n/a | n/a |
| 21 - 23 High Street | 21.8 | 16.0 | 16.1 | 40% | 0% | Negligible |
| 161 High St | 35.5 | 22.2 | 22.3 | 56% | 0% | Negligible |
| Barratt House 1 | 20.7 | 13.6 | 13.9 | 35% | 1% | Negligible |
| New Primary School | - | - | 11.5 | 29% | n/a | Negligible |

### 12.8.2 PM10 Annual Mean Concentrations

The predicted annual mean $PM_{10}$ concentrations for the 2020 and 2025 assessment scenarios are presented in Table 12.11 and Table 12.12 respectively. The percentage change in annual mean concentrations as a result of the proposed development have been rounded to the nearest percent as prescribed in the IAQM/EPUK guidance.

The model results indicate that annual mean $PM_{10}$ concentrations in excess of the 18 $\mu g.m^{-3}$ Scottish $PM_{10}$ objective occurred at some locations on Musselburgh High Street in 2014. These are at numbers 69, 86, 147, 161 and 167 High Street.

For all of the 2020 and 2025 future baseline and future with development scenarios annual mean $PM_{10}$ concentrations are predicted to remain in excess of the 18 $\mu g.m^{-3}$ Scottish objective at numbers 69, 86 and 161 High Street in Musselburgh. At 147 and 167 High Street the predicted annual mean $PM_{10}$ concentrations are less than the 18 $\mu g.m^{-3}$ objective in 2020 and 2025.

**Table 12.11: Modelled Annual Mean Concentrations $PM_{10}$ 2020**

| Receptor | 2014 Baseline ($\mu g.m^{-3}$) | 2025 Without Development ($\mu g.m^{-3}$) | 2025 With Development ($\mu g.m^{-3}$) | % of AQL With Development | % Magnitude of Change (rounded to nearest 1 %) | Impact Significance Descriptor |
|---|---|---|---|---|---|---|
| 137 High Street | 16.83 | 15.97 | 16.01 | 88.9% | 0% | Negligible |
| 69 High Street | 20.28 | 19.12 | 19.20 | 106.6% | 0% | Negligible |
| 86 High Street | 20.49 | 19.31 | 19.39 | 107.7% | 0% | Negligible |
| Bridge Street 1st floor | 15.54 | 14.62 | 14.63 | 81.3% | 0% | Negligible |
| Bridge St ground floor | 17.96 | 16.79 | 16.82 | 93.5% | 0% | Negligible |
| 154 N High St | 21.00 | 19.52 | 19.57 | 108.7% | 0% | Negligible |
| 4 Edinburgh Rd | 15.66 | 14.68 | 14.70 | 81.7% | 0% | Negligible |
| 238 Milton Rd E | 13.61 | 12.94 | 12.97 | 72.1% | 0% | Negligible |
| 221 Milton Rd E | 13.48 | 12.80 | 12.84 | 71.3% | 0% | Negligible |
| 2 Milton Rd E | 15.06 | 14.32 | 14.36 | 79.8% | 0% | Negligible |
| 3 Milton Rd E | 15.18 | 14.42 | 14.48 | 80.4% | 0% | Negligible |
| Brunstane Primary school | 13.93 | 13.31 | 13.31 | 74.0% | 0% | Negligible |
| Milton Rd 1 | 13.52 | 12.86 | 12.90 | 71.7% | 0% | Negligible |
| Milton Rd 2 | 13.44 | 12.78 | 12.81 | 71.2% | 0% | Negligible |
| 1 Newcraighall Rd West | 15.66 | 14.98 | 15.07 | 83.7% | 1% | Negligible |
| Niddrie Cottages 1 | 16.80 | 16.07 | 16.14 | 89.7% | 0% | Negligible |
| Niddrie Cottages 3 | 16.79 | 16.06 | 16.13 | 89.6% | 0% | Negligible |
| 16 Newcraighall Rd | 17.60 | 16.81 | 17.00 | 94.4% | 1% | Negligible |
| 104 Newcraighall Rd | 15.28 | 14.71 | 14.87 | 82.6% | 1% | Negligible |
| Olivebank Flats 1 | 15.29 | 14.39 | 14.41 | 80.0% | 0% | Negligible |

| Receptor | 2014 Baseline (µg.m$^{-3}$) | 2025 Without Development (µg.m$^{-3}$) | 2025 With Development (µg.m$^{-3}$) | % of AQL With Development | % Magnitude of Change (rounded to nearest 1 %) | Impact Significance Descriptor |
|---|---|---|---|---|---|---|
| 302 Milton Rd East | 14.24 | 13.46 | 13.49 | 74.9% | 0% | Negligible |
| 301 Milton Road East | 14.50 | 13.77 | 13.81 | 76.7% | 0% | Negligible |
| 44 Eastfield Rd | 15.72 | 14.84 | 14.87 | 82.6% | 0% | Negligible |
| 86 Brunstane Rd | 14.18 | 13.52 | 13.54 | 75.2% | 0% | Negligible |
| 81 Brunstane Rd | 14.06 | 13.41 | 13.42 | 74.6% | 0% | Negligible |
| 1 Brunstane Rd South | 14.18 | 13.54 | 13.55 | 75.3% | 0% | Negligible |
| 147 High Street | 18.35 | 17.31 | 17.36 | 96.4% | 0% | Negligible |
| 167 High Street | 18.91 | 17.78 | 17.84 | 99.1% | 0% | Negligible |
| New housing 1 | 13.68 | 13.09 | 13.10 | 72.8% | n/a | n/a |
| New housing 2 | 13.34 | 12.78 | 12.78 | 71.0% | n/a | n/a |
| New housing 3 | 13.16 | 12.58 | 12.58 | 69.9% | n/a | n/a |
| New housing 4 | 13.36 | 12.79 | 12.80 | 71.1% | n/a | n/a |
| New housing 5 | 13.43 | 12.86 | 12.87 | 71.5% | n/a | n/a |
| 21 - 23 High Street | 15.03 | 14.20 | 14.22 | 79.0% | 0% | Negligible |
| 161 High St | 19.38 | 18.09 | 18.13 | 100.7% | 0% | Negligible |
| Barratt House 1 | 16.70 | 15.93 | 16.07 | 89.3% | 1% | Negligible |

**Table 12.12: Modelled Annual Mean Concentrations $PM_{10}$ 2025**

| Receptor | 2014 Baseline ($\mu g.m^{-3}$) | 2025 Without Development ($\mu g.m^{-3}$) | 2025 With Development ($\mu g.m^{-3}$) | % of AQL With Development | % Magnitude of Change (rounded to nearest 1 %) | Impact Significance Descriptor |
|---|---|---|---|---|---|---|
| 137 High Street | 16.83 | 15.90 | 15.96 | 88.7% | 0% | Negligible |
| 69 High Street | 20.28 | 19.13 | 19.25 | 107.0% | 1% | Moderate |
| 86 High Street | 20.49 | 19.31 | 19.44 | 108.0% | 1% | Moderate |
| Bridge Street 1st floor | 15.54 | 14.51 | 14.54 | 80.8% | 0% | Negligible |
| Bridge St ground floor | 17.96 | 16.73 | 16.79 | 93.3% | 0% | Negligible |
| 154 N High St | 21.00 | 19.51 | 19.60 | 108.9% | 0% | Negligible |
| 4 Edinburgh Rd | 15.66 | 14.58 | 14.62 | 81.2% | 0% | Negligible |
| 238 Milton Rd E | 13.61 | 12.83 | 12.95 | 72.0% | 1% | Negligible |
| 221 Milton Rd E | 13.48 | 12.68 | 12.77 | 70.9% | 0% | Negligible |
| 2 Milton Rd E | 15.06 | 14.22 | 14.30 | 79.4% | 0% | Negligible |
| 3 Milton Rd E | 15.18 | 14.33 | 14.43 | 80.1% | 1% | Negligible |
| Brunstane Primary school | 13.93 | 13.19 | 13.21 | 73.4% | 0% | Negligible |
| Milton Rd 1 | 13.52 | 12.74 | 12.80 | 71.1% | 0% | Negligible |
| Milton Rd 2 | 13.44 | 12.66 | 12.71 | 70.6% | 0% | Negligible |
| 1 Newcraighall Rd West | 15.66 | 14.91 | 15.03 | 83.5% | 1% | Negligible |
| Niddrie Cottages 1 | 16.80 | 15.98 | 16.08 | 89.3% | 1% | Negligible |
| Niddrie Cottages 3 | 16.79 | 15.96 | 16.07 | 89.3% | 1% | Negligible |
| 16 Newcraighall Rd | 17.60 | 16.74 | 17.02 | 94.5% | 2% | Slight |
| 104 Newcraighall Rd | 15.28 | 14.64 | 14.89 | 82.7% | 1% | Negligible |

| Receptor | 2014 Baseline ($\mu g.m^{-3}$) | 2025 Without Development ($\mu g.m^{-3}$) | 2025 With Development ($\mu g.m^{-3}$) | % of AQL With Development | % Magnitude of Change (rounded to nearest 1 %) | Impact Significance Descriptor |
|---|---|---|---|---|---|---|
| Olivebank Flats 1 | 15.29 | 14.29 | 14.31 | 79.5% | 0% | Negligible |
| 302 Milton Rd East | 14.24 | 13.35 | 13.41 | 74.5% | 0% | Negligible |
| 301 Milton Road East | 14.50 | 13.67 | 13.78 | 76.6% | 1% | Negligible |
| 44 Eastfield Rd | 15.72 | 14.76 | 14.83 | 82.4% | 0% | Negligible |
| 86 Brunstane Rd | 14.18 | 13.40 | 13.44 | 74.7% | 0% | Negligible |
| 81 Brunstane Rd | 14.06 | 13.28 | 13.32 | 74.0% | 0% | Negligible |
| 1 Brunstane Rd South | 14.18 | 13.42 | 13.45 | 74.7% | 0% | Negligible |
| 147 High Street | 18.35 | 17.27 | 17.36 | 96.4% | 1% | Slight |
| 167 High Street | 18.91 | 17.74 | 17.84 | 99.1% | 1% | Slight |
| New housing 1 | 13.68 | 12.96 | 13.41 | 74.5% | n/a | n/a |
| New housing 2 | 13.34 | 12.65 | 12.77 | 70.9% | n/a | n/a |
| New housing 3 | 13.16 | 12.44 | 12.46 | 69.2% | n/a | n/a |
| New housing 4 | 13.36 | 12.66 | 12.73 | 70.7% | n/a | n/a |
| New housing 5 | 13.43 | 12.73 | 12.77 | 70.9% | n/a | n/a |
| 21 - 23 High Street | 15.03 | 14.09 | 14.12 | 78.5% | 0% | Negligible |
| 161 High St | 19.38 | 18.07 | 18.14 | 100.8% | 0% | Negligible |
| Barratt House 1 | 16.70 | 15.84 | 16.03 | 89.1% | 1% | Negligible |
| New Primary School | - | - | - | 72.9% | n/a | Negligible |

### 12.8.3 Impact Assessment

***Risk of Introducing New Human Exposure to Poor Air Quality***

The predicted annual mean $NO_2$ and $PM_{10}$ concentrations at the proposed locations of the new residential properties are well within the respective annual mean objectives for $NO_2$ and $PM_{10}$.

This indicates that locating residential properties would not result in the introduction of new human exposure into an area with poor air quality.

***Impact of Proposed Development on Air Quality at Sensitive Receptors***

The calculated magnitude of change attributable to the proposed development in both the interim scenario in 2020 and the proposed development complete in 2025 are presented in Table 12.9 and Table 12.10 for $NO_2$ and Table 12.11 and Table 12.12 for $PM_{10}$. The predicted impact descriptors for $NO_2$ are classified as 'negligible' at all of the existing receptor locations assessed.

For the 2020 Interim 'no bridge' scenario, a negligible impact is predicted for annual mean $PM_{10}$ concentrations at all receptor locations modelled.

For the 2025 'completed development with bridge' scenario, the model indicates a 'moderate' impact on annual mean $PM_{10}$ concentration at some receptor locations along Musselburgh High Street. The future baseline annual mean $PM_{10}$ is predicted to be in excess of the 18 $\mu g.m^{-3}$ Scottish air quality objective at these locations. The proposed development is increasing annual mean concentrations by up to 0.13 $\mu g.m^{-3}$. This is just enough to be categorised as a 'moderate' impact descriptor at this location as the future total concentration is greater than 103% of the 18 $\mu g.m^{-3}$ objective and the magnitude of change, rounded to the nearest percent of the objective, is 1%.

For the 2025 'completed development with bridge' scenario, the dispersion modelling results indicates a 'slight' impact on annual mean $PM_{10}$ concentration at the residential properties close to the road opposite Newcraighall Primary School on Newcraighall Road.

***Significance of Operational Phase Air Quality Impacts***

The predicted impact of the proposed development on $NO_2$levels has been determined to be 'negligible' at all existing residential properties included in the assessment.

The predicted impact of the proposed development on $PM_{10}$ levels has been determined to be 'negligible' at all existing residential properties included in the assessment, with the exception of a small number of properties in Musselburgh High Street and one property at Newcraighall Road. At a small number of properties in Musselburgh, the impact is described as 'moderate' and at Newcraighall Road the impact is described as 'slight'.

The negligible impact on air quality at almost all sensitive locations surrounding the proposed development reflects the strategically advantageous location of the development, with ready access to the surrounding trunk road network. The forecast 'moderate' impact in Musselburgh High Street is due to the elevated baseline levels of $PM_{10}$ levels at this location, with the proposed development resulting in an increase of less than 1%. While the elevated baseline levels at this location are of concern, there is little to be gained from further mitigation of the impacts of the proposed development at this location. More general mitigation measures for the proposed development are set out in Section 12.11.

## 12.9 Cumulative Effects Assessment

It is not predicted that any Type 1 Cumulative impacts will arise as a result of the air quality impacts of the proposed development. In relation to Type 2 Cumulative Effects, Chapter 15 should be referred to for a detailed explanation of the process of identifying other developments in the vicinity which could result in cumulative effects with the proposed development. The assessment in relation to air quality is presented in Table 12.13.

**Table 12.13: Cumulative Effects Assessment – Air Quality**

| | **Site 1**<br>**Newcraighall North**<br>13/03181/FUL* | **Site 2**<br>**Newcraighall East**<br>10/03506/PPP*<br>15/04112/AMC* | **Site 14**<br>**Brunstane Steadings**<br>06/02742/FUL*<br>08/02704/FUL *<br>14/01049/FUL* | **Site 20**<br>**Wanton Walls**<br>PPA-230-491* |
|---|---|---|---|---|
| Summary of Development Proposal | Residential development of 220 units comprising houses, cottages and flats and two commercial units (as amended). Land 335 Metres Southwest of 103 Newcraighall Road Edinburgh.<br>Currently under construction. | Residential development comprising 176 No. dwellings and associated infrastructure.<br>Construction not yet commenced. | Convert steading and outbuildings to form 12 dwelling houses (as amended).<br>Currently under construction. | Erection of 11 houses, alteration to access road and demolition of 105 Newcraighall and outbuildings.<br>Development status unconfirmed. |
| Summary of relevant development aspects and interactions. | Vehicles trips generated by this development will contribute to future traffic flows in and around the local area. | Vehicles trips generated by this development will contribute to future traffic flows in and around the local area. | Vehicles trips generated by this development will contribute to future traffic flows in and around the local area. | Vehicles trips generated by this development will contribute to future traffic flows in and around the local area.<br>Demolition and Construction phases may lead to dust emissions. |

| | **Site 1**<br>**Newcraighall North**<br>13/03181/FUL* | **Site 2**<br>**Newcraighall East**<br>10/03506/PPP*<br>15/04112/AMC* | **Site 14**<br>**Brunstane Steadings**<br>06/02742/FUL*<br>08/02704/FUL *<br>14/01049/FUL* | **Site 20**<br>**Wanton Walls**<br>PPA-230-491* |
|---|---|---|---|---|
| Potential cumulative effects with New Brunstane. | Additional future road traffic emissions (emissions from committed development traffic have been accounted for in the air quality impact assessment). | Additional future road traffic emissions (emissions from committed development traffic have been accounted for in the air quality impact assessment). | Additional future road traffic emissions (emissions from committed development traffic have been accounted for in the air quality impact assessment). | Additional future road traffic emissions (emissions from committed development traffic have been accounted for in the air quality impact assessment)<br>Potential for additional dust impacts at some locations if demolition and construction phase occurs at the same time and nearby one of the Brunstane construction phase/zones. |
| Likelihood of cumulative effects with New Brunstane (H/M/L) | H | H | L | M |
| Proposed mitigation (with apportionment if relevant) | Reduce vehicle trip generation where possible via provision of good public transport links and infrastructure that promotes active travel modes.<br>Provide charging infrastructure for plug-in vehicles as per current IAQM/EPUK air quality best practice guidance. | | | |
| Residual cumulative effects with New Brunstane | Unknown, but considered unlikely to be significant. | Unknown, but considered unlikely to be significant. | Unknown, but considered unlikely to be significant. | Unknown, but considered unlikely to be significant. |

## 12.10 Construction Dust Risk Assessment

Construction activities may give rise to increases in $PM_{10}$ concentrations at nearby locations and can result in nuisance to nearby receptors due to the spoiling of surfaces by dust as a result of the site activities. The magnitude of these impacts depends on the local conditions and the use of dust suppression and other mitigation measures on site.

For this assessment the risk assessment approach developed by the institute of Air Quality Management (IAQM)[6] has been used to assess the potential emissions from construction on site.

The assessment is conducted in four steps:

**Step 1:** Screen the requirement for a more detailed assessment based on distance of the site to nearby sensitive receptors.

**Step 2:** Assess the effect of dust effects - determined by:

- The scale and nature of the works, which determines the risk of dust arising from four onsite activities: demolition, earthworks, construction and track-out; each activity is assigned a level of risk;
- The sensitivity of the area;
- Determine the risk of dust impacts by combining the above factors.

**Step 3:** Determine the site specific mitigation for each of the four potential activities. This will be based on the risk of dust impacts identified in Step 2.

**Step 4:** Examine the effects to determine whether or not these are significant.

### 12.10.1 Step 1- Screen the Need for a Detailed Assessment

There are a number of residential properties within 350m of the site boundary, therefore an assessment is required.

[6] Guidance on the assessment of dust from demolition and construction, 2014, IAQM.

### 12.10.2 Step 2A Define the Potential Dust Emissions Magnitude

***Demolition Phase Risk Assessment***

The only anticipated demolition works would be the overbridge over the railway which runs through the centre of proposed site in a north west to south east direction. This demolition will be low volume and will not include any demolition greater than 10m in height. For this assessment the potential dust emission magnitude during demolition works is classified as "Small".

***Earthworks***

The proposed development covers an area greater than 10,000m$^2$, the site is therefore classified as 'Large'. At this stage of the development, is it proposed that all excavated material will remain onsite and be used as appropriate, this will limit the amount of material being removed from the site. The material will therefore be stockpiled, with an assumed bund height of approximately 4m. This bund height is within the 'small' site classification.

During earthworks the anticipated number of earth moving vehicles operational at any one time will vary between the different construction phases of the proposed development. As discussed in Chapter 2 of this ES, the site will be developed in four phases; during each phase a section of both the east and west sectors of the site will be developed. The anticipated vehicle movements range between 10 - 90 movements per day. It is currently unknown how many earth moving vehicles will be operational at any one time.

Across the majority of the site, the deposits beneath the surface are made up of sands and gravels. This is not classified as a dusty soil type.

Although the site classification varies based on the proposed activities; the potential dust emission magnitude during earthworks is considered to be 'Medium'. During periods where more than 10 earth moving vehicles are operational at any one time, the potential dust emission magnitude is classified as 'Large'.

***Construction***

The proposed construction on site will involve the erection of the proposed residential units, the school and commercial properties. The construction materials used for the residential units are likely to be timber frame clad with brick facing. The construction will be conducted in four phases, during each phases a section of both the east and west sectors of the site will be constructed concurrently.

It is assumed that all housing units will be constructed on standard foundations. Areas of potential piling would be the proposed school building and the bridge abutments for the new railway bridge. It is anticipated that all road subbases will be constructed of Type 1 or similar material. Concrete will be required for the new railway bridge within the development. Calculating the estimated building volume in $m^3$ per unit and multiplying by the units in each phase indicates that the total building volume is between 25,000$m^3$ - 100,000$m^3$.

Based on the currently available information regarding the construction phase, the potential dust emission magnitude is classified as 'Medium'.

***Track-Out***

Vehicles travelling over unpaved ground during dry conditions may lead to dust suspension. It is anticipated that there will be between 10-50 HGV movements per day and that the extent of unpaved road could be around 1,000m during construction. The sand and gravel soil type at the site indicates that unpaved surfaces are likely to have a low potential for dust release.

Based on the available information the potential dust emissions magnitude from track-out is classified as 'Medium'.

The potential dust emission magnitude from each activity is summarised in Table 12.14.

**Table 12.14: Dust Emission Magnitude**

| Activity | Dust Emission Magnitude |
|---|---|
| Demolition | Small |
| Earthworks | Medium |
| **Activity** | **Dust Emission Magnitude** |
| Construction | Medium |
| Track-out | Medium |

### 12.10.3 Step 2B- Define the Sensitivity of the Area

***Description of Site and Surrounding Area:***

Dust impacts during the construction phase could occur at locations up to 350m from construction activities. The distance of sensitive receptors from construction activities will vary as the proposed development rolls out. Any newly occupied residential properties constructed as part of the proposed development will also be sensitive to potential construction dust impacts.

The sensitive receptors within 350m of the site where dust impacts could potentially occur are:

- Residential properties at 226 to 230 Milton Road East that are within 20m of the proposed northern site entrance – vehicle movements at this location will mean there is a risk of vehicle trackout and re-suspended particulates;
- Residential properties along Daiches Braes, and at Brunstane Road South and Gilbertstoun;
- Residential properties to the north east of the site at Brunstane Mill Road, Milton Glen and Milton Road East;
- Residential properties to the south of the site at Newcraighall;
- Jewel and Esk College;

- Offices and National Trust property at the Newhailes Estate;
- The Portobello Cemetery.

The proposed development site is not within an AQMA. The 2014 $PM_{10}$ annual mean background concentration in the area around the site ranges from 12.1 to 13.9 $\mu g.m^{-3}$, which is up to 77% of the Scottish 18 $\mu g.m^{-3}$ $PM_{10}$ annual mean objective.

The approximate number of sensitive receptors (nearby residential, public and commercial properties) and their proximity to the site boundary outlined by the IAQM construction guidance are present in Table 12.15.

**Table 12.15: Proximity of Nearby Receptors**

| Proximity to Construction Site Boundary | Number of Receptor Category |
|---|---|
| < 20 m | 10-100 Receptors |
| 20 – 50 m | 10-100 Receptors |
| 50 to 100 m | >100 receptors |
| > 100 m | >100 receptors |

***Sensitivity of Area to Dust Soiling Effects on People and Property:***

As there are approximately 10-100 receptors within 20m of the site boundary, the worst case sensitivity of dust soiling effects is classified as 'High' during earthworks and construction activities.

For vehicle track-out the sensitivity is classified as 'High' for properties within 20m of the main access roads to the site that will be used by construction traffic.

During the demolition of the railway bridge, there could be approximately 10-100 new residential properties, within 50m of the demolition activities, therefore the sensitivity has been classified as 'Medium'.

***Sensitivity of the Area to Human Health Impacts:***

The annual mean background $PM_{10}$ concentration ranges from 12.1 to 13.9 $\mu g.m^{-3}$ in and around the area where the proposed development is located, and there are between 10-100 receptors within 20m of the site boundary. Therefore the sensitivity of the area is classified as 'Low' during the earthworks and construction phases.

During the demolition of the railway bridge it is anticipated there will be approximately 10-100 receptors within 50m of the source, therefore the sensitivity to human health impacts has been classified as "Low".

For vehicle track-out the sensitivity to human health impacts is classified as "Low" as there approximately 10-100 properties within 20m of the main access roads to the site.

***Sensitivity of the Area to Ecological Impacts:***

There are no ecological receptors nearby which would be significantly affected by changes in air quality if the proposed mitigation measures are implemented during the construction phase.

The outcome of defining the sensitivity of the area using the IAQM risk assessment method is summarised in Table 12.13.

**Table 12.13: Outcome of Defining the Sensitivity of the Area**

| Potential impacts | Demolition | Earthworks | Construction | Track-Out |
|---|---|---|---|---|
| Dust Soiling | Medium | High | High | High |
| Human Health | Low | Low | Low | Low |
| Ecological | n/a | n/a | n/a | n/a |

### 12.10.4 Step 2C- Define the Risk of Impacts

The dust emission magnitude determined in Step 2A is now combined with the sensitivity of the area determined in Step 2B to determine the risk of impacts with no mitigation applied. This is then used to determine the level of mitigation that must be applied. For those cases where the risk category is 'negligible' no mitigation measures beyond those required by legislation will be required.

The risk of impact from the proposed site activities are defined in Table 12.17 below:

**Table 12.14: Summary of Dust Impacts**

| Potential Impacts | Demolition | Earthworks | Construction | Track-Out |
|---|---|---|---|---|
| Dust Soiling | Low Risk | Medium Risk | Medium Risk | Medium Risk |
| Human Health | Negligible | Low Risk | Low Risk | Low Risk |
| Ecological | n/a | n/a | n/a | n/a |

### 12.10.5 Step 3-Site Specific Mitigation

Based on the risk assessment conducted, mitigation measures will be required during the earthworks and construction phases of the proposed development and to control potential impacts from vehicle track-out. This will help to reduce the adverse effects of on-site dust sources on nearby receptors. A number of mitigation measures are suggested in the IAQM Construction Dust guidance based on the risk category of the site, some of which are presented in Table 12.18. Further suggested mitigation measures are detailed in the IAQM Construction Dust guidance.

**Table 12.18: IAQM Recommended Mitigation Measures**

| Mitigation Category | Mitigation Method |
|---|---|
| Communications | • Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager;<br>• Display the head or regional office contact information. |
| Dust Management | • Develop and implement a Dust Management Plan (DMP);<br>• Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book;<br>• Make the complaints log available to the local authority when asked. |

| Mitigation Category | Mitigation Method |
|---|---|
| Monitoring | • Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked;<br>• Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. |
| Preparing maintaining the site | • Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;<br>• Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;<br>• Avoid site runoff of water or mud. |
| Operating vehicles/machinery | • Ensure all vehicles switch off engines when stationary – no idling vehicles;<br>• Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;<br>• Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate). |
| Operations | • Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;<br>• Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;<br>• Use enclosed chutes and conveyors and covered skips. |

| Mitigation Category | Mitigation Method |
|---|---|
| Track-out Measures | • Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use;<br>• Avoid dry sweeping of large areas;<br>• Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;<br>• Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;<br>• Record all inspections of haul routes and any subsequent action in a site log book;<br>• 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;<br>• Access gates to be located at least 10m from receptors where possible. |

## 12.11 Proposed Mitigation

The scheme has a number of mitigation measures relevant to the management of air quality impacts built in. These are largely related to the mitigation of traffic impacts, and include measures relating to public transport, provision of electric charging points, and car parking provision. Traffic impact mitigation measures are set out in Chapter 11 of this ES and in the accompanying TA.

Additionally, research, development and regulation to reduce vehicle emissions is ongoing. Although recent developments have highlighted problems with the testing and regulation of emissions, the long-term picture remains a consistent reduction in emissions from vehicle exhausts.

The assessment found that these mitigation measures would be effective in resulting in insignificant impacts on air quality at all locations apart from a small number of properties on Musselburgh High Street, at which a moderate impact was forecast. The “moderate” impact is related almost entirely to baseline traffic levels, and even though the impact is described as “moderate”, the proposed development would not have any detectable effect on air quality at these properties.

## 12.12 Summary of Residual Effects and Statement of Significance

Air quality at the new sensitive properties within the proposed development would comply with the Scottish air quality standards.

The predicted impact of the proposed development on $NO_2$ levels would be negligible at all existing residential properties.

The predicted impact of the proposed development on $PM_{10}$ levels would be negligible at all existing residential properties, with the exception of a small number of properties in Musselburgh High Street. At these properties, the impact would be moderate. The forecast moderate impact in Musselburgh High Street is due to the elevated baseline levels of $PM_{10}$ levels at this location, with the proposed development resulting in an increase of less than 1% which would not be measureable.

Dust during construction could potentially affect nearby residents. Mitigation measures have been proposed which would result in no significant adverse effects due to construction dust. Provided appropriate mitigation measures are implemented, dust impacts would be insignificant.

## 12.13 Conclusions

The proposed development would have an insignificant effect on air quality at all locations, with the exception of a small number of residential properties at Musselburgh High Street, where the impact would be moderate. This reflects the advantageous location and the mitigation built in to the proposed development.

The forecast moderate impact in Musselburgh High Street is due to the elevated baseline levels of $PM_{10}$ levels at this location, with the proposed development resulting in a marginal increase of less than 1% which would not be measureable.

## 12.14 EIA Summary Tables

**Table 12.19: Air Quality**

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| **Construction / Temporary** | | | | | | | |
| Adverse | High | Insignificant (based on IAQM construction guidance) | Medium (during construction phase) | Temporary | Not applicable | Minor (based on IAQM construction guidance) | Minor (based on IAQM construction guidance) |
| **Operation / Permanent** | | | | | | | |
| **On proposed development site** | | | | | | | |
| Adverse | High | Negligible | Long term | Permanent; will decline over time as new vehicle emission standards are implemented | Not applicable | Negligible | Negligible |
| **Off site – Limited number of properties on Musselburgh High Street** | | | | | | | |
| Adverse | High | Moderate | Long term | Permanent; will decline over time as new vehicle emission standards are implemented | Not applicable | Moderate | Moderate |

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| **Off site – Other off-site locations** | | | | | | | |
| Adverse | High | Minor | Long term | Permanent; will decline over time as new vehicle emission standards are implemented | Not applicable | Minor | Minor |

**Table 12.20: Air Quality, Summary of Proposed Mitigation**

| Reference | Proposed Mitigation and Management | Project Phase | | | |
|---|---|---|---|---|---|
| | | Pre-Construction | Construction | Operation | Deconstruction |
| AQ1 | Construction Dust Management Plan which includes the mitigation measures recommended in the Construction Dust Risk Assessment | | ✓ | | |
| AQ2 | Reduce road traffic where possible via provision of good public transport links and infrastructure that promotes active travel modes. | | | ✓ | |
| AQ3 | Provide charging infrastructure for plug-in vehicles as per current IAQM/EPUK air quality best practice guidance | | | ✓ | |

## 12.15 References


- IAQM, *'Guidance on the assessment of dust from demolition and construction'*, London, February 2014, p14-27, Available from: http://www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf;

- Defra and The Devolved Administrations, *'Technical Guidance LAQM. TG (16)*', London, April 2016;

- Institute of Air Quality Management and Environmental Protection UK, *'Land-Use Planning & Development Control: Planning for Air Quality'*, London, May 2015, p17-24;

- Scottish Government, 'Maps of Annual Concentrations', 2015, http://www.scottishairquality.co.uk/data/mapping.

# 13. NOISE AND VIBRATION

## 13.1 List of Figures

- Figure 13.1 Noise Monitoring Location Plan and Noise Sensitive Receptors.

## 13.2 List of Appendices

- Appendix 13.A Glossary of Acoustic Terminology;
- Appendix 13.B Baseline Noise Measurements;
- Appendix 13.C Predictive Noise Impact Calculations.

## 13.3 Introduction

This chapter assesses the potential impacts of the proposed development on the existing local acoustic climate, and on local noise sensitive receptors (NSRs). Consideration is also given to the potential impact of existing local acoustic sources on the proposed development.

An EIA scoping report for the proposed development was issued to City of Edinburgh Council (CEC) in March 2016. Within the noise and vibration chapter of the scoping report, potential influences on the existing acoustic environment were identified as road traffic noise, and rail traffic noise. In addition, potential influences were identified on ground borne vibration levels for the proposed development through local rail traffic.

The site is situated within a suburban area to the south east of Edinburgh (see Chapter 2, Figure 2.1) and comprises some 54.6ha of a predominantly green-field site in Brunstane.

Two scenarios have been adopted to inform this assessment for the likely phased implementation of the proposed development:

***Scenario 1***

- Development phases located to the north of the site to commence, with no railway overbridge in place, to link the west and east sections of the site.

***Scenario 2***

- The entire proposed development completed along with all required infrastructure (including the new railway overbridge) in place.

## 13.4 Legislation, Policy and Guidance

The assessment of noise and vibration took account of relevant legislation, policy and guidance from Scottish Government, Department for Transport (DfT), Transport Research Laboratory, Highways Agency, British Standards Institute (BSI), and the World Health Organisation (WHO). Reference was also made to the guidelines set out in the Guidelines for Environmental Noise Impact Assessment (IEMA, 2014). A list of all reference documents is given at the end of this chapter.

## 13.5 Consultation

Initial consultations were undertaken with CEC Environmental Health to discuss the approach to the noise assessment for the proposed development. Whilst general agreement was reached on the overall approach to be adopted, CEC also specified that they expected to see some consideration given to:

- The potential for rail traffic to influence existing ground borne vibration levels for new vibration sensitive receptors within the proposed development;

- The potential for overhead electrical powerlines traversing the site to impact on the acoustic climate of the new development.

With respect to the overhead powerlines, CEC indicated that any noise attributed to the overhead lines should comply with the noise rating curve NR20 frequency band thresholds for any new residential property, within the proposed development, with a windows 'partially opened' scenario.

Further consultation with CEC indicated that, for transportation noise sources, a "closed window" scenario would be acceptable to assess the noise impact. With respect to any potential commercial / industrial noise sources, the associated noise impact would need to be determined using an "open window" scenario.

Consultations were undertaken with Network Rail, to determine the following information:

- The number of freight trains passing the site on a 24 hour basis;
- The number of freight trains passing the site during night-time periods.

Network Rail responded with an estimation of freight train traffic over a 24-hour period but was unable to provide information pertaining to the night time period.

No noise specific issues were raised through CECs formal EIA scoping opinion (see Appendix 4.A).

## 13.6 Assessment Methodology

In accordance with the Scoping Report, reference was made to the guidance set out in PAN 1/2011 and Technical Advice Note (TAN) 1, 2011. Alongside these guidance documents, reference was also made to the Guidelines for Environmental Noise Impact Assessment, GENIA (IEMA, 2014), which include some of the concepts used for noise impact assessment in PAN1 and TAN1.

### 13.6.1 Study Area

The study area for noise assessment was defined largely by the distribution of NSRs shown in Figure 13.1. The boundaries of the study area are approximately defined by the following road networks:

- Milton Road East, to the north of the site;
- Eastfield Road, to the north-east and east;
- The A1 Milton Link Road, to the west;
- Newcraighall Road and Newhailes Road to the south of the site.

### 13.6.2 Identify Sensitive Receptors and their Sensitivity

In the first instance, satellite imagery covering the site and surrounding area was reviewed in the context of the scheme extent to identify potentially sensitive NSRs.

Table 13.1 below outlines the assessment categories used to describe the sensitivity of each NSR. All nearby residential receptors have been considered as highly sensitive, due to the permanent nature of the proposed development. Brunstane Primary School and the Jewel & Esk College have been classified as having a medium sensitivity, due to their relative distance from the site combined with the fact that they will only be operational during daytime periods. The Milton Road East Cemetery, and industrial units located within Newhailes Industrial Estate are considered to be low sensitivity due to the nature of their operations, i.e. during daytime periods only.

**Table 13.1: Sensitivity Categories**

| Sensitivity | Type of Receptor | Identified Sensitive Receptors |
|---|---|---|
| High | Residential properties (and proposed New Brunstane Primary School) | Residential dwellings on Milton Road East, Brunstane Mill Road, Brunstane Road South, Daiches Braes, Brunstane Crescent, Brunstane Bank, Gilberstoun Place, Newcraighall Road, Brunstane House, Newhailes House and the proposed New Brunstane Primary School. |
| Medium | Educational facilities | Jewel & Esk College and Brunstane Primary School. |
| Low | Industrial or public facilities with transient usage | Industrial units within Newhailes Industrial Estate and Milton Road East Cemetery. |

### 13.6.3 Road Traffic Noise

Both short term (interim) and long term (operational) effects from the proposed development on road traffic noise were assessed in line with the prediction method detailed in CRTN (DfT, 1995).

The road traffic assessment considered noise level changes at NSRs according to their baseline levels, predicted to 10m from the road carriageway.

The predictive method, detailed in CRTN, was used to determine the baseline road traffic noise influence alongside two further scenarios in relation to the potential impact from the proposed development for all the road networks considered.

The predictive method took account of typical weekday traffic volumes during an 18-hour period, extending from 06:00 – 00:00 hours (18-hour AADT flows). The calculation method allowed corrections for the following variables:

- Percentage of heavy goods vehicles (HGVs);
- Traffic speeds;
- Road gradient;
- Nature of road surfacing.

Several scenarios were considered in the predictive calculation method, these were used to derive an $L_{A10,\ 18hour}$ value in each case. The scenarios considered in the calculations were as follows:

- Baseline measured traffic flows for 2015;
- Future baseline traffic flows with high background traffic growth applied for years 2020 and 2025, with no development;
- Future projected traffic growth for 2020, with other committed development and some of the proposed development complete in the absence of the railway bridge;
- Future projected traffic growth for 2025, with other committed development and the proposed development complete with the new railway bridge installed.

Committed developments in this case refers to two residential developments currently being considered to be situated both north and south of Newcraighall Road. These developments are further considered in Section 13.9.

To determine the magnitude of impact of road traffic noise on current NSRs, the difference in $L_{A10, 18hour}$ values was calculated between the baseline future years (2020 and 2025) and the future development scenarios for 2020 and 2025 as listed above, where 2025 is taken as the year of completion. The $L_{A10, 18hr}$ values were then converted to $L_{Aeq, 16hr}$ values using the following equation:

$L_{A10, 18hr}$ – 2dB = $L_{Aeq, 16hr}$ (PPG24, 1994)

Once $L_{Aeq}$ values had been derived, reference was then made to Table 13.2 below. This table was based on the guidelines in the GENIA document and modified for the purposes of this assessment. The criteria within this table were used to determine the magnitude of impact, both for short term (interim) effects and for the long term (operational) impacts of the project.

**Table 13.2: Classification of Magnitude of Noise Impacts for both Short Term and Long Term Impact According to Increment of Change**

| Long- term Impact Classification | Short-term Impact Classification | Sound Level Change, $L_{Aeq,T}$ (where T is either 16 hour day, 8 hour night) (dB) |
|---|---|---|
| No impact | No impact | -1≤ x <0 |
| Negligible | Negligible | 0 ≤ x < 1 |
| | Minor | 1 ≤ x < 3 |
| Minor | Moderate | 3 ≤ x < 5 |
| Moderate | Major | 5 ≤ x < 10 |
| Major | | x ≥ 10 |

For the purposes of determining the magnitude of impact of rail traffic noise on the proposed development, reference was made to the thresholds given in the World Health Organisation (WHO) Guideline Values for Community Noise (1999) as shown in Table 13.3 below.

**Table 13.3: WHO Guideline Values for Community Noise**

| Specific Environment / Conditions to be Achieved | $L_{Aeq}$ Threshold (dB) | Time period – hours (day / night) |
|---|---|---|
| Outdoor living space / annoyance | 50 (External) | 16 (day) |
| Outside bedrooms / sleep disturbance | 45 (External) | 8 (night) |
| School classrooms (indoors / speech intelligibility | 35 (Internal) | During class time |
| Inside bedrooms / sleep disturbance | 30 (Internal) | 8 (night) |

### 13.6.4 Railway Traffic Noise and Vibration

To determine the potential noise and vibration impact of existing rail traffic on new NSRs within the proposed development, reference was made to the methods detailed in the Technical Memorandum, CRN (1995). In accordance with TAN1/2011, daytime periods were defined as 07:00 – 23:00 and night time periods as 23:00 – 07:00. Noise and vibration monitoring was carried out at three monitoring locations ML10, ML11 and ML12, as shown in Figure 13.1. ML10 was adopted to target the location of the proposed primary school. Monitoring locations ML11 and ML12 were adopted to consider the potential impact on new NSRs situated to the southeast and east of the rail corridor respectively. Reference was made to current passenger service timetables for all services passing the site, both north and south bound, between 07:00 and 23:00 hours. From the timetables it was concluded that a total of 148 passenger trains pass the site during a midweek daytime period, with four passing during a mid-week night time period. A slight variation in passenger train traffic was noted for Saturday daytime with 152 train passes. Consultations with Network Rail indicated that "up to" fifteen freight trains could pass the site in any 24-hour period. Fifteen freight train passes were therefore assumed as a worst case for the purpose of the assessment for daytime periods.

With respect to night time freight traffic, Network Rail was unable to provide an estimate of traffic volumes. On this basis, a number of scenarios were assessed, to consider the noise levels generated at ML10, ML11 and ML12 for the following levels of freight traffic during an eight hour night-time period:

- Five trains passing;
- Four, three and two trains passing.

The scenario of five freight trains passing during a night time period was considered to represent a reasonable worst case. Where fifteen freight trains are known to pass the site during a 24-hour period, and the night time (8-hour) period accounts for one third of that time period, it was considered unlikely that as many as a third of overall freight traffic would pass the site during a night time period. To adopt this approach presents a reasonable worst case.

Reference was made to the methods detailed in Calculation of Rail Noise (CRN, 1995), to enable $L_{Aeq,\ 16\ hour}$ values to be determined for both daytime and night-time periods. The significance of impact of rail traffic noise was determined with respect to the threshold criteria given in Table 13.2 (IEMA, 2014).

## 13.7 Baseline Conditions

### 13.7.1 Current Site Setting and Present Acoustic Climate

The site spans two fields situated to the south east of Edinburgh. The closest residential receptors are situated at the north, west and southern boundaries of the site. There are also scattered residential properties to the south and east and Newhailes Industrial Estate is located to the southeast of the site. The site is roughly dissected by the East Coast Main Line (ECML) railway and is bound on all sides by key commuting roads to and from Edinburgh (i.e. A199 and the A1).

During monitoring at all locations, air traffic noise was noted as an influence on measured noise levels; on one occasion the $L_{Amax}$ value was noted to be attributable to this noise source. However, the acoustic environment at most monitoring locations was dominated by road traffic noise from the adjacent road network, notably the A1, A199 (Milton Road East) and Newcraighall Road. Road traffic was found to be a dominant noise source at ML1, ML4, ML7, ML8 and ML9. At the other monitoring locations distant road traffic was found to be a constant source of noise. In addition, to road and air traffic noise, some monitoring locations had site specific noise influences, which were noted as follows:

- Monitoring Location 1 – noise from children in Brunstane Primary School and noise from residential properties;
- Monitoring Location 2 – road traffic movement local to the Jewel and Esk College and noise from a pedestrian crossing on Milton Road East;
- Monitoring Location 3 – flowing water within the Brunstane Burn and passing rail traffic;
- Monitoring Location 4 – vehicle reverse beepers and local road traffic within the Newhailes Industrial Estate;
- Monitoring Location 6 – distant rail traffic movements and construction noise from the Newcraighall housing development construction site;
- Monitoring Locations 10, 11 and 12 – rail traffic movements, local road traffic and occasional noise attributed to construction works at the Newcraighall housing development construction site.

Whilst reasonable efforts were made to collate representative noise data during the survey, some atypical noise influences were also unavoidably captured during the monitoring, such as occasional construction noise. It is not however considered that this significantly influenced the results obtained.

### 13.7.2 Noise Monitoring Method

For all types of baseline monitoring on-site, A Brüel & Kjaer 2250 analysing digital sound level meter (SLM) was used to record noise levels. The B&K 2250 is a Type 1 sound meter. The SLM is independently calibrated at a UKAS accredited laboratory at least once every two years. The sound meter was calibrated on-site at the start and end of each monitoring shift, to ensure that there was no drift in the sensitivity of the instrument. A fitted omni-directional microphone and windshield was attached to the meter for all noise monitoring.

At all noise monitoring locations, the noise meter was set up in a free field position, i.e. 1.2 – 1.5m above ground level and approximately 3.5m from all other reflective surfaces other than the ground.

The following noise parameters were recorded at each location:

- $L_{Aeq}$ The equivalent continuous A-weighted sound pressure level;
- $L_{A10}$, $L_{A50}$ and $L_{A90}$ The noise level exceeded for 10%, 50% or 90% of the sampling period of the measured time, respectively. $L_{A90}$ is commonly understood to represent the background noise level;
- $L_{Amax}$ and $L_{Amin}$ The maximum/minimum noise level measured during the sampling period.

To conform to the relevant guidance documents, there were slight differences in the way the noise meter was set up when IKM was targeting noise associated with rail and road traffic. The differences are discussed below:

***Rail Traffic Noise***

Rail noise was targeted at ML10, ML11 and ML12. All noise measurements at these locations complied with the measurement method detailed in the Calculation of Railway Noise (1995).

Noise levels were recorded in half hour sampling periods, which were divided into one to five minute time increments to enable further dissemination of the data for each train pass wherever possible. Broadband and frequency analysis data was recorded concurrently. Noise monitoring was undertaken using a slow weighted time response(s).

Rail traffic was monitored during a day and night time period during 9th February 2016 and 7th – 8th March 2016 respectively. IKM attended site during time periods that would feature local train passes and fast speed passenger train passes in either direction.

***Road Traffic Noise***

Road traffic noise was targeted at ML1, ML7, ML8 and ML9. In accordance with the shortened measurement procedure taken from the Calculation of Road Traffic Noise publication (CRTN, 1988) three hours of daytime noise data was collected in five minute sampling periods at each location between the hours of 10:00 and 17:00. Broadband and frequency band analysis was recorded concurrently.

All noise readings were based on the A-weighted network, using a fast time weighted response (F).

Road traffic was monitored during the day time period of 10th February and 17th March 2016.

***All Other Baseline Noise Monitoring***

At all other locations, where road or rail traffic noise was not specifically targeted (i.e. ML2, ML3, ML4, ML5 and ML6) all noise readings were based on the A-weighted network, using fast time weightings (F). Broadband and frequency noise data was recorded concurrently.

Depending on the nature of the receptor location (i.e. residential/commercial/ educational), monitoring was undertaken during a day-time off-peak period, a day-time peak period or a night-time period or a combination of the different time periods, as shown in Table 13.4.

**Table 13.4: Summary of Noise Monitoring Survey**

| Monitoring Location | Monitoring Time Period | Date of Monitoring |
|---|---|---|
| ML1 | 08/02/2016 | Peak |
| | 17/03/2016 | Off peak |
| ML2 | 08/02/2016 | Off peak |
| | 17/03/2016 | Peak |
| ML3 | 08/02/2016 | Off peak |
| | 07/03/2016 | Night |
| | 14/03/2016 | Peak |
| ML4 | 08/02/2016 | Peak and Off peak |
| | 08/03/2016 | Night |
| | 11/03/2016 | Off peak |
| | 11/03/2016 | Peak |
| ML5 | 08/03/2016 | Night |
| | 11/03/2016 | Peak |
| | 14/03/2016 | Off peak |
| ML6 | 09/02/2016 | Peak |
| | 08/03/2016 | Night |
| | 11/03/2016 | Off peak |

***Note: Monitoring time periods were defined as follows:***

- ***Daytime peak: 06:00 – 09:00, 16:00 – 18:00***
- ***Daytime off peak: 09:00 – 16:00***
- ***Night time: 21:00 – 06:00***

***Vibration***

For the purposes of monitoring ground-borne vibration from rail traffic, IKM used a Vibrock V901 seismograph, to measure both Vibration Dose Value (VDV) and Peak Particle Velocity (PPV). The arrows on the transducers were orientated in the direction of the noise source (i.e. the railway). The transducers were firmly coupled to the ground surface with sandbags.

## 13.8 Identification and Evaluation of Key Impacts

### 13.8.1 Road Traffic Noise

***Baseline Levels***

Initially, consideration was given to whether a potential increase in road traffic noise attributable to high growth traffic curves might occur, in the absence of any new development. From Table 13.5 below, it can be seen that normal increases in road traffic volumes on the road network surrounding the site, during baseline future years of 2020 and 2025, lead to a negligible level of change in road traffic noise for nominal receptors situated along the road links considered.

**Table 13.5: Comparison of Predicted Day-time Noise Levels for 2015, and Baseline Future Years (2020, 2025) - $L_{A10,18hr}$ Values**

| Location | Baseline 2015 $L_{A10,18hr}$ (dB) | Baseline 2020 $L_{A10,18hr}$ (dB) | Baseline 2025 $L_{A10,18h}$ (dB) | Noise Level Change (dB) - 5 year period | Noise Level Change (dB) - 10 year period | Magnitude of Change (5 Year) | Magnitude of Change (10 Year) |
|---|---|---|---|---|---|---|---|
| Milton Road East | 64.8 | 65.1 | 65.1 | 0.3 | 0.3 | Negligible | Negligible |
| A1 Milton Link | 74.0 | 74.0 | 75.0 | 0.0 | 1.0 | No impact | Negligible |
| Newcraighall Road | 69.8 | 69.0 | 70.0 | 0.0 | 1.0 | No impact | Negligible |
| Eastfield | 68.3 | 68.7 | 68.9 | 0.3 | 0.6 | Negligible | Negligible |
| Gilberstoun | 60.0 | 61.0 | 61.0 | 1.0 | 1.0 | Negligible | Negligible |

**Table 13.6: Comparison of Predicted Day-time Noise Levels for 2015, and Baseline Future Years (2020, 2025) - $L_{Aeq,16hr}$ Values**

| Location | Baseline 2015 $L_{Aeq,16hr}$ (dB) | Baseline 2020 $L_{Aeq,16hr}$ (dB) | Baseline 2025 $L_{Aeq,16hr}$ (dB) | Noise Level Change (dB) - 5 year period | Noise Level Change (dB) - 10 year period | Magnitude of Change (5 Year) | Magnitude of Change (10 Year) |
|---|---|---|---|---|---|---|---|
| Milton Road East | 62.8 | 63.1 | 63.1 | 0.3 | 0.3 | Negligible | Negligible |
| A1 Milton Link | 72.0 | 72.0 | 73.0 | 0.0 | 1.0 | No impact | Negligible |
| Newcraighall Road | 67.0 | 67.0 | 68.0 | 0.0 | 1.0 | No impact | Negligible |
| Eastfield | 66.3 | 66.7 | 66.9 | 0.3 | 0.6 | Negligible | Negligible |
| Gilberstoun | 58.0 | 59.0 | 59.0 | 1.0 | 1.0 | Negligible | Negligible |

***Interim, Short Term Impact***

To determine the short term, interim impact of the proposed development on road traffic noise levels at existing NSRs, comparison was made between the baseline 2020 traffic figures with the traffic figures determined for the interim year of development (2020). This scenario takes into consideration all aspects of the proposed development that could be undertaken in the absence of the railway bridge, alongside any committed development that has the potential to impact on the local road network, as well as the application of normal traffic growth algorithms.

Tables 13.7 and 13.8 demonstrate the changes predicted in road traffic noise levels at nominal receptors along each part of the surrounding road network, with and without development. The highest increment of change in noise levels was +0.1dB, which is an acoustic change not discernible by the human ear (PAN1/2011). The overall magnitude of change for this scenario has therefore been deemed negligible.

**Table 13.7: Comparison of Predicted Baselines for 2020 with Short-Term (Interim) Scenario - Part of Proposed Development in Place, No Railway Bridge - $L_{A10,18hr}$ Values**

| Monitoring Location | Baseline 2020 $L_{A10,18hr}$ (dB) | Predicted Noise Level - 2020 + Proposed Development Without Bridge $L_{A10,18hr}$ (dB) | Noise Level Change (dB) | Magnitude of Change |
|---|---|---|---|---|
| Milton Road East | 65.1 | 65.1 | 0.0 | Negligible |
| A1 Milton Link | 74.0 | 74.0 | 0.0 | Negligible |
| Newcraighall Road | 69.0 | 70.0 | 1.0 | Negligible |
| Eastfield | 68.7 | 68.7 | 0.1 | Negligible |
| Gilberstoun | 61.0 | 61.0 | 0.0 | Negligible |

**Table 13.8: Comparison of Predicted Baselines for 2020 with Short-Term (Interim) Scenario - Part of Proposed Development in Place, No Railway Bridge - $L_{Aeq,16hr}$ Values**

| Monitoring Location | Baseline 2020 $L_{Aeq,16hr}$ (dB) | Predicted Noise Level - 2020 + Proposed Development Without Bridge $L_{Aeq,16hr}$ (dB) | Noise Level Change (dB) | Magnitude of Change |
|---|---|---|---|---|
| Milton Road East | 63.1 | 63.1 | 0.0 | Negligible |
| A1 Milton Link | 74.0 | 74.0 | 0.0 | Negligible |
| Newcraighall Road | 69.0 | 70.0 | 1.0 | Negligible |
| Eastfield | 66.7 | 66.7 | 0.0 | Negligible |
| Gilberstoun | 61.0 | 61.0 | 0.0 | Negligible |

With respect to the interim short term impact on new NSRs, within the proposed development, by inference if a negligible change in road traffic noise levels is concluded for existing NSRs since the new NSRs within the proposed development will be situated at a greater separation distance from the source of road traffic noise, then it can be inferred that the road traffic noise impact would also be negligible at these receptors.

***Long Term (Operational) Impact***

A similar approach was adopted to determine the long term (operational) impact from changes in road traffic noise levels on existing NSRs. Tables 13.9 and 13.10 show the comparison made between the projected 2025 traffic figures with the predicted traffic figures associated with year of completion for the proposed development.

The year of completion scenario assumes the entire proposed development has been completed with the railway bridge installed, and also allows for projected normal traffic increases and other committed development in the vicinity. From Tables 13.9 and 13.10 below, it can be seen that the highest increment of change in road traffic noise level was +0.6dB at Newcraighall Road, which in terms of magnitude of impact, is deemed negligible. These increments of change are not discernible to the human ear. Similarly, all other changes in road traffic noise at the nominal receptors along the road network were deemed as negligible in terms of magnitude of impact.

A similar inference can be made in consideration of the long term (operational) impact on new NSRs, as part of the proposed development, as was inferred for the short term interim impact. The fact that all new NSRs will be situated a greater distance from the source of road traffic noise in each case and will be at least partially screened from the road network by intervening buildings in most cases, infers that the magnitude of impact from increases in road traffic noise will be negligible.

**Table 13.9: Comparison of Predicted Baselines for 2025 with Long Term Scenario - Proposed Development Complete, Railway Bridge Installed - $L_{A10,18hr}$ Values**

| Monitoring Location | Baseline 2025 $L_{A10,18hr}$ (dB) | Predicted Noise Level - 2025 + Proposed Development Complete With Bridge $L_{A10,18hr}$ (dB) | Noise Level Change (dB) | Magnitude of Change |
|---|---|---|---|---|
| Milton Road East | 65.1 | 65.2 | 0.1 | Negligible |
| A1 Milton Link | 75.0 | 75.0 | 0.0 | Negligible |
| Newcraighall Road | 70.0 | 70.0 | 0.0 | Negligible |
| Eastfield | 68.9 | 69.0 | 0.1 | Negligible |
| Gilberstoun | 61.0 | 61.0 | 0.0 | Negligible |

**Table 13.10: Comparison of Predicted Baselines for 2025 with Long Term Scenario - Proposed Development Complete, Railway Bridge Installed - $L_{Aeq,16hr}$ Values**

| Monitoring Location | Baseline 2025 $L_{A10,18hr}$ (dB) | Predicted Noise Level - 2025 + Proposed Development Complete With Bridge $LA_{10,18hr}$ (dB) | Noise Level Change (dB) | Magnitude of Change |
|---|---|---|---|---|
| Milton Road East | 63.1 | 63.2 | 0.1 | Negligible |
| A1 Milton Link | 69.6 | 69.6 | 0.0 | Negligible |
| Newcraighall Road | 65.1 | 65.7 | 0.6 | Negligible |
| Eastfield | 66.9 | 67.0 | 0.1 | Negligible |
| Gilberstoun | 59.0 | 59.0 | 0.0 | Negligible |

***Night Time Impact***

With respect to road traffic noise on main roads, daytime noise levels can be generally considered to reduce by 10dB during night time periods (PPG24, 1994). Changes in road traffic noise attributable to the development have been deemed likely to have a negligible impact on existing NSRs along the road network considered. By inference, it is therefore considered likely that there will be no perceptible increase in road traffic noise levels, as a result of the proposed development, during night time periods.

### 13.8.2 Rail Traffic Noise

To determine the potential impact on existing rail traffic passing the site on new NSRs within the proposed development, reference was made to the assessment method and impact criteria detailed in the GENIA document.

Table 13.2 shows the magnitude of impact and significance of effect criteria assigned to the predicted changes in noise levels, attributable to local rail traffic, on new NSRs within the proposed development. From Tables 13.11 to 13.12 below, for all new NSRs considered, the magnitude of impact for both northbound and southbound passenger trains travelling past the site during weekday and weekend time periods is predicted to have either a negligible impact or no impact.

The same conclusion was drawn for the magnitude of impact and significance of effect for passenger rail traffic during night time periods, as depicted in Table 13.13 below.

Consideration was also given to the potential impact of freight rail traffic during both daytime and night time periods. Tables 13.14 and 13.15 below summarise the findings of the scenarios considered and listed in Section 13.6.4. The magnitude of impact from daytime freight traffic was deemed as no impact. Conversely, from Table 13.15 it can be seen that the night time $L_{Aeq,8hr}$ values for ML10, ML11 exceed the adopted WHO Guideline Value of 45dB for five (worst case) and four trains passing. However, when freight traffic passes drop to three and two the $L_{Aeq,8hr}$ values for ML10, ML11 fall below the threshold.

Therefore, for the worst case scenario, a minor adverse impact is predicted for NSR located at the west and south east sections of the proposed development. A negligible impact is predicted for the passing of two to three freight trains during night-time periods, on NSR located at the west and south east sections of the proposed development.

For the purposes of this assessment, the proposed primary school was considered to be represented by ML10. The magnitude of impact of daytime passenger trains and daytime freight services are considered to be negligible for the proposed school.

**Table 13.11: Magnitude of Impact (Passenger Rail Noise) - Daytime (Monday - Friday)**

| | Calculated Daytime $L_{Aeq,16hr}$ (dB) | | Calculated Daytime Minus WHO Guideline Value (Outdoor Living Space), $L_{Aeq,16hr}$ Daytime( 50dB) | | Magnitude of Impact | |
|---|---|---|---|---|---|---|
| **Location** | **$L_{Aeq,16hr}$ Northbound** | **$L_{Aeq,16hr}$ Southbound** | **Northbound** | **Southbound** | **Northbound** | **Southbound** |
| ML10 | 50.6 | 48.1 | 0.6 | -1.9 | Negligible | No impact |
| ML11 | 39.7 | 43.8 | -10.3 | -6.2 | No impact | No impact |
| ML12 | 46.3 | 49.7 | -3.7 | -0.3 | No impact | No impact |

**Table 13.12: Magnitude of Impact (Passenger Rail Noise) - Daytime (Saturday)**

| | Calculated Daytime $L_{Aeq,16hr}$ (dB) | | Calculated Daytime Minus WHO Guideline Value (Outdoor Living Space), $L_{Aeq,16hr}$ Daytime( 50dB) | | Magnitude of Impact | |
|---|---|---|---|---|---|---|
| **Location** | **$L_{Aeq,16hr}$ Northbound** | **$L_{Aeq,16hr}$ Southbound** | **Northbound** | **Southbound** | **Northbound** | **Southbound** |
| ML10 | 50.6 | 48.1 | 0.6 | -1.9 | Negligible | No impact |
| ML11 | 39.7 | 43.9 | -10.3 | -6.1 | No impact | No impact |
| ML12 | 48.9 | 46.3 | -1.1 | -3.7 | No impact | No impact |

**Table 13.13: Magnitude of Impact (Passenger Rail Noise) - Night Time**

| | Calculated Night time $L_{Aeq,8hr}$ | | Calculated Daytime Minus WHO Guideline Value (Outside Bedrooms), $L_{Aeq,16hr}$ Daytime( 45dB) | | Magnitude of Impact | |
|---|---|---|---|---|---|---|
| **Location** | **$L_{Aeq,8hr}$ Northbound** | **$L_{Aeq,8hr}$ Southbound** | **Northbound** | **Southbound** | **Northbound** | **Southbound** |
| ML11 | 27.6 | n/a | -17.4 | n/a | No impact | n/a |
| ML12 | 33.2 | 30.5 | -11.8 | -14.5 | No impact | No impact |

**Table 13.14: Magnitude of Impact (Rail Freight Traffic) - Daytime**

| | Southbound | | |
|---|---|---|---|
| **Location** | **Calculated $L_{Aeq,16hr}$** | **Calculated daytime minus WHO Guidelines Value (Outdoor Living Space), $L_{Aeq,16hr}$ - Daytime ( 50 dB)** | **Magnitude of Impact** |
| ML10 | 48.4 | -1.6 | No impact |
| ML11 | 48.4 | -1.6 | No impact |
| ML12 | 45.4 | -4.6 | No impact |

**Table 13.15: Predicted Night-time Impact – Rail Freight Traffic Noise – Varying Levels of Freight Traffic**

| | Predicted $L_{aeq,8hr}$ Value at Each Location (dB) | | |
|---|---|---|---|
| **No. of Freight Trains Passing Overnight** | **ML10** | **ML11** | **ML12** |
| 5 | 46.7 | 46.7 | 43.7 |
| 4 | 45.7 | 45.7 | 42.7 |
| 3 | 44.5 | 44.5 | 41.5 |
| 2 | 42.7 | 42.7 | 39.7 |

**Table 13.16: Measured Night Time $L_{Amax}$ Values**

| Location | Night Time $L_{Amax}$ Value, dB |
|---|---|
| ML10 | 51.1 |
| ML11 | 61.4 |
| ML12 | 72.3 |

Consideration was also given to the $L_{Amax}$ values measured on site, as shown in Table 13.16 above. All $L_{Amax}$ values attributed to rail traffic noise were found to exceed the external night time WHO Guideline value of 45dB. For new NSRs located to the west of the site (ML10), in the absence of mitigation a moderate adverse long term impact was identified; whilst a major adverse impact was identified for new NSRs located near ML11 and ML12 in terms of $L_{Amax}$ values. It should be noted that $L_{Amax}$ values relate to momentary increases in noise and can be considered a worst case.

### 13.8.3 Rail Traffic and Ground Borne Vibration

To determine the potential impact of rail traffic on ground borne vibration levels for new NSRs and the new school within the proposed development, vibration measurements collated on site were compared with thresholds stipulated in BS6472 (2008) and BS5228 – Part 2: 2009. In particular, the potential impact on building response to ground borne vibration, in terms of PPV measurements, were compared with guideline values for the onset of cosmetic damage for transient vibration sources (BS5228 – Part 2: 2009).

Similarly, the potential impact on human receptors within the proposed development, from ground borne vibration levels generated by local rail traffic, was assessed through the comparison of VDV measurements compared with VDV values shown in Table 1 of BS6472 (2008).

Tables 13.17 to 13.19 below show the ground borne vibration measurements collated on site, in terms of both PPV and VDV parameters, and the threshold values referenced for the purposes of this assessment. From the tables below it can be seen that all PPV readings were notably below the thresholds stipulated at all frequency ranges noted for the potential onset of cosmetic damage to *"residential or light commercial type buildings"*. In consideration of the fact that the highest PPV reading collated (0.7mm/s) was attributed to the passing of a freight train during the monitoring period, it is deemed likely that the rail traffic passing the site will have no adverse impact on new residential and commercial structures within the proposed development.

**Table 13.17: Ground Borne Vibration Measurements Collated During Baseline Survey**

| Monitoring Location, ML | Ground Borne Vibration Measurements Collated on Site | | PPV/VDV Attributed To |
|---|---|---|---|
| | PPV (mm/s) | VDV ($m/s^{1.75}$) | |
| 10 | 0.5 | 0.2 | Train passes; 14:35 Virgin train south, 14:47 Local train north. |
| 11 | 0.5 | 0.0 | Train passes; 14:56 Cross country train heading south, 15:11 Virgin train heading south, 15:13 Cross country train passing north |
| 12 | 0.7 | 0.2 | Train passes; 13:45 local train heading north, 13:55 freight train heading south, 14:05 Virgin train heading north, 14:08 Virgin train heading south, 14:12 High speed train heading south. |

**Table 13.18: VDV Values Which Might Result in Low Probability of Adverse Comment (Ref: BS6472 - 2008)**

| Place and Time | Low Probability of Adverse Comment ($m/s^{1.75}$) |
|---|---|
| Residential buildings 16h day | 0.2 to 0.4 |
| Residential buildings 8h night | 0.1 to 0.2 |

***Table 1: Vibration dose ranges which might result in various probabilities of adverse comment within residential buildings***

***Note: Below these ranges adverse comment is not expected, but is still possible.***

**Table 13.19: Transient Vibration Guide Values for Cosmetic Damage (Ref: BS5228-PART 2:2009)**

| Type of Building | Peak Component Particle Velocity in Frequency Range of Predominant Pulse - mm/s | |
|---|---|---|
| | 4 Hz to 15 Hz | 15 Hz and above |
| Unreinforced or light framed structures Residential or light commercial type buildings | 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz | 20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above |

***Note: Values referred to are at the base of the building.***

With respect to the potential impact on human receptors, from ground borne vibration levels generated by local rail traffic, the highest VDV reading recorded on site was $0.2m/s^{-1.75}$. These values lie within the vibration dose ranges which are considered to result in low probability of adverse comment during both daytime and night time periods. There is therefore considered to be a low probability of adverse comment in relation to ground borne vibration levels generated by rail traffic passing the site.

### 13.8.4 Construction and Construction Traffic Noise

Construction projects invariably give rise to acoustic disturbance when undertaken in close proximity to local NSRs, although construction activities are temporary and generally transient by nature. With respect to the proposed phased approach for the construction of the proposed development (refer to Chapter 2 of this ES), this will lead to a change in the levels of noise generated and the NSRs affected as construction progresses.

There is also the potential for situations to arise where construction noise could impact on both existing and new NSRs within the proposed development simultaneously.

BS5228 – Part 1 (2009) is customarily used as a calculation method to predict the impact of construction noise. The calculation methods within BS5228 Part 1 (2009) allow accurate noise levels to be determined for a variety of construction activities. However, the value of any such predictions are necessarily limited by the level of detail required in the input parameters to the calculation. The prediction method is also limited by the number of assumptions that are required in the absence of a detailed dataset regarding the number and type of site plant to be used, their location and detailed operating parameters. A relatively small change in the dataset can lead to changes in predicted noise levels that are perceptible to human receptors.

Some of the information required to inform this calculation process will be clarified as the detail of each development phase emerges and in the latter stages when resources are mobilised, but other information (such as exact location of operating plant, duration of operations and details of where site plant will operate concurrently, etc.) would remain uncertain at this stage.

In consideration of the information currently available on the construction processes, a short term, temporary, significant adverse impact has been identified as likely to affect residential receptors situated on Milton Road East, during construction of the new crossing over the Brunstane Burn crossing and the site haul route (the overall construction phase duration is currently estimated to be six months). Whilst this is recognised as a potential impact, it is temporary and transient in nature and can be mitigated by implementation of good site practices and adopting Best Practicable Means (BPM) (see Section 13.10).

### 13.8.5 Commercial / Industrial Noise

In the absence of detail at planning permission in principle (PPP) stage relating to the nature of any commercial units that may be incorporated into the local centre, it is not currently possible to assess the potential impact of new commercial units on either existing or new NSRs. However, it is assumed that these will be small units for light commercial use only and would not be significant generators of either noise or vibration from commercial operations, traffic or fixed plant.

A further noise impact assessment may be required to determine the acceptability of, and as a means of controlling the acoustic impact of, any new commercial uses when any such detailed information becomes available. If necessary, this can be controlled via planning condition.

With respect to the potential impact of existing commercial noise sources on new NSRs within the proposed development, reference was made to the site noise measurements collated at Newhailes Industrial Estate during the baseline survey.

Frequency analysis data was collated during the site visit, and a review of this data demonstrates that no tonal features were observed within the ambient noise levels recorded at the time of the survey. In addition, consultations with CEC indicated at the time that were no known records of noise related complaints pertaining to current commercial or industrial activities in or around the Brunstane area.

### 13.8.6 Noise from Overhead Power Lines

At the time of undertaking consultations with CEC, the proposed development design indicated that the overhead 33kV pylons traversing the east field of on the site would remain insitu. More recently, engineering decisions have established that these powerlines have been replaced by buried cables near the south-west boundary of the site, and that the existing pylons are scheduled to be removed in due course. The overhead powerlines are therefore no longer a potential source of noise, and no further consideration as been given to them in this chapter.

## 13.9 Cumulative Effects

Four adjacent development proposals either consented or under construction were considered as having the potential to result in cumulative effects alongside the proposed development (refer to Chapter 15 of this ES):

- Newcraighall North (LPA: Ref 13/03/81/FUL);
- Newcraighall East (LPA: Ref 10/03506/APP and (15/04112/AMC);
- Brunstane Steadings (LPA: 06/02742/FUL; 08/02704/FUL; 14/01049/FUL);
- Wanton Walls (LPA: PPA-230-491).

In terms of potential impact on road traffic noise levels, consideration was given to both the Newcraighall North and East committed developments within the traffic modelling figures generated. These figures were then input to the road traffic noise calculation. The predictive noise calculations output indicated that a negligible impact would be imparted on existing NSRs along the roads considered in terms of road traffic noise.

With respect to the other committed developments, Brunstane Steadings and Wanton Walls, the size of these developments indicates that the potential impact in terms of increase in road traffic volumes is deemed likely to be lower than the impact predicted for the Newcraighall North and East developments. These developments are therefore not considered likely to have a cumulative effect with the proposed development in terms of road traffic noise.

With respect to cumulative effects in terms of construction noise impact, there is a possibility that construction activities for the other committed developments may coincide with construction of the proposed development. When greater detail on the construction process is available, at detailed design stage, then further assessment should be undertaken to determine likely cumulative effects of construction noise in this respect.

A summary of the cumulative effects assessment in relation to noise and vibration is presented in Table 13.20.

**Table 13.20: Cumulative Effects Assessment – Noise Impact**

| | **Site 1**<br>**Newcraighall North**<br>**13/03181/FUL*** | **Site 2**<br>**Newcraighall East**<br>**10/03506/PPP***<br>**15/04112/AMC*** | **Site 14**<br>**Brunstane Steadings**<br>**06/02742/FUL***<br>**08/02702/FUL***<br>**14/01049/FUL*** | **Site 20**<br>**Wanton Wells**<br>**PPA-230-491*** |
|---|---|---|---|---|
| Summary of Development Proposal | Residential development of 220 units comprising houses, cottages and flats and two commercial units (as amended). Land 335 Metres South-west of 103 Newcraighall Road, Edinburgh.<br>Currently under construction. | Residential development comprising 176 No. dwellings and associated infrastructure.<br>Construction not yet commenced. | Convert steading and outbuildings to form 12 dwelling houses (as amended).<br>Currently under construction | Erection of 11 houses, alteration of access road and demolition of 105 Newcraighall and outbuildings.<br>Development status unconfirmed. |
| Summary of relevant development aspects and interactions | Vehicle movements associated with the development will contribute to future road traffic flows in and around the local area.<br>Noise emissions from mobile and static construction plant on the site. | Vehicle movements associated with the development will contribute to future road traffic flows in and around the local area.<br>Noise emissions from mobile and static construction plant on the site. | Vehicle movements associated with the development will contribute to future road traffic flows in and around the local area.<br>Noise emissions from mobile and static construction plant on the site. | Vehicle movements associated with the development will contribute to future road traffic flows in and around the local area.<br>Noise emissions from mobile and static construction plant on the site. |
| Potential cumulative effects with New Brunstane | Additional noise attributed to future road traffic (noise contributed by committed development traffic has been taken into account within the road traffic noise impact assessment). | Additional noise attributed to future road traffic (noise contributed by committed development traffic has been taken into account within the road traffic noise impact assessment). | Additional noise attributed to future road traffic (noise contributed by committed development traffic has been taken into account within the road traffic noise impact assessment). | Additional noise attributed to future road traffic (noise contributed by committed development traffic has been taken into account within the road traffic noise impact assessment). |

| | **Site 1**<br>**Newcraighall North**<br>**13/03181/FUL*** | **Site 2**<br>**Newcraighall East**<br>**10/03506/PPP***<br>**15/04112/AMC*** | **Site 14**<br>**Brunstane Steadings**<br>**06/02742/FUL***<br>**08/02702/FUL***<br>**14/01049/FUL*** | **Site 20**<br>**Wanton Wells**<br>**PPA-230-491*** |
|---|---|---|---|---|
| Likelihood of cumulative effects with New Brunstane (H/M/L) | H | H | M | M |
| Proposed mitigation (with apportionment if relevant) | Implementation of BPM on construction sites to manage noise emissions from site plant.<br>Reduce site vehicle movements to/from site wherever practicable. Undertake site deliveries during less sensitive daytime periods. | | | |
| Residual cumulative effects with New Brunstane | Unknown, but considered unlikely to be significant. | Unknown, but considered unlikely to be significant. | Unknown, but considered unlikely to be significant. | Unknown, but considered unlikely to be significant. |

## 13.10 Proposed Mitigation

### 13.10.1Design Evolution / In-Built Mitigation

In light of the current scheme design, consideration has been given to some in-built mitigation measures which would aid noise mitigation in the form of the following:

- Construction of a 1.8m close-board noise barrier to separate the proposed development from the rail corridor situated 3m from the Network Rail boundary and running parallel with the rail corridor. This is expected to result in a nominal 5dB reduction in noise levels for ground floor façades of receptor buildings within the proposed development;

- Internal room layouts for residential and commercial units within the proposed development to orientate more sensitive habitable spaces away from the rail corridor.

All these design details will be subject to review during the detailed design stage.

### 13.10.2Proposed Additional Mitigation Measures

***Transportation Noise Sources***

The noise impact assessment has shown that the potential impact of road and rail traffic noise sources on both existing and new NSRs is likely to be, in most instances, negligible. No additional mitigation measures are therefore deemed necessary to mitigate the impact of local transportation noise sources.

In the absence of confirmation of the number of freight trains that currently pass the site during night time periods, a reasonable assumption has been made to inform this assessment. However, although not considered necessary, further survey could be undertaken at detailed design stage to determine the precise number of night time freight train movements.

Consultations undertaken with CEC indicated that a "close window" scenario was acceptable for transportation noise impact. On this basis no further mitigation is required for the facades of new NSR buildings facing the railway corridor, since a nominal attenuation factor of 25dB (attributable to closed, well-fitted, single glazed window units) can be applied to the predicted $L_{Aeq,8hour}$ values summarised in Section 13.8.2 (Table 13.15) would ensure internal noise levels that are significantly below 30dB, the WHO Guideline threshold for promoting restorative sleep conditions. (Pilkington, 2014). This would reduce the impact significance to negligible.

The noise impact assessment highlighted a potential for moderate to major impacts to affect new NSRs within the proposed development, due to $L_{Amax}$ values attributable to rail traffic noise. $L_{Amax}$ values can be considered to represent momentary increases in noise, not necessarily representative of the noise climate as a whole.

However, further acoustic attenuation can be afforded through the use of double glazing (of a nominal 30dB) and for alternative ventilation solutions, such as trickle ventilators, which can lead to sound attenuation of up to 40dB (Anglian Homes, 2016). Where such measures are implemented, this would likely reduce the impact of $L_{Amax}$ noise levels to minor to negligible. Such additional measures will be considered, on the basis of detailed development layouts and building specifications, at the detailed design stage.

***Construction Noise***

The noise impact assessment has highlighted the potential for adverse effects on both existing and new NSRs for construction site activities where these are to be undertaken in proximity to the receptors. Appropriate mitigation measures will be implemented to reduce adverse effects using BPM. Such mitigation measures will be incorporated into a Construction Environmental Management Plan (CEMP) and will include, but will not necessarily be limited to:

- Adopting the principle of Best Practicable Means (BPM) to reduce noise levels during all construction work phases and vigorously enforcing these principles through induction and training of site staff;

- Selection of most appropriate, well-maintained site plant, and where appropriate inherently quiet site plant, or the use of silencers, to minimise noise levels at source;

- The positioning of ancillary site plant, such as generators, compressors and pumps, at the furthest possible distance from NSRs. Incorporating localised screening and enclosures, where practicable, to reduce noise emissions at source;

- Use of localised site hoardings on the sections of the site where generated noise emissions have the potential to affect NSRs;

- Adopt a considerate and neighbourly approach to relations with local residents, e.g. construction works not undertaken outside normal working hours to be agreed with CEC. Where works are required to be undertaken out with "normal working hours" then prior notification should be given to residents and CEC notified accordingly;

- The routing and timing of vehicle deliveries to site planned so as to minimise disturbance to local residents;

- All site plant in intermittent use shut down in the intervening periods between work, and idling not permitted;

- Regular liaison between the construction team and local residents to inform them of planned work phases, and periods when noise levels are anticipated to be most disruptive.

### 13.11 Summary of Residual Effects and Statement of Significance

Where the mitigation measures outlined above are implemented this is predicted to reduce the effects of the construction phase of the proposed development to negligible.

All acoustic impacts likely to result from transportation sources are predicted to result in a negligible effect of neutral significance on the existing and new NSR considered here, aside from that associated with $L_{Amax}$ noise measurements. With appropriate mitigation in place, the predicted impact of $L_{Amax}$ noise levels could be reduced from a moderate/major significance to a minor/negligible significance.

**Table 13.21: Noise and Vibration - Summary of Predicted Effects**

| Potential Key Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| **Construction / Temporary** | | | | | | | |
| Construction noise (some worst cases) | High | Major | Short | Temporary | Major | Minor | Minor |
| Construction noise ( typical case) | High | Minor | Short | Temporary | Minor | Negligible | Negligible |
| Construction traffic | High | Minor | Short | Temporary | Minor | Negligible | Negligible |
| **Operation / Permanent** | | | | | | | |
| Changes in road traffic noise affecting existing NSR | High | Negligible / No impact | Permanent | Irreversible | Negligible | Negligible | Negligible |
| Final road traffic noise levels affecting closest new NSR within proposed development | High | Negligible | Permanent | Irreversible | Negligible | Negligible | Negligible |
| Existing commercial noise on new NSR | High | Negligible | Permanent | Reversible | Negligible | Negligible | Negligible |

| Potential Key Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| Rail traffic noise and vibration impact on proposed school (daytime passenger and freight) | High | Negligible / No impact | Permanent | Irreversible | Negligible | Negligible | Negligible |
| Rail traffic noise and vibration impact on all other new NSRs (daytime passenger and freight) | High | Negligible / No impact | Permanent | Irreversible | Negligible | Negligible | Negligible |
| Night time freight rail traffic on proposed new school | High | Minor adverse | Permanent | Irreversible | Minor | Negligible | Negligible |
| Night time freight rail traffic on all new NSRs | High | Minor adverse | Permanent | Irreversible | Minor | Negligible | Negligible |
| Rail traffic impact (worst case $L_{Amax}$ values) on all new NSRs | High | Minor | Permanent | Irreversible | Major to Moderate | Minor to Negligible | Minor to Negligible |

**Table 13.22: Noise and Vibration - Summary of Proposed Mitigation**

| Reference | Proposed Mitigation and Management | Project Phase | | | |
|---|---|---|---|---|---|
| | | Pre-Construction | Construction | Operation | Deconstruction |
| NV1 | Construction Environmental Management Plan, with Noise Management Plan (NMP) included. Enforcing BPM measures on site. | ✓ | ✓ | | |
| NV2 | Undertake a BS5228 (1) construction noise assessment at detailed design stage, to inform the NMP. | ✓ | | ✓ | ✓ |

## 13.12 References


- BS6472: Guide to Evaluation of Human Exposure to Vibration in Buildings (2008);
- Control of Pollution Act 1974 (CoPA) (HMSO, 1974);
- The Department of Transport/Welsh Office Memorandum "Calculation of Road Traffic Noise" (CRTN) (Department of Transport / Welsh Office, 1988);
- Calculation of Railway Noise (CRN) (Department of Transport, 1995);
- British Standards (BS) 5228: Code of practice for noise and vibration control on construction and open sites – Part 1 (2009): Noise, and Part 2 (2009): Vibration (BSI, 2009);
- British Standard (BS) 8233: Sound insulation and noise reduction for buildings – code of practice (BSI, 2014);
- World Health Organisation (WHO) "Guidelines for Community Noise" (WHO, 1999);
- Guidelines for Environmental Noise Impact Assessment (IEMA, 2014);
- Planning Advice Note 1/2011: Planning and Noise (Scottish Government, 2011);
- Technical Advice Note 1/2011: Assessment of Noise (Scottish Government, 2011);
- Planning Policy Guidance 24: Planning and Noise (DoE, 1995);
- Pilkington Option™: Laminated Glass for Noise Control (June 2014);
- Anglian Homes website, 2016 (www.anglianhomes.co.uk/windows/sound-reducing-windows).

# 14. SOCIOECONOMICS

## 14.1 Introduction

This chapter assesses the potential impacts of the proposed development on the local and regional economy in quantitative and qualitative terms. It considers the potential effects of the development on employment and economic output.

This chapter was written by GVA James Barr Ltd.

Key socioeconomic issues that are included within the assessment include: population numbers and structure, housing requirements, employment, healthcare and education provision.

## 14.2 Legislation, Policy and Guidance

### 14.2.1 Planning Policy Context

***Government Economic Strategy***

The Scottish Government replaced the Government Economic Strategy (GES) in 2015 with Scotland's Economic Strategy (SES). The strategy sets out an overarching framework for a more competitive and a fairer Scotland. It identifies four broad priority areas where actions will be targeted to make a difference. The four broad priority areas are i) Investment ii) Innovation iii) Inclusive Growth; and iv) Internationalisation. These work towards two overarching objectives of competitiveness and tackling inequality.

As set out in the framework above, the approach to delivering sustainable economic growth is characterised by four key priorities:

- An economy where growth is underpinned by long-term sustainable investment in people, infrastructure and assets;
- An economy where growth is based on innovation, change and openness to new ways of doing things;

- A society that promotes inclusive growth and creates opportunity through a fair and inclusive jobs market and regional cohesion to provide economic opportunities across all of Scotland;

- A country with an international outlook and focus, open to trade, migration and new ideas.

***National Planning Framework 3***

The National Planning Framework (NPF) 3 was published in 2014. It sets out a spatial expression of the Government Economic Strategy and it identifies national developments and other strategically important development opportunities in Scotland. The Vision in NPF3 is a Scotland which is:

- A successful, sustainable place;

- A low carbon place;

- A natural, resilient place;

- A connected place.

***Scottish Planning Policy***

Scottish Planning Policy (SPP) is the Scottish Government's policy on land use planning and development matters. The SPP is based on sustainable economic development principles

SPP 2014 sets out national planning policies which should influence Local Development Plans and be material considerations in determining applications. SPP assumes a presumption in favour of development that contributes to sustainable development through design, economic growth and transport. 13 principles are set out at paragraph 29 to guide policies and decisions in the context of the presumption in favour of development that contributes to sustainable development.

***Edinburgh's Economic Strategy 2012 - 2017***

Edinburgh's Economic Strategy, 'A Strategy for Jobs 2012-17' aims to achieve sustainable economic growth through investment in jobs. The City of Edinburgh Council (CEC) and its partners are working towards this goal in four ways:

- Investing in the city's development and regeneration;
- Supporting inward investment;
- Supporting businesses;
- Helping unemployed people into work or learning.

In terms of 'investing in the city's development and regeneration', the Strategy recognises the importance of supporting the delivery of the *'Council-wide development plans for each of the four priority investment zones: the City Centre, South and East Edinburgh, the Waterfront, and West Edinburgh'.* These plans will reflect the different regeneration and investment propositions in each zone, and will involve local people in design and implementation.

Of equal importance to the proposed development are the measures set out under the 'helping unemployed people into work and learning' theme, where there is a desire to build a coordinated approach across CEC to developing employment and skills – notably amongst young people.

The Strategy also states the importance of 'the use of community benefit clauses in tenders will help secure new employment and training opportunities for local residents'.

CEC tracks the progress of the Strategy in three main ways: monitoring progress against the Single Outcome Agreement indicators; measuring the economic wellbeing of residents and businesses; and assessing the impact of activities against key performance indicators, these being:

- Support the creation or safeguarding of 20,000 jobs in Edinburgh;
- Support £1.3 billion of development in Edinburgh;
- Support the movement into work or learning of 10,000 people.

The proposed development will support each of the above performance measures and as it is located in a priority investment zone the impact of these measures is expected to be even greater in supporting growth and reducing inequality across the city economy.

## 14.3 Consultation

No external consultations were necessary to complete this assessment, and no comments relating so socioeconomics were received through the EIA scoping or wider consultation process.

## 14.4 Assessment Methodology

This assessment has used appraisal techniques which are consistent with those outlined in the Scottish Enterprise Economic Impact Assessment Guidance [1]. This includes assessment of construction and operational employment opportunities and the potential impact this would have on the economy.

The overall assessment methodology for the EIA is set out in Chapter 4 of this ES and includes considerations of:

- Positive and negative impacts;
- Short, medium and long-term impacts;
- Direct and indirect impacts;
- Permanent and temporary impacts;
- Cumulative impacts and impact interactions.

Impacts are expressed as adverse or beneficial.

## 14.5 Baseline Conditions

An overview of existing socioeconomic conditions in terms of the local and regional situation is key to understanding any potential challenge and/or opportunity imposed by the proposed development. A socioeconomic profile of key subjects across the local and regional area is set out below.

For the purposes of this assessment, local is defined by the Portobello and Craigmillar wards and regional is the administrative boundary of the City of Edinburgh Council (CEC) for comparative and contextual analysis.

### 14.5.1 Population

The most recent household size survey conducted by the National Records of Scotland [2] shows that the City of Edinburgh Council in 2012 had an average household size of 2.07 people which is projected to reduce to 2.04 by 2017 and 2.01 by 2022. Based on a proposed development of between 900 – 1,330 houses, this would result in a population increase of between 1,836 and 2,713 people (based on the 2017 projected figure of 2.04 people per household). Census 2011 data [3] by ward confirms the following key points in respect of the local area ward:

- The local area has a higher proportion of children and pensionable age residents than Edinburgh generally;
- The local area has a lower proportion of working age residents than Edinburgh generally;
- The local area has a higher proportion of economically inactive people than Edinburgh as a whole; the proportion of economically active is marginally lower than for Edinburgh;
- In terms of home ownership, the local area is slightly below the regional average at 55.1% and 58.9% respectively.

### 14.5.2 Health

The site is located within the NHS Lothian catchment area. NHS Lothian services are operated at the local level by Community Health Partnerships (CHP) and the site is located within the Edinburgh Community Health Partnership area.

Information from the Incomes Data Services (IDS) [4] has established that within the Lothian area, there are 125 GP surgeries with an average list size of 7,364. Within Edinburgh itself, there are 75 GP surgeries with an average list size of 7,194. For contextual purposes, the average list size across Scotland as a whole is 5,736 in 981 GP practices. It is clear that within Edinburgh, list sizes are above the national average.

The nearest GP surgery is the Portobello Surgery, approximately 1.2km from the site. Other nearby surgeries in the area include Milton Surgery, approximately 1.5km from the site, and the Durham Road Medical Group, approximately 1.6km from the site. Information on individual GP practice ratios is not routinely provided by practices and is commercially confidential. It is therefore subject to the individual practice to determine their willingness to share GP numbers, patient ratio and capacity.

The nearest NHS Hospital – The Royal Infirmary of Edinburgh – is located approximately 6.9km from the site. Residents of the proposed development will benefit from close proximity to the hospital which provides community healthcare services on an inpatient and outpatient basis.

### 14.5.3 Education

A baseline audit of education estate infrastructure has been undertaken to establish the potential impact of the proposed development. It should be noted that the detailed requirements in terms of education provision will be developed during consideration of the application through ongoing discussions with CEC education and planning officers, as appropriate. This aspect of the assessment has been considered at a high level in this chapter.

***Primary Education***

The site is within the catchment of Newcraighall Primary School (non-denominational) and St Francis' RC Primary School (Roman Catholic).

Niddrie Mill Primary School and Castleview Primary School are outwith catchment but located within relatively close proximity (approximately 2.3 and 2.4 miles respectively).

***Secondary Education***

The site is within the catchment of Castlebrae High School (non-denominational) and Holy Rood RC High School (Roman Catholic).

### 14.5.4 Council Tax

Assumptions have been made about the likely market value of the proposed residential units and the probable Council Tax band that they will fall into. Calculations have been made, using current year Council Tax rates, to establish the potential annual Council Tax revenue that will be generated through the residential element of the development. For the purposes of this assessment, having considered the Scottish Assessors Association (SAA) by relevant postcode sector, assumptions have established that the probable Council Tax bands that the residential component of the development will fall into are as follows:

- Band D - £1,169 (£1,592.90);
- Band E - £1,428.78 (£1,946.88);
- Band F - £1,688.56 (£2,300.86);
- Band G - £1,948.33 (£2,654.83).

Figures in brackets include water and sewerage charges.

It should be noted that a final housing mix has not yet been defined and for the purposes of this assessment, an average rate (£1,558.66) has therefore been applied to the maximum 1,330 units proposed.

### 14.5.5 House Prices

The average house price [5] in Edinburgh is £195,000. However, a Registers of Scotland report (February 2016) [6] states that the average sale prices in Edinburgh in the preceding quarter to February 2016 is £233,000.

The same report by RoS in respect of the 3rd quarter of 2015/2016 showed that the housing market in Edinburgh was the most active region with 3,532 sales. The City of Edinburgh remained the largest market with sales of just under £824m for the quarter, an increase of 25.3% on the previous year.

In the local context, analysis of house sales [7] shows that within the EH15 postcode sector (Portobello) (within which the site is located), the average sale price between Jan 2015 – Jan 2016 was £236,645 with an average of 42 sales per month. Within the EH16 postcode sector (Craigmillar), the average sale price between Jan 2015 – Jan 2016 was £203,890 with an average of 54 sales per month. Across the Portobello and Craigmillar ward area, it can be derived that the average house price is therefore £220,267. This is above the average for the region.

### 14.5.6 Construction

The amount of construction employment provided by the development has been estimated using 'man years of employment' (MYE) derived from the average turnover per employee in the construction industry in Edinburgh. The number of full time equivalent jobs that the project would create is then calculated assuming that 10 man years of employment is the equivalent of one full time equivalent.

In order to calculate the Gross Value Added (GVA) impact of new construction related posts the GVA per construction employee is utilised. In this case, this is £66,208. This figure is derived from the Scottish Annual Business Statistics [8].

At the time of the assessment, a detailed breakdown of housing construction costs was not available. However, the likely costs, using an assumption based on £85,500/dwelling (taking the maximum number of units of 1,330), are estimated to be approximately £114m and it is this figure that has been used for the purposes of this assessment.

In terms of existing economic activity, the land is currently used for agricultural purposes and it is acknowledged that this will be lost. Indeed, the loss of the land for agriculture has already been established by the emerging Edinburgh Local Development Plan (ELDP) (Second Proposed Plan) which allocates the site for housing. Whilst there would be a loss of this agricultural land, the construction and longer term employment jobs would more than compensate for any loss in economic terms.

### 14.5.7 Summary of Baseline

The local area performs reasonably well when considered against the regional City – Wide equivalent. There are however challenges and opportunities across a number of social and economic factors that have been considered for the purposes of establishing a broad socioeconomic area profile.

## 14.6 Identification and Evaluation of Key Impacts - Completed Development

### 14.6.1 Population

Based on an average household size of 2.04 per household, the completed development assuming a maximum 1330 units is expected to accommodate up to 2,713 residents. Based on the most recent CEC population profile, it can be assumed that the age split composition of residents in the development will be as follows:

- 149 will be pre-school age (0-4);
- 163 will be primary school age (5-11);
- 100 will be of secondary school age (12-15);
- 409 will be aged 16-24;
- 857 will be aged 25-44;
- 646 will be aged 45-64;
- 334 will be aged 65 – 84;
- 54 will be aged 85 +.

From this analysis, the proposed development will clearly create the largest increase in the working age population. Indeed, the second largest increase will be in the 'retirement' age category followed by the combined primary and secondary age category. This could place some increased pressure on local educational and health facilities within the vicinity of the development, as considered below.

It should however also be acknowledged that the timeframe for construction and completion of the development is expected to take place over some 9 years and the increase will therefore be incremental over this period.

The completed development will increase the working age population of the city, albeit by a small amount. In any case, the increase in population – over 9 years to occur – would have a negligible impact on the regional area but a permanent, minor beneficial impact at the local level through increased levels of income, investment, employment opportunities.

### 14.6.2 Health

In terms of health services, it is likely that as a worst case scenario, the prospect of capacity in existing surgeries is not certain. As noted above, list sizes in Edinburgh are greater than average when considered against the national level. Any further increase required in physical capacity, in the event of a successful planning application, would need to be looked at and as a consequence, there would be a potential impact, requiring investment, in the event of a development at the site.

It is understood that NHS Lothian will provide General Medical Support for new GP practices in respect of normal running costs where there is evidence of need.

The development makes provision for a new local centre and this could allow for the creation of new community facilities such as GP surgery if required.

On balance, applying a precautionary approach in the context of the above, the indirect effect of increased population on the capacity of local healthcare facilities at the local level – without mitigation – is anticipated to be negative, long term and of minor adverse significance at a local level.

### 14.6.3 Education

With regards to the Edinburgh Council education infrastructure appraisal [9], it is possible to calculate the potential effect of the development on education infrastructure.

There is capacity in the identified catchment and nearby schools at present. In the short term, as the proposed development is constructed, this available capacity is likely to be able to accommodate the additional demand for school places initially arising from the proposed development. However, the expectation is that, due to existing demographic pressures and committed development, this capacity will be filled over the course of time and additional school capacity will be required.

CEC pupil yield ratios, which are set out in the Edinburgh Local Development Plan (ELDP) Education Appraisal (June 2014), are used by CEC to assess the needs arising from new development.

The approach set out within the Education Appraisal suggests, at 1,330 units, that the development will generate the following:

- Non-denominational primary pupils – 293;
- RC Denominational primary pupils – 45 (adjusted to 25 by CEC);
- Non-denominational Secondary pupils – 188;
- RC Denominational secondary pupils – 33.

It should be noted that these figures, based on pupil yield ratio utilised by CEC, indicate more pupils than are expected to be generated by the proposed development, based on CEC's own most recent population profile, as noted above.

In any case, the school capacity and roll figures of CEC suggest that whilst there is some capacity, there is a requirement for a new primary school safeguard opportunity to be provided on the basis of the scale of new development proposed within the area. CEC proposes that a new primary school opportunity is provided within the New Brunstane development site.

The preferred option for educational infrastructure (primary) is a double stream (14 class) primary school. Provision has been made accordingly within the proposed development although this will require further discussion with CEC as part of broader planning application discussions and negotiations.

In terms of secondary education, the area is served by Castlebrae Community High School. There is a low occupancy rate of 22% but as pupil generation increases from new large scale development, the roll will increase over time. It is understood that CEC has expressed a commitment to provide a replacement high school and is investigating the ability to bring forward a phased expansion of the replacement high school to accommodate both existing catchment pupils and those that are generated from new development.

Education is an important feature of social infrastructure. Information available suggests that existing primary and secondary capacity will be taken up over the course of time. Consequently, unless mitigated the effect of the development on primary education would be considered to be negative, long term and of moderate adverse significance at a local level.

### 14.6.4 Council Tax

The potential impact that the residential elements of the proposed development will have on the Council Tax base has been assessed. For the purposes of this assessment, it is assumed that two and three bedroom units will fall into Council Tax bands [D] and [E] (£1,169 and £1,428.78/annum respectively) and four and five bedroom units into Council Tax band [F] and [G] (£1,688.56 and £1,948.33/annum respectively) (excluding water and sewerage charges).

A final density mix is not available but it is assumed that the development will include a mix of residential units including 2, 3, 4 and 5 bedroom sizes. Using an average Council Tax rate from D-G, of £1,558.66, the development has been assessed to generate additional Council Tax receipts in the region of £2,073,018 / per annum.

On this basis, this is expected to have a permanent, minor beneficial impact at the regional level at which Council Tax is collected.

### 14.6.5 Construction

On the basis of the construction value and employment effect multiplier, the estimated total direct and indirect construction employment effect is 1,618 man years of construction employment. Based on the Scottish Enterprise Project Appraisal Guidance [1], the assessment assumes that 67% of construction jobs would be taken by people in the regional area (City of Edinburgh). This equates to 1,084 man years of construction employment at the regional level, or 108 full time equivalent jobs.

Based on a GVA per construction of £66,208 / annum, it is estimated that the development would generate an additional £71m for the regional economy.

With regards to the Scottish Annual Business Statistics [7], there are around 8,000 construction jobs in Edinburgh. On this basis, construction of the proposed development is expected to have a negligible impact on the regional construction market. The more precise extent of impact would be informed by the number of jobs which are sourced locally, noting that these jobs would be temporary in nature to fulfil the construction of the proposed development. The impact on the local level is expected to be temporary and minor beneficial. It is worth noting however that, whilst temporary, the impact would be over a reasonably extended time period.

The Edinburgh construction sector was valued at £564.7m in GVA terms in 2014 [7] which suggests that the £71m GVA injection as a result of the development would have a temporary, beneficial impact at the regional level.

It is not possible to assess the significance at the local level as employment and GVA figures are not available at the local level. It is likely however that the £71m GVA injection will have an effect on the neighbouring communities (supporting workforce and local expenditure etc.). At the local level, the scale of the development would suggest it would have a temporary, minor beneficial impact.

## 14.7 Cumulative Effects

The EIA Regulations require consideration of cumulative effects, which are those effects resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed development.

As identified in Chapter 15 of this ES, four developments which have been approved, or are under consideration by CEC, have been considered as having a potential cumulative impact alongside the proposed development in terms of Type 2 cumulative effects. These are:

- Newcraighall North (LPA: Ref 13/03/81/FUL);
- Newcraighall East (LPA: Ref 10/03506/APP and (15/04112/AMC);
- Brunstane Steadings (LPA: 06/02742/FUL; 08/02704/FUL; 14/01049/FUL);
- Wanton Walls (LPA: PPA-230-491).

### 14.7.1 Construction

The cumulative effect of a potential additional combined 600 (approx.) units will inject further investment and activity into the regional construction sector. It will represent approximately a further 50% of the scale of investment and activity expected to be created by the proposed development.

Taking into account the predicted employment generation associated with the construction phase, the potential effects at the regional level are expected to be temporary and of minor beneficial significance.

### 14.7.2 Completed Development

The increase in population will contribute towards CEC's Economic Strategy in respect of job creation, supporting development and supporting the movement into work or learning.

The increase in population will have the potential to put pressure on existing local infrastructure. However, reasonable and proportionate S75 agreement(s) are expected to be put in place to help unlock investment in new public services including education and health infrastructure. Subject to reasonable and proportionate financial and/or other provision, the likely cumulative effects of the proposed developments on education and healthcare are expected to be long term and of minor beneficial significance.

## 14.8 Proposed Mitigation

### 14.8.1 Design Evolution / In-Built Mitigation

Collectively, the construction and operational employment impacts of the development will be beneficial in nature and therefore no mitigation is required.

***Community Facilities (Education and Health)***

The proposed development makes provision for a local centre which is intended to include a new primary school. Subject to further discussions with CEC, on the assumption that it is required, it will mitigate the effect of the development on existing primary school infrastructure.

Similarly, potential local adverse effects have been identified in respect of increased pressure on local healthcare provision due to the additional population generated by the development. These effects could be mitigated by the provision within the proposed development – controlled by S75 or other appropriate means – for a new standalone facility within the local centre proposed as part of the development, if necessary.

### 14.8.2 Proposed Additional Mitigation Measures

No additional mitigation measures are considered necessary to address the socioeconomic impacts of the proposed development.

## 14.9 Summary of Residual Effects and Statement of Significance

### 14.9.1 Construction

The proposed development would have an overall positive effect in terms of construction, economic conditions, population and taxation. Permanent direct operational employment effects would be limited due to the residential focus of the development. Notwithstanding this, the proposed development provides an opportunity to encourage investment and new jobs generally.

No mitigation measures relating to regional level construction impacts are required and therefore the construction of the development would have a negligible impact on the regional construction market.

The development could increase the local construction sector activity by a higher degree particularly if a proportion of jobs can be sourced locally through various initiatives. At the local level, the development would have a temporary, minor beneficial impact on the local construction employment market.

The GVA injection of some £71m into the construction sector by construction of the proposed development is considered to have a temporary, moderate beneficial impact at the regional level. It is not possible to accurately assess significance at the local level, for reasons set out above, but it is likely that the £71m injection would have a positive effect on the community and surroundings. At the local level, the development would have a temporary, minor beneficial impact.

### 14.9.2 Completed development

***Population, Education and Health***

No mitigation is required as the increase in population would have a negligible impact on the regional area and a permanent, minor beneficial impact at the local level through increased levels of income, investment, and expenditure. The new population would support and encourage new businesses, as well as support the sustainability of existing local services such as community, health and education.

***Taxation***

New Council Tax revenues are expected to have a permanent, minor beneficial impact at the regional level at which Council Tax is collected.

**Table 14.1: Socio Economics, Summary of Predicted Effects**

| Potential Impact | Sensitivity of Receptor | Magnitude of Impact | Duration of Impact | Reversibility of Impact | Impact Significance Before Mitigation | Impact Significance After Mitigation | Residual Effect |
|---|---|---|---|---|---|---|---|
| **Construction / Temporary** | | | | | | | |
| Impact Adverse / Beneficial | High / Medium / Low / Negligible | Major / Moderate / Minor / Negligible | Short / Medium / Long Term | Temporary / Permanent | Major / Moderate / Minor / Negligible | Major / Moderate / Minor / Negligible | Major / Moderate / Minor / Negligible |
| Construction – jobs | Low | Minor | Short | Temporary | Minor | Minor | Minor |
| Construction – GVA | Low | Minor | Short | Temporary | Minor | Minor | Minor |
| **Operation / Permanent** | | | | | | | |
| Population change | Low | Minor | Permanent | Permanent | Minor | Minor | Minor |
| Taxation | Low | Minor | Permanent | Permanent | Minor | Minor | Minor |
| Education | High | Moderate | Long | Temporary | Moderate | Minor | Negligible |
| Health | Medium | Moderate | Long | Temporary | Minor | Minor | Negligible |

**Table 14.2: Socio Economics, Summary of Proposed Mitigation**

| Reference | Proposed Mitigation and Management | Project Phase | | | |
|---|---|---|---|---|---|
| | | Pre-Construction | Construction | Operation | Deconstruction |
| SO1 | Primary school – safeguard land and contributions | | | ✓ | |
| S02 | Secondary school - contributions | | | ✓ | |
| SO3 | Healthcare Facilities | | | ✓ | |

## 14.10 References


- Scottish Enterprise Environmental Impact Assessment Guidance, 2007;
- National Records of Scotland;
- Census Data 2011;
- Incomes Services Data 2015;
- Hometrack (2015);
- Registers of Scotland (February 2016);
- House price analysis (January 2015 – January 2016);
- Scottish Annual Business Statistics 2013;
- City of Edinburgh Council Education Infrastructure Appraisal 2014.

# 15. CUMULATIVE EFFECTS ASSESSMENT

## 15.1 Introduction

The EIA Regulations require consideration of cumulative effects, which are those effects resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed development.

Broadly, there are two types of cumulative effects considered as part of the EIA process:

- The combined effects of interrelationships between individual assessment topics (for example noise, dust and visual impacts) on an individual or group of receptors. These are termed Type 1 Cumulative Effects and have been identified, where relevant, throughout the technical chapters of this ES with cross-references to other disciplines where required;

- The impacts of several developments, which individually may or may not be significant, but when considered together may result in significant effects. These are termed Type 2 Cumulative Effects. The remainder of this chapter presents the methodology and information gathering process that has been undertaken in relation to Type 2 Cumulative Effects, and the results are presented in a dedicated section of each technical chapter of this ES.

The aim of the cumulative effects assessment is to identify and, where necessary, mitigate significant cumulative environmental effects. It is not intended to document every possible impact. The focus of the assessment therefore is on identifying other development proposals which have the potential to result in significant cumulative effects when considered together with the proposed development, and not identifying and assessing every proposed development and impact within a given proximity of the site.

This chapter is explanatory in nature and does not present any technical assessment. It describes the process that has been followed to identify other development proposals in proximity to the site which may give rise to cumulative effects. The assessment of cumulative effects relates specifically to each technical discipline, was undertaken by the relevant specialist consultant (refer to Table 1.1 in Chapter 1 of this ES for details), and is presented in a dedicated section within each chapter of this ES.

This chapter was written by IKM Consulting with supporting research on cumulative developments provided by GVA James Barr.

## 15.2 Relevant Legislation and Guidance

Schedule 4 of the EIA Regulations requires an ES to include:

> *"A description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape* ***and the interrelationship between the above factors****";*
>
> *"A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary,* ***cumulative****, short, medium and long-term, permanent and temporary, positive and negative effects of the development…"* .

Whilst there is some minimal guidance available from public sector and industry sources, there is not yet a single agreed methodology that should be adopted for cumulative effects assessment in EIA outside of the renewable energy sector. In England, the Planning Inspectorate has recently published Advice Note Seventeen: Cumulative Effects Assessment (The Planning Inspectorate, 2015). Although it has no status other than advice, is only directly applicable to nationally significant infrastructure projects in England and Wales, and is more complex for that reason than the approach required here, it is still considered to be the most up to date and comprehensive overview of current practice in relation to cumulative effects assessment. Some of the methods suggested in the Advice Note are therefore referred to in this chapter.

## 15.3 Assessment Methodology

The methodology adopted has followed a systematic four-stage process to identify, consider and assess the likelihood of significant environmental effects arising from other proposed developments at various stages in the development process within the vicinity of the site.

### 15.3.1 Stage 1 - Establish Longlist of Cumulative Developments

During this first stage, research was undertaken with reference to current and proposed development plan documents for Edinburgh, East Lothian and Midlothian. Consideration was also given to planning applications, decisions and appeals, together with reference to the consultation and online mapping services provided by the relevant local authorities. This research was used to identify all relevant planning applications for the sites identified. Local knowledge of the assessment team was also important in identifying sites which are currently the subject of a variety of development proposals.

For consistency, the longlist includes any "committed development" that the Transport Assessment includes, plus other notable development proposals for which planning permission is in place or has been applied for by mid-April 2016 when the assessment was undertaken. It also includes any other significant future development proposals at an early stage in their development process.

Sites at the following stages of development were included in the longlist:

- Sites with planning permission in place;
- Sites subject to an application for planning permission;
- Development Plan allocated sites;
- Other known and reasonably foreseeable development proposals (e.g. consented under other regimes than planning).

To complete the longlist of candidate sites for cumulative assessment the distance from the proposed development to each location was measured and sites within approximately 6km were included.

At this stage, planning departments of City of Edinburgh Council (CEC), Midlothian Council (MLC) and East Lothian Council (ELC) were consulted by email to identify any specific development proposals they would like to see included for consideration of potential for cumulative effects.

### 15.3.2 Stage 2 - Initial Information Gathering and Shortlist of Cumulative Developments

In order to develop a shortlist of sites, each of the sites identified during Stage 1 was first assessed using a Tier system. Tiers 1 to 3, as set out below, have been used to categorise the longlist of sites in terms of the likelihood of them contributing to a significant cumulative effect:

- **Tier 1** – greatest certainty. These are sites either under construction, have a planning permission in place or an application for planning permission has been submitted;

- **Tier 2** – some certainty. These are sites which are the subject of an EIA scoping request or PAN notice, and therefore an application for planning permission is likely to follow;

- **Tier 3** – low certainty. These are sites identified in a development plan or elsewhere but for which there are no firm proposals or applications in progress. There is generally limited publicly available information on what they will comprise or if/when they may be brought forward.

The Tiers assigned to each site in the longlist are summarised in Table 15.1.

Only Tier 1 and Tier 2 sites were considered further in the assessment. Tier 3 sites have been excluded on the basis that there are no firm proposals available to assess.

The shortlist of sites was then selected using a small number of additional include/exclude criteria, such as: the proximity of the site; the scale and nature of the development; the likely timing and programme of the works and the extent of overlap; and the predicted significant effects of other developments (where known and publicly available). This decision making process is necessarily subjective and not formulaic, but allows for an initial screening of other development proposals to focus the assessment on those proposals where cumulative effects with the proposed development may result.

The shortlisting was based on information in the public domain when the assessment was undertaken in mid-April 2016 about the timing, nature and scale of those other developments, the sensitivity of the receiving environment, and any other relevant factors.

### 15.3.3 Stage 3 - Information Gathering and Sharing

Detailed information on each of the shortlisted developments was then gathered using online planning portal sites. This information was shared with all technical specialists, who then completed an initial review of the potential for cumulative effects in relation to the conclusions of their own technical assessments of the New Brunstane development.

### 15.3.4 Stage 4 - Cumulative Effects Assessment

Each of the shortlisted developments was reviewed in detail by each of the technical specialists and then collectively as an EIA team to determine the likelihood of significant cumulative effects, apportion the relative influence of each scheme in contributing to the total cumulative effect identified, and propose any appropriate mitigation measures specific to the cumulative effects identified. It is often the case that the mitigation appropriate to address any predicted significant cumulative effects is already proposed in the ES, and where this is the case it has been identified in the assessment tables but not repeated in the Schedule of Mitigation in Chapter 16 of the ES.

## 15.4 Longlist of Development Proposals

Following the methodology outlined in Section 15.3, Table 15.1 below summarises the longlist of development proposals within approximately 6km of the site. Unless otherwise stated, all proposed developments identified in the table are for housing or include a housing component.

The location of all known sites is shown on Figure 15.1, and the sites selected for inclusion in the longlist is shown on Figure 15.2.

**Table 15.1: Longlist of Development Proposals for Assessment of Type 2 Cumulative Effects**

| Ref | Site | Local Authority | Planning Reference | Approx. Distance to Brunstane Site (km Centre to Centre) | LDP Allocation Status | Application Status | Development Status | Comments | Tier |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Newcraighall North | CEC | 13/03181/FUL | 0.5 | HSG14 (ECLP) HSG 26 (ELDP) | Approved | Under Construction | | 1 |
| 2 | Newcraighall East | CEC | 10/03506/PPP | 0.778 | HSG16 (ECLP) HSG 27 (ELDP) | Approved | Construction Not Commenced | | 1 |
| | | | 15/04112/AMC | | | Approved | Construction Not Commenced | | |
| 3 | Queen Margaret University | ELC | 15/00337/PM | 1.643 | PREF-M1 (MIR proposal) | Pending Consideration | Planning Permission Not in Place | Proposed Allocation within LDP. First parcel of a wider scheme | 1 |
| 4 | Millerhill Recycling | MID | 15/00285/DPP | 1.94 | n/a | Approved | Construction Not Commenced | | 1 |
| 5 | Shawfair (mixed use) | MID | 02/00660/OUT | 1.986 | H43 (Local Plan) | Approved | Construction Not Commenced | Granted 2014 covering a significant area. | 1 |
| | | | 15/00089/MSC | | | Pending Consideration | Planning Permission Not in Place | | |
| 6 | Cauldcoats | MID | 14/00910/PPP | 1.797 | HS0 (Proposed Plan) | Pending Consideration | Planning Permission Not in Place | | 1 |

| Ref | Site | Local Authority | Planning Reference | Approx. Distance to Brunstane Site (km Centre to Centre) | LDP Allocation Status | Application Status | Development Status | Comments | Tier |
|---|---|---|---|---|---|---|---|---|---|
| 7 | Greendykes | CEC | 05/01358/OUT | 2.844 | HSG 5,6, and 9 (ECLP) HSG 16, 17 and 18 (ELDP) | Approved | Under Construction | Outline granted in 2006 with a variety of AMC/MSC applications since then by different developers | 1 |
| | | | Various others | | | | Under Construction | | |
| 8 | Craigmillar Town Centre | CEC | 14/03416/PPP | 2.918 | HSG 7 (ECLP) HSG14 (ELDP) | Approved | Construction Not Commenced | Outline consent granted in 2015 with further AMC's since then (EDI site) | 1 |
| | | | Various AMC | | | | Construction Not Commenced | | |
| 9 | Newton Farm | MID/ELC | 15/00391/SCR | 3.281 | HS1 (Proposed Plan) | Pending Consideration | Other | EIA Screening applied for - allocated site | 2 |
| 10 | Goosebay, Wallyford | ELC | 12/00924/PPM | 5.084 | H7 (LP) and PREF-M11 (MIR Proposal) | Approved | Construction Not Commenced | There have been a variety of amendments to the original consent made through a variety of different applications including 14/00903/PM. Included given significant scale | 1 |

| Ref | Site | Local Authority | Planning Reference | Approx. Distance to Brunstane Site (km Centre to Centre) | LDP Allocation Status | Application Status | Development Status | Comments | Tier |
|---|---|---|---|---|---|---|---|---|---|
| 11 | Millerhill Railyard | MID | 15/00844/DPP | 1.889 | n/a | Pending Consideration | Planning Permission Not in Place | Significant works to existing rail maintenance depot | 1 |
| 12 | Millerhill Digestor Plant | MID | 11/00174/PPP | 1.596 | E26 | Approved | Under Construction | | 1 |
| 13 | Baileyfield | CEC | 14/03736/PPP | 1.889 | n/a | Approved | Under Construction | number of AMC apps to cover detail inc 15/02624/AMC, 15/04234/AMC, 15/04197/AMC, 15/02910/AMC | 1 |
| 14 | Brunstane Steadings | CEC | 06/02742/FUL | Adjacent | n/a | Approved | Under Construction | Original consent only. Has been modified since to increase number of units (08/02704/FUL; 14/01049/FUL) | 1 |
| 15 | Old Craighall Village | ELC | 13/01020/PPM | 2.49 | PREF-M2 (MIR proposal) | Approved Appeal | Construction Not Commenced | | 1 |
| 16 | North Old Craighall Services (business) | ELC | 08/00669/OUT | 2.357 | BUS 2 (LP) | Approved | Construction Not Commenced | Consent has now expired | 1 |

| Ref | Site | Local Authority | Planning Reference | Approx. Distance to Brunstane Site (km Centre to Centre) | LDP Allocation Status | Application Status | Development Status | Comments | Tier |
|---|---|---|---|---|---|---|---|---|---|
| 17 | The Wisp (springfield) | CEC | PPA-230-2129 (DPEA) | 2.509 | n/a | Approved Appeal | Planning Permission Not in Place | Intention to allow pending S75 | 1 |
| 18 | Blackchapel Close | CEC | 13/01378/FUL | 1.447 | n/a | Approved | Under Construction | | 1 |
| 19 | Dunddingston Park South | CEC | 13/00040/FUL | 1.548 | n/a | Approved | Under Construction | | 1 |
| 20 | Wanton Walls | CEC | PPA-230-491 | Adjacent | n/a | Approved on Appeal | Unconfirmed | | 1 |
| 21 | Land at The Wisp | CEC | 16/00216/PPP | 2.465 | n/a | Pending Consideration | Planning Permission Not in Place | | 1 |
| 22 | Old Dalkeith Road | CEC | 14/01057/PPP | 3.575 | n/a | Approved | Construction Not Commenced | | 1 |
| 23 | Edmonstone Estate | CEC | 14/00578/FUL | 3.761 | n/a | Approved | Construction Not Commenced | amendment to previous consent 12/01624/FUL | 1 |
| 24 | 143 Drum Street | CEC | 15/02905/PPP | 4.766 | n/a | Pending Consideration | Planning Permission Not in Place | | 1 |
| 25 | Candlemakers Place | CEC | 14/01238/PPP | 4.68 | HSG25 | Pending Consideration | Planning Permission Not in Place | | 1 |
| 26 | Gilmerton Dykes Road | CEC | 14/01446/FUL | 5.572 | HSG24 | Pending Consideration by Appeal | Planning Permission Not in Place | | 1 |

| Ref | Site | Local Authority | Planning Reference | Approx. Distance to Brunstane Site (km Centre to Centre) | LDP Allocation Status | Application Status | Development Status | Comments | Tier |
|---|---|---|---|---|---|---|---|---|---|
| 27 | Gilmerton Station Road | CEC | 14/01649/PPP | 5.244 | HSG23 | Approved Appeal | Construction Not Commenced | | 1 |
| 28 | Pinkie Mains | ELC | 08/01090/OUT | 3.612 | H4 (LP) PREF-M7 (MIR proposal) | Approved | Under Construction | | 1 |
| | | | 11/00974/AMM | 3.612 | | Approved | Under Construction | | |
| 29 | Barbacklaw Farm | ELC | 10/00341/PPM | 4.2 | H41 (LP) | Approved Appeal | Construction Not Commenced | No housing has yet been delivered but the frame for the dog track has been started | 1 |
| 30 | Salters Road | ELC | 14/00102/PP | 4.769 | n/a | Approved | Under Construction | | 1 |
| | | | 15/00100/AMC | 4.769 | | Approved | Under Construction | | |
| 31 | Cauldcoats EIA (6) | MID | 14/00245/SCR | 1.897 | HS0 (Proposed Plan) | Approved | Other | EIA in reference to the wider Cauldcoats area (no. 6) | 1 |
| 32 | Salters Park | MID | 15/00543/SCR | 4.745 | D1 a-d | Approved | Other | | 2 |
| 33 | North Danderhall | MID | n/a - HOUSING ALLOCATION | 3.033 | H44 | N/A | Other | Allocated Site | 3 |
| 34 | South Danderhall | MID | n/a - HOUSING ALLOCATION | 3.47 | H45 | N/A | Other | Allocated Site | 3 |
| 35 | Eastfield Farm Rd Industrial Estate | MID | n/a - ECONOMIC ALLOCATION | 5.134 | E26 | N/A | Other | Allocated Site | 3 |

| Ref | Site | Local Authority | Planning Reference | Approx. Distance to Brunstane Site (km Centre to Centre) | LDP Allocation Status | Application Status | Development Status | Comments | Tier |
|---|---|---|---|---|---|---|---|---|---|
| 36 | Thornybank Industrial Estate | MID | n/a - ECONOMIC ALLOCATION | 5.646 | E10 | N/A | Other | Allocated Site | 3 |
| 37 | South East Wedge Development | CEC | 15/05074/PPP | 3.44 | n/a | Pending Consideration | Planning Permission Not in Place | | 1 |
| 38 | Goshen | ELC | 08/01090/OUT 11/00974/AMM | 4.80 | H4 | Approved | Under Construction | Allocated Site | 1 |

## 15.5 Shortlist of Development Proposals

To reiterate, and based on an initial review of the development proposals identified in Table 15.1, a shortlist of sites from Tier 1 and Tier 2 were selected for more detailed assessment.

Exclusion of other sites from the detailed cumulative effects assessment has been based on judgements as to the likelihood of significant cumulative effects arising from, in particular:

- Proximity to the proposed New Brunstane site. A judgement has been made on a case by case basis to reflect that sites closer to the proposed development are more likely to result in significant cumulative effects than those at greater distances;

- The allocated Tier of development (1-3), which is based on the status of the proposal, how certain it is to come forward, and consequently the level of information that will be available. Tier 3 sites have been excluded on the basis that there are no firm proposals available to assess.

Of the 34 Tier 1 and 2 developments identified in Table 15.1, four were shortlisted for more detailed consideration of their cumulative effects together with New Brunstane due to their physical proximity to the site. The remaining 30 sites were considered to be too far from the proposed development to result in significant cumulative environmental effects, or in some circumstances their effects (e.g. on future traffic flows) are already accounted for in the EIA through inclusion within the future growth scenarios used in the transport assessment modelling and associated assessments of the noise and air quality effects of road traffic.

Two of the four shortlisted projects are currently under construction. As there is no definitive information on whether those developments would be completed prior to construction start at New Brunstane (in which case effects arising from them are considered as part of the baseline) it has been assumed they would not and have therefore been included in the cumulative effects assessment.

Shortlisted development proposals are identified in Table 15.2.

**Table 15.2: Shortlist of Development Proposals for Assessment of Type 2 Cumulative Effects**

| Ref | Site | Planning Reference | Approx. Distance to Brunstane Site (km Centre to Centre) | Development Status |
|---|---|---|---|---|
| 1 | Newcraighall North | 13/03181/FUL | 0.5 | Under Construction |
| 2 | Newcraighall East | 10/03506/PPP | 0.78 | Construction Not Commenced |
| | | 15/04112/AMC | | Construction Not Commenced |
| 14 | Brunstane Steadings | 06/02742/FUL | Adjacent | Under Construction |
| 20 | Wanton Walls | PPA-230-491 | Adjacent | Unconfirmed |

## 15.6 Cumulative Effects Assessment

Once selected, each of the developments was researched in further detail to understand what information is available relating to what is proposed, when, and the potential for significant environmental effects.

Where relevant, each of the technical chapters of this ES considers the potential for Type 1 and Type 2 cumulative effects in a dedicated section based on the information presented in this chapter as necessary, to determine if additional mitigation is required over and above that already proposed. The assessment of cumulative effects can be found in the following chapters:

- Chapter 6, Section 6.9 – Ecology, Biodiversity and Nature Conservation;
- Chapter 7, Section 7.10 – Landscape and Visual;
- Chapter 8, Section 8.10 – Historic Environment;
- Chapter 9, Section 9.9 – Water Resources, Hydrology, Flood Risk and Drainage;
- Chapter 10, Section 10.9 – Ground Conditions, Hydrogeology, Geology and Soils;
- Chapter 11, Section 11.4.5 – Traffic, Transportation and Access;
- Chapter 12, Section 12.9 – Air Quality;

- Chapter 13, Section 13.9 – Noise and Vibration;
- Chapter 14, Section 14.7 – Socioeconomics.

## 15.7 References


- Advice Note Seventeen: Cumulative Effects Assessment, The Planning Inspectorate, 2015;
- Planning Advice Note (PAN) 1/2013 Environmental Impact Assessment, Scottish Government, 2013;
- Circular 3/2011 The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011, Scottish Government, 2011;
- A Handbook on Environmental Impact Assessment (4th Ed), Scottish Natural Heritage, 2013;
- Institute of Environmental Management and Assessment 'Guidelines for Environmental Impact Assessment' 2004 (as amended).

# 16. SCHEDULE OF MITIGATION

## 16.1 Introduction

This chapter presents an itemised list of the key mitigation measures proposed throughout this Environmental Statement (ES). It includes actions to address all of the environmental impacts identified as well as other measures considered to be appropriate in relation to minimising the environmental effects of the proposed development and maximising its environmental benefits.

The mitigation measures presented here are specific and particular further actions that can be taken to avoid, reduce or offset the environmental effects of the proposed development. They do not include the range of embedded mitigation measures which have been incorporated into the scheme design itself.

## 16.2 Referencing

For ease of reference, each proposed mitigation measure has been allocated a unique reference comprising a two-letter prefix corresponding to one of the technical chapters of the ES, followed by a number. The prefixes used are:

EM Environmental Management (general measures across all disciplines)

EC Ecology, Biodiversity and Nature Conservation (ES Chapter 6)

LV Landscape, Townscape and Visual (ES Chapter 7)

AR Historic Environment (ES Chapter 8)

HY Water Resources, Hydrology, Flood Risk and Drainage (ES Chapter 9)

GC Ground Conditions, Hydrogeology, Geology and Soils (ES Chapter 10)

TT Traffic, Transportation and Access (ES Chapter 11)

AQ Air Quality (ES Chapter 12)

NV Noise and Vibration (ES Chapter 13)

SO Socioeconomic (ES Chapter 14)

## 16.3 Construction Environmental Management Plan

EM1 A Construction Environmental Management Plan (CEMP) will be in place and agreed prior to the commencement of physical works.

Once completed, the CEMP will bring together all of the construction-specific mitigation measures identified in the ES (summarised below) with any others emerging from the post-submission, consenting and consultation process, to address the range of potential environmental effects arising as a result of the construction of the proposed development.

## 16.4 Ecology, Biodiversity and Nature Conservation (ES Chapter 6)

- EC1: Pre-construction surveys for protected and invasive species;
- EC2: Phasing of works to ensure that there are always reservoirs of semi-natural habitat nearby for displaced wildlife to move into;
- EC3: No site compounds, storage sites or haul roads to be sited within 30m of the Brunstane Burn LBS or the Newhailes Policy Woodlands;
- EC4: All habitat creation will aim to use native species of local provenance;
- EC5: Wildflower meadows to be established with the Edinburgh Meadow Mix 2015;
- EC6: Management prescriptions will be developed for inclusion in the landscaping scheme for the development;
- EC7: Best practice guidance with respect to SuDS design as set out in the CIRIA SUDS Manual (C697) and SEPA Guidance Note 2 to be adhered to;
- EC8: The crossing of the Brunstane Burn for the northern access road will be laid a minimum of 200mm below natural bed level to allow natural substrate to be used, and at the same gradient. Exact design to be agreed with SEPA;
- EC9: Scheme for the eradication of Japanese knotweed and giant hogweed will be submitted to and approved by CEC prior to the commencement of the development;
- EC10: Site clearance of vegetation will be undertaken outside of the main bird breeding season where possible (typically mid-March - August inclusive);

- EC11: Swift bricks will be incorporated into the design of some buildings in the development;

- EC12: Works to be phased to reduce disturbance to breeding barn owls and alternative nest sites to be provided, if required;

- EC13: Development of offsetting scheme for barn owl to be approved with SNH prior to the commencement of the development;

- EC14: Trees in the proposed development site identified as having potential for bat roosts will be climbed and inspected by a licensed bat worker in the unlikely event that they are required to be felled;

- EC15: Any construction work within 30m of structures which have been assessed as having more than negligible potential for roosting bats, should be informed by emergence/re-entry surveys prior to commencement of works;

- EC16: Design of operational lighting to minimise the potential for light spillage outwith the boundary of the proposed scheme in according to BS 5489 requirements;

- EC17: Otter fencing to be installed on both sides of the northern access road to a distance of at least 50m from the Brunstane Burn crossing;

- EC18: Mammal ledges will be built into the Brunstane Burn crossing and will be at least 450mm wide and be accessible from the banks of the burn via ramps at the 1 in 50-year flood level. There will also be provision made for otters to reach the ledge from the water, with ramps leading down to water level.

### 16.5 Landscape, Townscape and Visual (ES Chapter 7)

- LV1: Generally two-storey development, rising to three along key streets and a maximum of four storey to provide appropriate urban enclosure to the larger open spaces;

- LV2: Tree framed open space around Brunstane House, creating a green corridor and considered policy style planting;

- LV3: A broad street/linear green space providing a view corridor from Brunstane House to the sea;
- LV4: Substantial landscape buffer to the east to separate proposed development from designed landscape of Newhailes House;
- LV5: Low density housing abutting Newhailes to minimise visual effects on views from GDL;
- LV6: A broad street/linear green space providing a viewing corridor from the shell grotto within Newhailes Estate to Arthur's Seat, and minor view corridor from Newhailes House;
- LV7: Broad landscape and open space buffer along south side of Brunstane Burn east and west of new entrance road;
- LV8: Landscape buffer along NCR1;
- LV9: Main frontages of development normally arranged towards paths or open spaces;
- LV10: Green link along one side of the ECML railway, a combination of allotments and park acting as a wildlife corridor;
- LV11: Local open space distributed within the development, designed to be supervised passively by overlooking houses;
- LV12: Streets designed in response to existing topography to minimise cut and fill;
- LV13: Streets designed to maximise views out to wider landscape e.g. Berwick Law and the Firth of Forth;
- LV14: Boundaries designed to respond to specific character of the site;
- LV15: Tidy site management to reduce visual clutter, construction lighting in accordance with best practice.

## 16.6 Historic Environment (ES Chapter 8)

- HE1: Geophysical (gradiometer survey);
- HE2: Avoidance (fencing-off) of Scheduled Monuments SM10580 and SM4112;
- HE3: Programme of Archaeological Recording Work (to be agreed but likely to comprise trial trenching evaluation and / or archaeological monitoring and recording (watching briefs).

## 16.7 Water Resources, Hydrology, Flood Risk and Drainage (ES Chapter 9)

- HY1: Construction Environment Management Plan (CEMP) detailing good site practices, pollution prevention and SuDS during site preparation and construction;
- HY2: Use of SuDS measures as per CIRIA manual and agreed with SEPA and local council. e.g. Silt traps, Erosion control measures, Buffer zone between infrastructure and watercourses. Discharge of attenuated surface water runoff from the site into the watercourses should be limited to greenfield runoff rates and treated to appropriate levels before discharge;
- HY3: Detailed design of new crossing of Brunstane Burn will be undertaken at detailed planning stage, along with more detailed modelling and calculations, and consultation with CEC and SEPA;
- HY4: No buildings or construction work located on top of any sewers or culverted watercourses (i.e. Magdalene Burn), with an appropriate wayleave between the culvert and any buildings;
- HY5: Appropriate overland flow routes provided to enable any flood waters to flow through the site without flooding properties or the ECML;
- HY6: Residential development and SuDS are limited to areas outside the 200-year functional floodplain of the watercourses;

- HY7: Due to potential flood risk as a result of blockage of the Brunstane Burn culvert under the ECML, there will be no buildings or roads in land below 24m AOD, upstream of the ECML along the northern edge of the site and Finished Floor Levels of properties in this part of the site are set above this emergency level. However, other development such as open space or SuDS features could be in these areas;

- HY8: Regular maintenance programs for all components of the drainage system to ensure continuous effective functioning.

### 16.8 Ground Conditions, Hydrogeology, Geology and Soils (ES Chapter 10)

- GC1a: GI to determine made ground and contaminants;

- GC1b: GI to facilitate gas and groundwater monitoring;

- GC1c: GI to inform geotechnical design;

- GC1d: GI to determine risk of subsidence;

- GC2: Construction Environment Management Plan (CEMP) detailing the good site practices to: prevent or control dust; deal with unexpected ground conditions; mitigate against the migration of contaminants; undertake remediation and off-site disposal works and manage installation of grout to prevent pollution of groundwater;

- GC3: Good ventilation; gas monitoring prior to entering confined spaces; confined spaces training;

- GC4a: Creation of exclusion zones around shafts (if required);

- GC4b: Grouting of mine workings;

- GC4c: Choice of grout and site control of grouting activities;

- GC5: Relocate contamination off-site or provide a barrier to break pathways;

- GC6: Gas membranes and/or design-out confined spaces;

- GC7: Selection of construction materials to resist any aggressive ground conditions.

### 16.9 Traffic, Transportation and Access (ES Chapter 11)

- TT1: Construction Traffic Management Plan.

### 16.10 Air Quality (ES Chapter 12)

- AQ1: Construction Dust Management Plan which includes the mitigation measures recommended in the Construction Dust Risk Assessment;
- AQ2: Reduce road traffic where possible via provision of good public transport links and infrastructure that promotes active travel modes;
- AQ3: Provide charging infrastructure for plug-in vehicles as per current IAQM/EPUK air quality best practice guidance.

### 16.11 Noise and Vibration (ES Chapter 13)

- NV1: Construction Environmental Management Plan, with Noise Management Plan (NMP) included. Enforcing BPM measures on site;
- NV2: Undertake a BS5228 (1) construction noise assessment at detailed design stage, to inform the NMP.

### 16.12 Socioeconomic (ES Chapter 14)

- SO1: Primary school – safeguard land and contributions;
- SO2: Secondary school – contributions;
- SO3: Healthcare Facilities.