

Application for Planning Permission in Principle
October 2013



Environmental Impact Assessment: Main Report

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1. Introduction

Strategic Context

- 1.1 Aberdeen is Scotland's third largest city and the primary service centre for the North-East. Its long association with the oil and gas industry has enabled it to develop strong links with other parts of the UK and beyond. This role is recognised in the National Planning Framework 2 (2009), which identifies Aberdeen as an "international gateway", with the potential both to strengthen its external links and to disseminate growth within the region.
- 1.2 The spatial strategy set out in the Aberdeen City and Shire Structure Plan, 2009, designates three "strategic growth areas". These include Aberdeen City, the primacy of which is to be maintained and strengthened, and the city is expected to accommodate at least half of the new housing and employment land likely to be required up to 2030.
- 1.3 Whilst much of this growth can be provided through regeneration and the use of brownfield sites, substantial development of greenfield land is anticipated, amounting to some 17,000 homes by 2023, and a further 4,000 homes and 175ha of employment land by 2030.

Local Development Plan

- 1.4 The Aberdeen Local Development Plan (LDP, February 2012) provides the framework within which this growth will be delivered over the next decade. Development on greenfield land must necessarily take place at relatively peripheral locations. The LDP states that greenfield development should take the form of mixed-use urban extensions or consolidation of existing suburban centres. Key considerations include the need to:
 - promote sustainable travel choice and connectivity, including links to existing and aspirational core paths;
 - complement the existing hierarchy of retail provision;
 - proactively provide supporting infrastructure;
 - ensure that new developments are genuinely mixed in character and make adequate provision for community services and employment; and
 - protect the most valued natural and cultural heritage features of the area, including those which contribute to the Green Space Network.
- 1.5 The LDP identifies the Bridge of Don/Grandhome area as suitable for growth, with the capacity to provide more than 7,000 new homes. The area is located within the Aberdeen to Peterhead corridor, which is a key element of the Energetica initiative, which seeks to optimise the development potential of the oil and gas sector.
- 1.6 In addition, the area is relatively close to existing employment areas (including two specialist technology parks) and will offer an improved level of accessibility, taking account of planned transport improvements such as the Third Don Crossing, the Aberdeen Western Peripheral Route (AWPR) and Haudagain Roundabout.
- 1.7 Sites considered to be appropriate for specific development proposals to be brought forward over the plan period are designated in the LDP as Opportunity Sites. Grandhome is designated as such a site (OP12), and is identified as being capable of accommodating 2,600 homes up to 2016, a further 2,100 homes up to 2023, 5ha of employment land up to

2023, and a further 2,300 homes up to 2030. The wider context of the Grandhome site is shown in **Fig 1.1**.

Masterplanning Process

- 1.8 As the potential suitability of Grandhome to meet the development aspirations set out in the Structure Plan and the emerging LDP became evident, masterplanning options began to be explored by the landowner, the Grandhome Trust. In May 2009, Grandhome was named by the Scottish Government as one of 11 projects in the Scottish Sustainable Communities Initiative (SSCI).
- 1.9 The site was then further selected (as one of only three locations) to be part of the National Charrette programme, a national community engagement exercise comprising intensive, interactive sessions, which involve local people and organisations in the early planning and design of their community. Masterplanning took place in tandem with preparation of the Aberdeen City LDP, providing input at key stages. In June 2009, Aberdeen City Council held an LDP Development Options Open Evening, at which opportunities relating to the Grandhome site were raised. Relevant issues were re-visited in November of that year as part of consultation on the Main Issues Report.
- 1.10 The masterplanning team undertook scene-setting, orientation and visioning in February 2010, as a prelude to the SSCI charrette the following March. The charrette was led by the masterplanners Duany Plater-Zyberk & Company (DPZ), and comprised an 8-day participative design exercise, translating ideas into plans and drawings, and testing the masterplan as it progressed. The charrette was attended both by members of the public and by stakeholders such as the City Council and statutory agencies. The masterplan that emerged from the charrette was revised during mid-2010 to reflect the emerging LDP, and a community update session was held in August.
- 1.11 The decision to proceed to planning submission was made in mid-2011, once it was clear that Grandhome would be brought forward as an Opportunity Site in the LDP. A range of supporting work was commissioned, including topographical and arboricultural surveys, and technical studies relating to transport, utilities, landscape, ecology, archaeology and ground conditions.
- 1.12 This work resulted in the issue of a revised brief to DPZ, which formed the basis for further development of the masterplan in early 2012. This included revisions to the site boundary, the restructuring of neighbourhoods and the green space network, a reduced retail element and the introduction of a business park. A series of follow-up consultations were held in mid-2012 with the City Council and other statutory consultees, both to brief them on these changes and to address specific issues such as road access.
- 1.13 The final masterplan was submitted to Aberdeen City Council and was adopted as Interim Planning Guidance, as part of a Grandhome Development Framework, in March 2013.

Planning Strategy

- 1.14 The masterplan for the entire Grandhome site, which extends to 319ha, will eventually extend to over 7,000 dwellings and include 7 neighbourhoods. The housing land requirements of the Local Development Plan allocate 4,700 units in the current plan period (2007 to 2023), with the remaining 2,300 units safeguarded to come forward in the next plan period (2023 to 2030).

1.15 In accordance with this allocation, the Grandhome Trust is seeking planning permission in principle (PPiP) for Phases 1 to 5 for the greater part of the overall site, amounting to 227hectares (see **Fig 4.1**). Detailed work is ongoing on Phase 1, which will be the subject of a full application in the near future.

Need for Environmental Impact Assessment

1.16 The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 (the EIA Regulations) require that developments of a certain type and scale are subject to environmental impact assessment (EIA) before planning applications can be determined. Guidance on the Regulations is provided in Scottish Executive Circular 3/2011, whilst technical advice is provided in, for example, Planning Advice Note (PAN) 58: Environmental Impact Assessment (1999) and the SNH Environmental Assessment Handbook (2002).

1.17 The need for EIA varies on a case-by-case basis and is derived initially from two schedules (1 and 2). EIA is mandatory for developments of the type listed in Schedule 1. Developments listed in Schedule 2 will require EIA if they are likely to give rise to significant effects on the environment. The likelihood of significant effects depends on three main factors: the scale and type of the development, the sensitivity of the environment and the nature of the likely effects (e.g. their extent, severity or duration).

1.18 Regulation 2(1) requires that all non-Schedule 1 developments within “sensitive areas” are screened to determine whether they require EIA, regardless of their scale or type. Sensitive areas are defined as:

- Sites of Special Scientific Interest;
- Land subject to Nature Conservation Orders;
- International Conservation Sites;
- National Scenic Areas;
- World Heritage Sites;
- Scheduled Monuments; and
- National Parks.

1.19 For non-Schedule 1 developments that are not located within a sensitive area, Schedule 2 sets out a series of “applicable thresholds and criteria” for various categories of project. Where the relevant threshold is exceeded, the project is regarded as “Schedule 2 development” and must be screened to determine whether significant effects are likely to occur.

1.20 The development proposed in this case is not of a type listed in Schedule 1. Neither is any part of it located within a sensitive area, although there are several located in the surrounding area; for example, a scheduled monument is located a short distance beyond the northern boundary.

1.21 The development falls within Schedule 2 category 10. Infrastructure projects, sub-category (b) Urban development projects, for which the applicable threshold is 0.5 hectares. The PPiP application site clearly exceeds this by a very considerable margin.

1.22 PAN 58 advises (in Para 36) that EIA will generally be required for Schedule 2 projects that are:

- major developments of more than local importance;

- located within particularly environmentally sensitive or vulnerable locations (albeit outside sensitive areas); and
- likely to give rise to unusually complex and potentially hazardous environmental effects.

1.23 The nature and scale of the PPIP application, not to mention the overall masterplan, are such that it constitutes a “major development” that is clearly of city-wide and probably regional importance. Whilst the site is not regarded as “particularly environmentally sensitive or vulnerable”, a number of sensitivities have been identified, including:

- the presence of protected species;
- areas of known and potentially contaminated ground;
- its countryside character and role in local views;
- its urban fringe location; and
- its relationship to the highway network, including areas of traffic congestion.

1.24 As a result, a likelihood of potentially significant effects cannot be ruled out, although these effects are “not anticipated to be either unusually complex or hazardous”. In consideration of these factors, the Grandhome Trust has always assumed that the proposals comprise “EIA development”, and an Environmental Statement (ES) has therefore been prepared in support of the PPIP application.

Structure of the ES

1.25 The ES comprises three tiers of documents: a Non-Technical Summary (NTS), a Main Report and a series of Technical Annexes. This document comprises the Main Report and is organised as follows:

- Chapter 2 describes the EIA process;
- Chapter 3 provides an overview of the application site and surrounding area;
- Chapter 4 sets out the environmental policy context;
- Chapter 5 describes the proposed development; and
- Chapters 6-16 identify the predicted effects in relation to a series of assessment topics, together with the measures proposed to mitigate any significant adverse effects.

1.26 The Technical Annexes present a range of supporting information related to the assessment topics, together with standalone reports required by the planning process. They are as follows:

1. Scoping Responses
2. Air Quality
3. Energy Statement
4. Cultural Heritage
5. Ecology
6. Flood Risk and Drainage
7. Geo-Environmental
8. Landscape and Visual
9. Noise and Vibration

10. Socio-Economics
11. Transport
12. Waste
13. Agricultural Land Capability

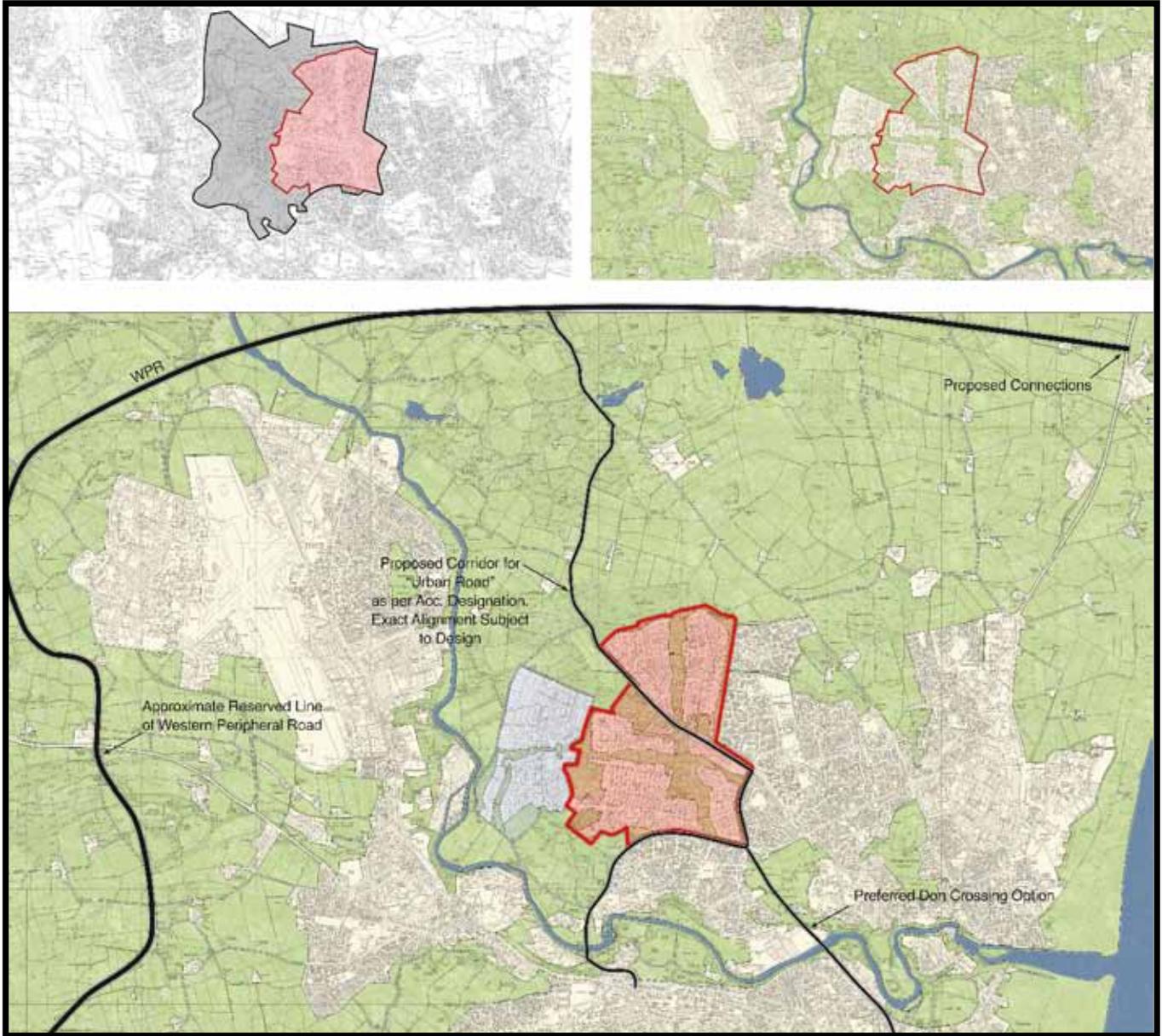


FIGURE 1.1

Grandhome Context



2. EIA Process

Overview

- 2.1 The regulatory context for the EIA has been set out in Chapter 1. EIA is a well-established process, in which the main steps are as follows:
- confirming the need for EIA (screening);
 - defining its scope (scoping);
 - consulting relevant parties;
 - carrying out baseline studies;
 - predicting the potential effects;
 - assessing the significance of those effects;
 - identifying measures to mitigate significant adverse effects;
 - assessing the residual effects; and
 - preparing the ES.
- 2.2 Regulations 5 and 10 provide for an applicant to request “screening” and “scoping” opinions respectively from the planning authority. A screening opinion confirms whether or not EIA is required, whilst a scoping opinion sets out the matters to be addressed. In this case a screening opinion was not requested, since the Grandhome Trust accepted from the outset that an EIA would be required. The remainder of this chapter focusses on the scope of the EIA and the methodologies adopted for the assessment of each topic.

Scope

- 2.3 Schedule 4 of the Regulations sets out the information to be included in environmental statements. Part I, para 3 requires an ES to include “*a description of the aspects of the environment likely to be significantly affected*”... and then lists the following topics:
- *Population;*
 - *Fauna;*
 - *Flora;*
 - *Soil;*
 - *Water;*
 - *Air;*
 - *Climatic factors;*
 - *Material assets, including the architectural and archaeological heritage; and*
 - *Landscape.*
- 2.4 In addition, para 1(c) requires an ES to identify the “*expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation etc)*”, whilst para 4 includes “*the use of natural resources...emission of pollutants, creation of nuisance and elimination of waste*” as potential sources of environmental effects.
- 2.5 This list is neither exhaustive nor prescriptive; the scope of each EIA must be defined on a case-by-case basis, taking account of the nature of the development and the sensitivity of the environment.
- 2.6 A request for a Scoping Opinion was submitted to Aberdeen City Council in September 2012, including a provisional schedule of topics and methodologies. The Council’s Scoping Opinion was issued on 5th April, 2013. Scoping responses had previously been received from the Scottish Environmental Protection Agency, Scottish Natural heritage

(SNH), Historic Scotland, and JMP Consultants/Transport Scotland. These responses are presented in **Technical Annex 1**.

2.7 The schedule of topics addressed in the EIA is set out in Table 2.1 below, together with the relevant Schedule 4 reference and justification.

Table 2.1: Assessment Topics

Topic	Schedule 4 Reference	Justification
Air Quality	<i>Air</i>	The development has the potential to generate substantial volumes of traffic, which could affect local air quality. A small number of nearby residential properties, as well as occupants of early phases, could be affected by fugitive dust impacts during construction. Emissions from any proposed point sources may need to be taken into account.
Climate Change	<i>Climatic factors</i>	The development will give rise to greenhouse gas (GHG) emissions from sources such as traffic and energy supply, and will be expected to demonstrate how these will be minimised.
Cultural Heritage	<i>Archaeological and architectural heritage</i>	The site includes a substantial number of (mainly undesignated) cultural heritage assets. The development will involve extensive ground disturbance, which in the absence of mitigation could damage such assets. The development also has the potential to affect the settings of listed buildings and a conservation area.
Ecology	<i>Fauna Flora</i>	The site includes a non-statutory designation (District Wildlife Site), together with habitats of local interest, and is known to be used by protected species (badger). Its character and habitat structure will be changed fundamentally by the development.
Flood Risk, Drainage and Surface-water Quality	<i>Water Population</i>	The site drains towards the River Don and its floodplain. The development will change the natural drainage regime of the site, and will be expected to incorporate sustainable drainage techniques. There is also a risk that surfacewater quality could be affected during construction and by the completed development (e.g. runoff from trafficked areas).
Geo-Environment	<i>Soils Water</i>	Residual ground contamination is known to occur at one location within the site, and may be present elsewhere. The development could affect groundwater levels and may pose a risk of contamination during construction and from some proposed uses (e.g. employment areas).
Landscape and Views	<i>Landscape Population</i>	The development will represent a fundamental change in site character, involving the loss of some landscape attributes and the introduction of new areas of green space, woodland etc. The introduction of built development will affect the character of the local landscape and a range of views.
Noise and Vibration	<i>Population</i>	Whilst noise is not anticipated to be a constraint on the proposed uses, this will need to be confirmed. The development will introduce sources of operational noise, primarily traffic, building services plant etc. Nearby residents could be disturbed during construction.
Socio-Economics	<i>Population</i>	The development represents a major urban extension, with the potential to have substantial impacts on housing supply and employment. It will generate additional demand for social infrastructure, which will be met within the masterplan, and has the potential to affect the local retail hierarchy.

Transport	<i>Population</i>	The development is likely to generate substantial traffic flows, which will have implications for highway capacity, including the provision of new infrastructure. There is the potential to benefit public transport (mainly bus services) through additional routes and increased demand. Pedestrian/cycle access is also likely to benefit through increased connectivity. Construction access and traffic could cause temporary delays through road closures etc.
Waste	<i>Population</i>	The development will give rise to substantial volumes of construction and operational waste, and will be expected to demonstrate how these will be minimised and managed, and to minimise its impact on the waste management regime.

Topics Scoped Out

- 2.8 The following topics have been excluded (i.e. scoped out) of the assessment: agricultural soils, electro-magnetic radiation, electronic interference and microclimate, and an explanation is provided below.

Agricultural Soils

- 2.9 A desk-based assessment of agricultural land capability was carried out at the scoping stage, and is attached as **Technical Annex 13**. The published LCA maps indicate that most of the site is Class 3.2, with some areas of Class 4.2. There is poorer-quality land to the north, and no land of higher quality than Class 3 in the surrounding area. On this basis, it is considered highly unlikely that the site includes any prime quality land, and even if it does such areas would be of very limited extent.
- 2.10 A soil protection plan will be implemented as part of the overall construction management strategy for the site. This plan will comply with the European Soil Thematic Strategy and will be developed in consultation with the City Council. Its primary aim will be to ensure that the soil resources of the site are retained, preferably for re-use in situ within gardens, public open space and habitat creation areas. With a commitment to such a plan, and in view of the relatively low-quality soils within the site, it was considered that this topic did not require any further assessment.

Electro-Magnetic Radiation (EMR)

- 2.11 The development will retain a buffer zone of a minimum width of 25m on either side of the high-voltage power lines which cross the eastern part of the site. The health effects of EMR associated with overhead lines is a contentious issue, for which the scientific evidence is suggestive rather than conclusive. Compliance with the required offset represents a precautionary approach that is intended to minimise the risk of any such effects. Little would be gained by specific assessment of this topic, and none was therefore carried out for the EIA.

Electronic Interference

- 2.12 Built development can in some circumstances interfere with electronic communications, including navigational systems at airports. BAA, the operators of Aberdeen Airport, have been consulted to determine their requirements for aviation safeguarding and to ensure that the development is fully compliant. Since no tall buildings are proposed, any other effects on electronic communications (e.g. mobile phones) are anticipated to be negligible. No further assessment of this topic was therefore carried out.

Microclimate

- 2.13 The development will be at relatively low density and will maintain an acceptable degree of separation from existing properties. Consequently, adverse effects on pedestrian comfort (due to acceleration of ground-level wind) and natural lighting (due to overshadowing) are highly unlikely to occur. Detailed design will ensure that the proposed buildings (especially dwellings) meet the relevant standards for solar access. No further assessment of this topic is therefore proposed in the EIA.

Scope and Methodology of Topic Assessments

- 2.14 The following sections set out the scope and methodology adopted for the assessment of each topic. Further details are provided in the technical chapters and annexes.

Air Quality

- 2.15 The scope of the assessment comprised:

- appraisal of baseline air quality using sources such as national databases and Aberdeen City Council's local air quality management (LAQM) process;
- screening of operational traffic emissions using the DMRB method;
- more detailed assessment of traffic impacts, based on dispersion modelling (e.g. ADMS Roads), where road links cannot be screened out;
- evaluation of traffic impacts with reference to the AQ Objectives and Environmental Protection UK Guidance, with specific consideration of air quality within the Aberdeen AQMAs; and
- qualitative assessment of construction dust impacts, using the IAQM guidance.

Climate Change

- 2.16 The assessment is based on a carbon footprinting study consistent with the BSI's PAS2020 and Defra guidance, using the GHG inventories set out in BS14064. The study has considered regulated GHG emissions relating primarily to energy use during construction and by the completed development. Options for carbon reduction through energy-efficiency and low- or zero-carbon technologies, as part of an overall energy strategy for the site, have been identified.

Cultural Heritage

- 2.17 The assessment has been carried out in accordance with the relevant Institute for Archaeologists' (IfA) Codes of Conduct and Standards and Guidance. A desk-based assessment (DBA) has been completed, using data from the National Monuments Record for Scotland, Aberdeen City Council's Historic Environment Record, historic OS mapping, the RCAHMS aerial photographic record and the Historic Scotland database.
- 2.18 A walkover survey has been carried out to locate all visible cultural heritage sites, monuments and landscape features, both identified during the DBA and previously unrecognised; to identify areas with the potential to contain unrecorded buried archaeological remains; and to inform the assessment of potential effects on those features. Effects on cultural heritage assets have been assessed on the basis of accepted

criteria (asset sensitivity x degree of impact), and an appropriate level of mitigation has been identified.

Ecology

2.19 The main elements of the ecological impact assessment (EclA) have comprised:

- habitat mapping and target notes in accordance with Joint Nature Conservancy Council (JNCC) guidance, and selected plant community assessment in accordance with the National Vegetation Classification (NVC);
- wintering and breeding bird surveys, with an emphasis on any Schedule 1 species;
- badger sett and field-sign survey, including territory mapping;
- otter holt and water vole surveys along watercourses;
- amphibian surveys of standing water;
- red squirrel survey; and
- bat activity survey to identify important flyways and potential roosts.

2.20 Ecological effects have been assessed in accordance with accepted criteria, e.g. Institute of Environmental Management and Assessment (IEMA) guidance, and mitigation has been identified where necessary.

Flood Risk and Drainage

2.21 A Flood Risk Assessment (FRA) compliant with relevant policies within Scottish Planning Policy (February, 2010) has been prepared. Its main elements have comprised:

- consultation with SEPA and the City Council;
- site visit and review of historic flooding risk;
- characterisation of potential flooding sources and zones, together with the vulnerability of proposed uses;
- assessment of potential changes to off-site risk;
- recommendation of mitigation measures, taking account of climate change; and
- preparation of an outline surfacewater drainage strategy based on sustainable drainage (SUDS) principles.

2.22 Reference has also been made to surfacewater pollution risk, based on a qualitative approach, taking account of site history, construction methods, the proposed uses and drainage strategy, and the sensitivity of receiving waters. Mitigation has been identified in accordance with SEPA's Pollution Prevention Guidelines. Since the development involves no work within designated flood zones or changes to significant watercourses, no hydraulic modelling or water quality sampling is proposed.

Geo-Environment

2.23 Site investigation (SI) work been carried out to verify the potential ground gas and contamination risks associated with two locations within or adjoining the site: Hall's Quarry and an area of made ground south of Whitestripes Road. This work has informed an overall Phase 1 geo-environmental study, which has included:

- a site walkover;
- historic map regression to identify previous uses;
- review of BGS published information and borehole records to determine ground/groundwater conditions;
- review of any other previous studies or records;
- an initial ground contamination assessment based on a conceptual risk model identifying potential risks to groundwater, site workers, future users and surrounding receptors; and
- if necessary, the recommendation of additional Phase 2 site investigation (SI) works, to be carried out by condition.

Landscape and Views

2.24 The assessment has followed the Landscape and Visual Impact Assessment (LVIA) guidance produced by the Landscape Institute/IEEMA (2002) and the SNH Landscape Character Assessment Guidance, and has comprised the following tasks:

- desktop review of relevant policy and landscape character assessments;
- site walkover and fieldwork to determine key landscape features, identify receptors, characterise the surrounding landscape/townscape and define visibility;
- identification of the approximate extent of visibility (ZTV) of the development, together with key views; and
- assessment of potential impacts on landscape character and visual amenity.

2.25 Annotated photographs have been prepared to illustrate the impact from relevant viewpoints, which have been agreed with the City Council. Mitigation has been presented in the form of a landscape strategy for the development, which will provide a framework for detailed design as each phase is brought forward.

Noise and Vibration

2.26 A noise and vibration assessment has been undertaken to characterise the noise climate of the site and to assess potential impacts on existing receptors and future occupants. The main tasks have comprised:

- review of published noise data (e.g. in relation to the airport);
- baseline noise monitoring to a methodology agreed with the EHO;

- site suitability assessment undertaken using the appropriate methodology in accordance with the Scottish Government's planning guidance for noise, PAN1/2011: Planning and Noise, and its Technical Advice Note: Assessment of Noise;
- assessment of effects on future residents, with recommendations for the acoustic treatment of buildings on the basis of BS8233, 1999: Sound Insulation and Noise Reduction for Buildings – Code of practice, where necessary;
- assessment of construction noise and vibration effects on representative receptors in accordance with BS5228, 2009: Noise and Vibration Control on Construction and Open Sites;
- assessment of the change in road traffic noise in accordance with the Calculation of Road Traffic Noise (CRTN) methodology, focusing on receptors close to existing and proposed roads used by development traffic; and
- assessment of fixed operational sources (building services plant etc) in accordance with BS4142, 1997: Method for Rating industrial Noise Affecting Mixed Residential and industrial Areas, with the aim of determining any likely impact on existing and future receptors.

Socio-Economics

2.27 The development has the potential to give rise to a wide range of socio-economic effects at a local, city-wide and regional level, many of which would be beneficial. The main areas of impact addressed have included:

- Employment: Direct impact of on-site employment, together with indirect and induced employment effects through the supply chain and household income;
- Population and Labour Market: Impact of new population on local, city-wide and Aberdeenshire labour market (size, skills base etc);
- Housing: Impact on housing supply/demand in terms of quantum, mix, local/regional deficiencies and Structure Plan/LDP targets;
- Social Infrastructure: Impact on demand/provision for education, health care and play space/recreation, both for new residents and the surrounding communities; and

2.28 The assessment has mainly considered impacts at the city-wide (Aberdeen City Council) level, but has also considered the wider shire (Aberdeenshire)/regional and local (Danestone/Bridge of Don) levels where relevant.

Transport

2.29 A Transport Assessment (TA) has been carried out in accordance with the following guidance:

- Transport Scotland's "Guide to Transport Assessment for Development Proposals in Scotland";
- the Transport policies within Scottish Planning Policy (February, 2010);

- PAN75: Planning for Transport, 2005; and
- PAN66: Best Practice in handling Planning Applications Affecting Trunk Roads.

2.30 The TA has taken account of the various studies undertaken previously in relation to the allocation of the Grandhome site, notably the Cumulative Transport Appraisal of Aberdeen City and Aberdeenshire Local Development Plans (2010). The approach to the mitigation of transport effects has taken account of the Aberdeen City and Shire SPG: Delivering Identified Projects through a Strategic Transport Fund (December 2011), which was adopted by the City Council in January 2012.

2.31 The main tasks have comprised:

- assessment of travel demand by mode and destination, based on an assumed modal share which takes account of the mixed-use character of the development and the promotion of sustainable transport choice inherent in the design;
- assessment of the implications of the “Designing Streets” approach for local traffic management and the provision of highway infrastructure;
- identification of footpath and cycleway connections to maximise integration of the development with the surrounding communities;
- development of a public transport strategy;
- assessments of network performance at key junctions; and
- identification of mitigation options.

2.32 Transport Scotland and the City Council have indicated that junction assessment across the Bridge of Don network is only required for Phase 1. At full development, it is anticipated that significant infrastructure interventions will be in place (AWPR and Third Don Crossing), and that the impacts of other developments will have been mitigated by payment to the Strategic Transport Fund. As a result, capacity assessment of the full development has been confined to the site accesses and junctions in the immediate vicinity along The Parkway and Whitestripes Road/Avenue.

Waste

2.33 A waste impact assessment has been carried out, and has included:

- a review of the local/regional waste management regime, with the specific aim of identifying any constraints;
- characterisation and calculation of the waste streams likely to arise during construction and operation; and
- assessment of impact on the waste management regime, taking account of any proposed mitigation (e.g. on-site recycling/composting).

Consultation

2.34 As noted in Chapter 1, consultation has taken place as part of the masterplanning process in the form of a charrette and public exhibitions. Organisations consulted during the scoping phase have been identified previously, and their response presented in Technical Annex 1. A number of other organisations have been consulted during the course of the assessment, mainly for information-gathering purposes; these are identified where necessary in the technical chapters and annexes.

Identification and Reporting of Effects

2.35 Schedule 4 of the Regulations requires an ES to describe the “*likely significant effects*” of a development, namely “*direct...and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects...*”

2.36 The definition of significance used for each topic is explained in the technical chapters and appendices, and reflects the specific methodological and regulatory requirements for each topic.

2.37 In reporting the effects, a distinction has been made between those occurring during the construction phase and those related to the permanent features or operation of the development. The additional terminology adopted in the Regulations is used where this is helpful in characterising the nature or duration of an effect.

2.38 The following synergistic effects have been addressed:

- combined effects, i.e. those resulting from a combination of impacts on specific resources or receptors (e.g. from different phases of the development); and
- cumulative effects, i.e. those resulting from interaction between the proposal and other future committed (or reasonably anticipated) developments.

Assessment Scenarios

2.39 The ES primarily reports the effects of the PPiP application (i.e. Phases 1-5 of the overall masterplan), which is assumed to be completed in 2038. However, transport modelling is unable to predict any further forward than 2032. For effects relating to operational traffic (notably air quality and noise) the assessment has therefore assumed completion of the PPiP in 2032.

2.40 The ES also reports the effects of Phase 1 (as a sub-set of the PPiP), which is assumed to commence construction in 2015 and to be completed by 2018. These effects are necessarily provisional, and will be re-visited when the application for Phase 1 is prepared.

2.41 Finally, the ES also reports the effects of the overall masterplan (i.e. Phases 6 and 7), which is assumed to be complete by 2050. Predicting baseline conditions and effects this far ahead is very difficult, and these effects will be re-visited as applications for individual phases are brought forward.

2.42 The expected completion date for the PPiP of 2038 assumes a build-out rate of 200 units per annum, based on anticipated housing demand. However, the development could be brought forward at a faster rate if demand requires, subject to the commensurate provision of infrastructure.

3. Environmental Policy Context

Introduction

3.1 This chapter identifies the environmental policies, at various levels, that are relevant to this EIA. It is not intended to assess the degree to which the proposed development complies or conflicts with those policies. Specific matters of policy relevant to each topic are discussed in the technical chapters and annexes.

3.2 Relevant policies are contained primarily in the following documents:

- Scottish Planning Framework Policy (SPP) 2010, Planning Advice Notes (PANs) and other guidance documents that remain in force;
- the Aberdeen City and Shire Structure Plan, February 2009;
- a number of regional plans and strategies relating to specific topics;
- the Aberdeen Local Development Plan; and
- the Grandhome Development Framework.

National Policy Framework

3.3 National policies and statutory provisions of relevance to each assessment topic are identified in Table 3.1.

Table 3.1: National Policy

Topic	Policy Instrument/ Statute	Summary
Air Quality	UK Air Quality Strategy (2007)	Sets out a series of Air Quality Objectives for the protection of human and environmental health.
	Air Quality (Scotland) Regs, 2000, Air Quality (Scotland) Amendment Regs, 2002, Air Quality Limit Values (Scotland) Regs, 2003, Air Quality Standards (Scotland) Regs, 2007	Implement the objectives of the Air Quality Strategy.
	Environment Act, 1995, Part IV	Provides requirement for local air quality review and management (LAQM).
	Environmental Protection Act, 1990, Section 79	Sets out provisions for statutory nuisance arising from emissions to air.
	PAN51: Planning and Environmental Protection	Provides guidance on management of air quality within development control.
Climate Change	Climate Change (Scotland) Act, 2009	Sets legally-binding targets for reducing greenhouse gas (GHG) emissions, with sector-specific targets presented in the Climate Change Delivery Plan.
	Changing Our Way: Scotland's Climate Change Programme	Sets out the framework for climate change adaptation.
	UK Energy Act (2010)	Includes GHG emission reduction targets which underpin Scotland's National Energy Policy and Energy Efficiency Action Plan.

Cultural Heritage	Scottish Heritage Environment Policy (SHEP)	Provides the strategic framework for the protection of cultural heritage assets.
	PAN 2/2011: Planning and Archaeology	Provides guidance on the protection of archaeological assets that are not statutorily designated.
	Planning (Listed Buildings and Conservation Areas)(Scotland) Act, 1997, and Ancient Monuments and Archaeological Areas Act 1979	Provide for protection of the settings of Listed Buildings, Conservation Areas and Scheduled Monuments.
Ecology	SPP, 2010	Provide the framework for the conservation of natural heritage in Scotland.
	PAN60: Planning for Natural Heritage, 2000	
	Protection of Badgers Act (POBA), 1992	Provides the regulatory framework for the protection of badgers and their setts.
	Wildlife and Countryside Act (W&CA), 1981 (as amended)	Provides the framework for the protection of other endangered or designated species, and for the notification of SSSIs.
	Nature Conservation (Scotland) Act, 2004	Revises Part I of the W&CA relating to the protection of birds, animals and plants, and strengthens the POBA.
	Habitats and Birds Directive Circular, 2000	Provides guidance on compliance with the Habitats and Wild Birds Directives.
	Conservation (Natural Habitats etc) Regulations, 1994	Regulate the protection of European protected species.
Flood Risk and Drainage	PAN61: Planning and Sustainable Urban Drainage Systems, 2001	Requires developments to incorporate sustainable drainage techniques where practicable.
	PAN69: Planning and Building Standards Advice on Flooding, 2004	Provides guidance on planning and building standards in flood-prone areas.
	PAN79: Water and Drainage	Clarifies role of planning authority in setting the direction of development to inform the provision of new water infrastructure.
	SEPA Policy 22	Flood Risk Assessment Strategy.
	SEPA Policy 41	Development at risk of Flooding: Advice and Consultation.
	Water Environment (Controlled Activities) (Scotland) Regulations, 2005	Control discharges from non-prescribed processes to the water environment.
Geo-Environment	SEPA Policy 19	Groundwater Protection Policy for Scotland.
	Section 57, Environment Act, 1995 (updating Environmental Protection Act, 1990)	Defines contaminated land and sets out responsibilities for its remediation; defines the “polluter pays” + “suitable for use” principles.
	PAN33: Development of Contaminated Land (2000)	Defines contaminated land and recommends a “suitable for use” approach.
Landscape and Views	PAN60: Planning for Natural Heritage	Provides framework for landscape protection.
	PAN44: Fitting New Housing Development into the Landscape	Provides guidance and design principles for new residential development.

Noise and Vibration	PAN1/2011: Planning and Noise, and Technical Advice Note (TAN): Assessment of Noise (2011)	Sets out approach to planning applications for noise-sensitive development (NSD) and noise-generating development (NGD).
	Environmental Protection Act, 1990, Part III	Sets out the basis for local authority powers in the event of statutory nuisance.
	Control of Pollution Act, 1974	Sets out the basis for the control of statutory nuisance on construction sites.
Socio-Economics	SPP, 2010	Provides the spatial framework for economic growth; specifically promotes the growth potential of the East Coast Corridor.
	Homes Fit For the 21 st Century	Provides principles for the planning and design of new homes.
	National Low Carbon Economic Strategy, 2010	Sets out the objectives for making the transition to a low carbon economy.
	National Transport Strategy, 2006	Sets out the framework for national transport policy.
	PAN75: Planning for Transport, 2005	Provides guidance on achieving closer integration between planning and transport.
Transport	SPP, 2010	Sets out the principles to be followed in delivering sustainable transport choice.
	PAN75: Planning for Transport	Identifies the priorities for sustainable transport planning, including accessibility guidelines.
	Designing Streets, 2010	States that street design should be based on place-making principles.
Waste	SPP, 2010: Waste Management	Sets out Scottish Gov's "zero waste" strategy, including municipal waste targets.
	Scotland's Zero Waste Plan, 2010	Sets out the strategy for delivering a "zero waste" economy.
	EU Landfill Directive (99/31/EC)	Major policy driver in diverting biodegradable waste away from landfill.

Aberdeen City and Shire Structure Plan

Strategic Aims

3.4 The main aims of the Structure Plan are to *"provide a strong framework for investment decisions which help to grow and diversify the regional economy, [whilst] promoting the need to use resources more efficiently and effectively [and meeting] the urgent challenges of sustainable development and climate change."* These aims will be achieved by:

- *[ensuring that there are] "enough people, homes and jobs to support the level of services and facilities needed to maintain and improve the quality of life";*
- *protecting and improving...valued assets and resources, including the built and natural environment and...cultural heritage;*
- *[creating] "sustainable mixed communities, and the associated infrastructure, which meet the highest standards of urban and rural design [whilst catering] for the needs of the whole population"; and*
- *[making]" the most efficient use of the transport network, reducing the need for people to travel and [ensuring] that walking, cycling and public transport are attractive choices."*

Spatial Strategy

3.5 These aims are applied through a spatial strategy which seeks to facilitate development within “strategic growth areas”. These include Aberdeen City, the primacy of which is to be maintained and enhanced, whilst disseminating growth more widely within the region.

Objectives and Targets

3.6 The Structure Plan translates its aims into six key objectives, with associated targets, which are summarised in Table 4.2 below.

Table 3.2: Structure Plan Objectives and Targets

Theme	Objective	Relevant Targets
Economic growth	<i>To provide opportunities which encourage economic development and create new employment in a range of areas that are both appropriate for and attractive to the needs of different industries, while...improving the essential strategic infrastructure necessary [for] the economy to grow over the long term.</i>	To ensure that at least 60 hectares of employment land are available at any time within the growth areas, at least half of which is suitable for “high-quality businesses [and] company headquarters.”
Sustainable development and climate change	<i>To [take] the lead in reducing the amount of carbon dioxide released into the air, [adapt] to the effects of climate change and [limit] the [use of] non-renewable resources.</i>	<ul style="list-style-type: none"> • All new buildings to be carbon-neutral by 2016. • Electricity needs to be met from renewable sources by 2020. • No increase in water abstraction from River Dee. • All new developments to use water-saving technology. • Avoid development on areas of unacceptable flood risk. • Reduce amount of biodegradable waste being sent to landfill to 54,000 tonnes per annum by 2020.
Population growth	<i>To [achieve an] increase [in] population [together with] a balanced age range [so as] to maintain and improve people’s quality of life.</i>	<ul style="list-style-type: none"> • To increase the population of the region to 230,000, and the proportion of working-age people to 15%, by 2030. • To provide at least 2,500 new homes per annum by 2014, and 3,000 per annum by 2020.
Quality of the environment	<i>To [ensure that] new development maintains and improves the region’s important built, natural and cultural assets.</i>	To ensure that new development improves, and does not deplete or damage, built, natural and cultural heritage assets, and that it does not prevent water bodies from achieving “good ecological status” under the Water Framework Directive.
Sustainable mixed communities	<i>To [ensure that] new development meets the needs of the whole community, both now and in the future, and makes the area a more attractive place for residents and businesses to move to.</i>	<ul style="list-style-type: none"> • Major new housing development in strategic growth areas to comply with approved supplementary guidance and to provide no less than 30 dwellings per hectare. • Quality and design of new development to be nationally

		<p>recognised.</p> <ul style="list-style-type: none"> • New development to provide an appropriate mix of dwelling types/sizes, including affordable housing.
Accessibility	<i>To [ensure that] new developments [help to reduce] the need to travel and encourage people to walk, cycle or use public transport by making these attractive choices.</i>	<ul style="list-style-type: none"> • Developments to meet accessibility standards set out in local transport strategies by 2013. • Major employment and service developments in strategic growth areas to be easily accessible by non-car modes and to reduce the need for car use.

Emerging Strategic Development Plan

- 3.7 The Aberdeen City and Shire Strategic Development Plan Authority have submitted the Aberdeen City and Shire Strategic Development Plan (SDP) to Scottish Ministers. Once adopted, the SDP will replace the existing Structure Plan and will set the housing targets for the period to 2035 as part of the long-term framework for growth and development. The emerging SDP places the same importance on Aberdeen City in delivering housing and identifies Grandhome as a proposed new community.

Regional Plans and Strategies

- 3.8 The following specific plans and strategies are of relevance:

- Aberdeen City Council: Draft Air Quality Action Plan, 2010.
- Integrated Sustainable Waste Management Strategy for Aberdeenshire, 2001.
- Energetica: strategy for building on Aberdeen's primacy in the oil and gas industry to become a centre of excellence in emerging energy technology.
- Building on Energy: The Economic Manifesto for Aberdeen City and Shire, 2007.
- Aberdeen City Local Transport Strategy, 2008.

Aberdeen Local Development Plan

- 3.9 Relevant policies from the Aberdeen LDP are summarised in Table 3.3 below.

Table 3.3: Local Development Plan Policies

Policy	Summary	Relevant Assessment Topic
T2. Managing the Transport Impact of Development	Sets out the priorities for minimising the potential impacts of development on transport networks.	Transport
D1. Architecture and Placemaking	Requirement to ensure that new development achieves a high standard of design, respecting its context and setting, protecting important views etc.	Landscape + Views
D3. Sustainable and Active Travel	Requirement for new development to promote sustainable travel choices and healthy lifestyles,	Transport

	achieving high levels of permeability, promoting walking, cycling and public transport etc.	
D5. Built Heritage	Requirement to protect archaeology, listed buildings etc in accordance with Scottish Planning Policy	Cultural Heritage
D6. Landscape	Requirement for new development to avoid adversely affecting landscape character and sense of place, obstructing important views, damaging recreation, wildlife or woodland resources or displacing important green space.	Landscape + Views
BI1. Business and Industrial Land	New business and industrial uses will be supported in principle subject to locational requirements, environmental controls etc.	Socio-Economics
CF2. New Community Facilities	New community facilities within new developments will be supported in principle subject to access and locational requirements.	Socio-Economics
H1-5. Housing	Set out the requirements for new residential areas, including density, mix and affordable provision.	Socio-Economics
RT5. Retail Development Serving New Development Areas	Such development shall be of an appropriate scale, in sustainably accessible locations etc.	Socio-Economics
NE1. Green Space Network	Set out the principles and standards to be met for the provision of green infrastructure in new developments.	Landscape + Views
NE4. Open Space Provision in new Developments		
NE5. Trees and Woodland	Requirement to protect established trees and woodland which contribute to landscape quality, amenity or nature conservation.	Landscape + Views
NE6. Flooding and Drainage	Presumption against development that increases flooding risk due to, for example, increased surfacewater runoff.	Flood Risk + Drainage
NE8. Natural Heritage	Requirement to conserve protected species and habitats in accordance with Scottish Planning Policy, and to ensure that appropriate mitigation measures are adopted.	Ecology
NE9. Access and Informal Recreation	Requirement to protect and enhance public access, core paths, permeability etc.	Transport
NE10. Air Quality	Requirement to assess and mitigate any adverse air quality impacts of new development.	Air Quality
R2. Degraded and Contaminated Land	Requirement to restore, reclaim or remediate such land.	Geo-Environment
R6. Waste Management Requirements for New Development	Sets out the principles to be adopted in relation to segregated waste storage, recycling etc.	Waste
R7. Low and Zero Carbon Buildings	Sets out the requirements for carbon reduction below 2007 building standards to be met by new development.	Climate Change

4. The Site and its Environmental Context

Location

4.1 The application site is shown on **Fig 4.1**. It is located on the north-western fringe of Aberdeen, within a wedge of countryside lying between the built-up areas of Dyce to the west and Bridge of Don to the east. The surrounding land uses are as follows:

- To the north: An area of farmland, woodlands and mosses typical of coastal Aberdeenshire, with scattered farmsteads and a pattern of minor and secondary roads.
- To the south: An area of woodland, farmland, former quarries and semi-industrial uses on sloping ground running down to the River Don. On the opposite side of the river, the former Davidson's paper mill is a prominent feature, although it has planning permission for redevelopment. The A90 (T) Parkway forms part of the southern boundary of the site, beyond which lies the built-up area of Danestone.
- To the east: The built-up area of Middleton Park, separated from the site partly by a mature tree belt and partly by Whitestripes Avenue.
- To the west: Farmland, including Grandhome House and its associated estate landscape, on sloping ground running down to the River Don, where Stoneywood Mill is prominent. The residential and employment areas of Stoneywood and Dyce lie to the west of the river, with Aberdeen Airport beyond.

Site Character

4.2 The overall masterplan site is approximately 319 hectares in area, of which the PPIP represents 227 hectares and Phase 1 comprises 28 hectares. The site comprises mixed farmland and woodlands, together with a number of farmsteads and dwellings. The main land uses comprise agricultural land and woodlands.

4.3 The site includes the following individual properties:

- Whitestripes Farm, Farmhouse, Farm Cottage, Cottage East and Cottage West;
- Upper and Lower Bonnyside;
- The Willows;
- Old School and Old Schoolhouse;
- Laverockbraes;
- Cothill and Cothill Cottages;
- North and South Lodge;
- Clerkhill;
- Inverawe; and
- Danestone Cottage West.

4.4 Whitestripes Road, a secondary road which connects northwards to the B997 Scotstown Road, passes through the middle of the site. A high-voltage power line runs broadly north/south across the eastern part of the site.

Topography, Drainage and Soils

- 4.5 Most of the site occupies the northern slopes of the Don valley, rising from an elevation of around 30m AOD at its south-western boundary, to a ridge which runs east/west across the centre of the site at elevations of up to 90m AOD. Levels decrease to beyond Whitestripes Road, reaching around 65m AOD along the northern boundary.
- 4.6 The greater part of the site, lying to the south of this ridge, drains towards the River Don, whilst the northern part drains towards Grandhome Moss. There are a number of minor watercourses and drainage ditches across the site, together with a water body known as the Manganese Pond. The River Don is prone to flooding, with a well-defined functional floodplain which lies just beyond the western and south-western boundaries of the site. The SEPA Flood Map indicates that most of the site lies within Flood Zone 1.
- 4.7 Two areas of ground disturbance and potential contamination risk have been identified within the site. These comprise a landfill occupying a former quarry (known as Hall's quarry) near Persley, and an area of made ground close to Whitestripes Road. Site investigation (SI) work has been undertaken to verify any contamination risk associated with these areas and to confirm what, if any constraint they may pose to development.
- 4.8 The site has been classed by the Soil Survey of Scotland Land Capability for Agriculture (LCA) map (1:50,000) as predominantly Class 3 Division 2, i.e. land capable of supporting mixed agriculture, with soil and wetness limitations. In addition, the most steeply-sloping parts of the site are defined as Class 4.2, i.e. land capable of producing a narrow range of crops.
- 4.9 The scale of the LCA map (1:50,000) cannot identify small areas which may not be entirely typical to the classification. While it is possible that some better quality land may be included within the site, these areas may be too isolated for practical farming to a consistently high standard. Furthermore, land immediately to the north of the site is assessed as Class 5.3, and there is no land better than Class 3 within a 10km radius. It is considered very unlikely that land of prime quality is present on the site.

Landscape and Views

- 4.10 The site is typical of the undulating and relatively open agricultural landscape which surrounds Aberdeen to the north. The Aberdeen Landscape Character Assessment (1996) identifies five landscape character types (LCTs). The northern third of the site lies within the Wooded Farmland LCT (Braes of Don LCA), whilst the remainder lies within the Valley LCT (Lower Don valley LCA).
- 4.11 Key landscape attributes of the site include its varied terrain; its pattern of medium-sized rectilinear fields, defined by stone walls; blocks of deciduous and coniferous woodland; mature tree belts (along the north-eastern boundary); and occasional farm buildings and dwellings.
- 4.12 No part of the site is designated for its landscape value, although the main areas of tree cover (Monument Wood, Clerkhill Wood and the eastern tree belt), together with some intervening areas, fall within the Green Space Network shown in the LDP. The northern, western and southern boundaries of the site adjoin part of the Aberdeen Green Belt.
- 4.13 The more elevated and open parts of the site enjoy wide-ranging views, particularly to the south and west across the Don valley. The two riverside paper mills, together with the built-up areas to the east and south, are prominent in some of these views. Inward views are variously influenced by topography and vegetation, notably the woodlands and tree

belt. The character of the eastern part of the site is affected by the high-voltage power line.

Cultural Heritage

- 4.14 A desk-based assessment has identified a number of recorded and potential cultural heritage assets within the site and the surrounding area. Those within the site are located mainly across its northern, western and south-western parts. Only one designated asset lies within the site: Grandhome South Lodge, which is Grade B listed.
- 4.15 Two features within the site, Whitestripes Burial Ground and the crop-mark of a possible henge, both of which are located in the vicinity of Whitestripes Farm, are considered to be of regional importance. Two further features, both possible enclosures, are of unknown importance. The remaining features are considered to be of no more than local importance.
- 4.16 There are nine scheduled monuments within 2km of the site. Most of these are within urban settings and most are associated with the remains of the Aberdeenshire Canal. Prehistoric scheduled sites comprise two standing stones, one of which is located within a modern urban setting; and Foucausie stone circle, which is located in Clerkhill Wood, just beyond the northern boundary. Bishop's Manor, a manor house and chapel, is probably of late medieval date and survives as turf-covered remains on a peninsula within Bishop's Loch, about 2km to the north.
- 4.17 There are numerous listed buildings in the surrounding area, mainly to the south and south-east, within urban settings. Other listed buildings, to the west of the site, and including Grandhome House, are located within wooded settings and policy lands.

Ecology

- 4.18 There is one area of designated ecological interest within the site: Monument Wood, which is a District Wildlife Site. Persley Quarries, which adjoin the site to the south; and Clerkhill Wood and Grandhome Moss, which adjoin the site to the north, are also District Wildlife Sites, together with the nearest section of the River Don. The nearest statutorily designated site is the Scotstown Moss SSSI and Local Nature Reserve, which lies to the east, beyond the built-up area of Middleton Park.
- 4.19 As intensively farmed land, most of the site is generally of no more than local habitat value. The most interesting areas, in addition to Monument Wood, are the field margins; the treebelts along the eastern boundary and to the south of Whitestripes Road; and wetter areas, notably in the vicinity of the Manganese Pond, on the south-eastern part of the site. The site is known to support badgers; two setts have been located within the boundary. Other protected species, such as bats, breeding birds and red squirrel, also use parts of the site.

Air Quality

- 4.20 The site is not located within an Air Quality Management Area. The following AQMAs have been declared within Aberdeen, all for nitrogen dioxide (NO₂) and fine particulates (PM₁₀):
- parts of the City Centre, including Union Street, Market Street, Virginia Street, Commerce Street and sections of Holburn Street, Guild Street and King Street;

- Anderson Drive and the area around the Haudagain Roundabout; and
- Wellington Road, from the Queen Elizabeth II Bridge to Balnagask Road.

4.21 No specific sources of emissions to air have been identified within the site, and air quality is typical of an urban fringe/rural location. Sources of emissions in the surrounding area are likely to include employment uses to the south and west (including a CHP plant at Stoneywood Mill), the airport and traffic on the A90.

Noise and Vibration

4.22 Noise levels are generally typical of an urban fringe/rural location. The most noticeable noise source in the area is aircraft using Aberdeen Airport, including helicopters overflying the site. Traffic noise from the A90 is influential on the south-eastern part of the site, whilst industrial noise from premises located beyond the river to the south-west is also audible on parts of the site.

Access

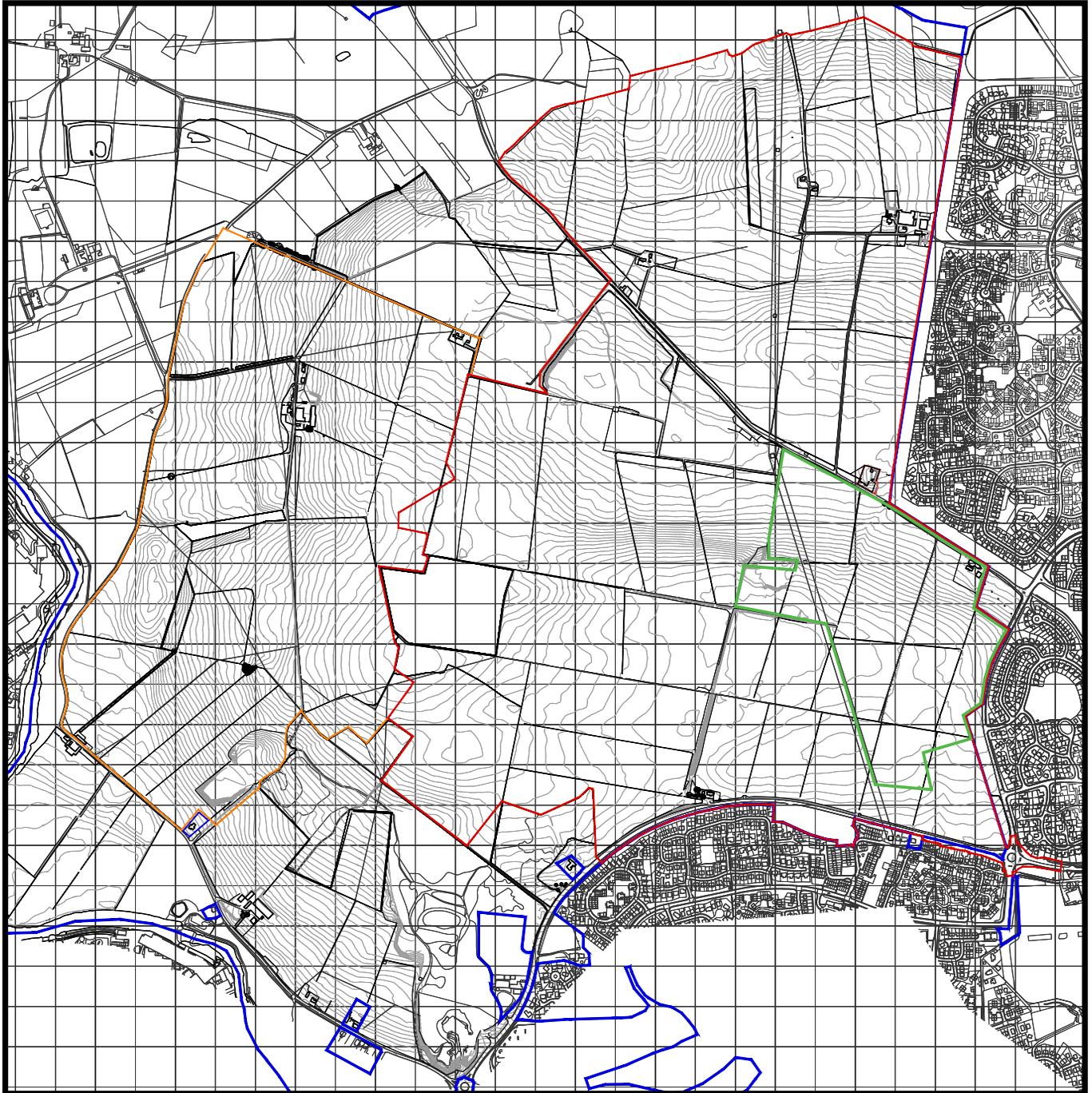
4.23 Access to the site is currently gained from Whitestripes Road, which runs across the centre of the site; from Grandhome Road which forms the western and south-western boundary; and from Whitestripes Avenue, which forms the south-eastern boundary. The A90/Parkway, which forms part of the southern boundary, is a trunk road with restricted access.

4.24 The A90 forms the main arterial route northwards to Peterhead and Fraserburgh, and southwards (via the ring road around the City Centre) to Dundee and the Central Belt. From the Haudagain Roundabout, the A96 forms the main arterial route north-westwards to Elgin and Inverness. The B997/Scotstown Road provides a secondary radial route to the north-east of the site, connecting with the A90 at Bridge of Don.

4.25 Planned improvements to the strategic road network include a Third Don Crossing, which would run southwards from the Parkway/Whitestripes Avenue junction; and the Aberdeen Western Peripheral Route (AWPR), which would skirt the built-up area to the north and west, providing an outer by-pass for A90 traffic. The AWPR would include a junction with the A947 north of Dyce, to which an upgraded B977 would provide a link from the Grandhome/Bridge of Don area.

4.26 The A90, A96 and A947 are relatively well-served by bus services, which also access the nearby suburban centres. The nearest railway station is at Dyce, on the Aberdeen to Inverness line. Aberdeen Airport is a major hub, serving both UK-wide and international destinations.

4.27 The core path network reaches into surrounding built-up areas, such as Middleton Park, Danestone and Dyce, and along a section of the River Don to the west of the site, and there is an aspiration to extend it further along the river. The planning permission for redevelopment of the Davidson's Mill site includes provision for contributions towards the cost of a new pedestrian/cycle bridge across the river.



- Planning in Principle Application (Phase 1 - 5)
- Grandhome Trust Boundary
- Post 2023 Maserplan (Phase 6 - 7)
- Phase 1

FIGURE 4.1

Application Site



5. The Proposed Development

Vision

- 5.1 The proposal is to create a new mixed-use community for Aberdeen promoting a high degree of socio-economic and environmental sustainability, whilst meeting the strategic objectives of the Development Plan and protecting the amenity of surrounding communities.
- 5.2 The indicative masterplan is shown in **Fig 5.1**. It comprises seven phases of development, of which Phases 1-5 are the subject of the PPIp. The masterplan responds to the policy objectives of the Aberdeen LDP, particularly in relation to the development of new communities, and to the principles set out in the adopted Development Framework. The Development Framework identifies the key components of the new community and sets out the parameters to be met by future development, including matters relating to design and style. The Framework is based on the following core principles:
- a strong sense of place;
 - sustainable and walkable neighbourhoods;
 - a well-balanced mixed community;
 - green spaces to breathe;
 - well-connected streets; and
 - a new centre for the Bridge of Don.

Key Parameters

- 5.3 The key parameters for the PPIp application (Phases 1-5 of the masterplan) may be summarised as follows:
- Up to 4,700 homes, of which 25% would be affordable, arranged in five neighbourhoods, with supporting shops and services;
 - a high street/town centre intended to provide district-level services to the Bridge of Don area;
 - 5 hectares of employment land, including a technology park;
 - two primary schools, sports pitches and community uses;
 - a community campus, including an academy, library and sports centre-use;
 - a health centre;
 - a network of green infrastructure incorporating a hierarchy of open space provision, including sports, neighbourhood parks and habitat creation;
 - highways and other access infrastructure; and
 - drainage and utilities infrastructure, including sustainable urban drainage features.
- 5.4 The spatial parameters for the PPIp on which the EIA has been based, are shown on the following figures:
- **Fig 5.2:** Regulating Plan;
 - **Fig 5.3:** Neighbourhoods and Block Structure;
 - **Fig 5.4:** Building heights;
 - **Fig 5.5:** Community Buildings;
 - **Fig 5.6:** Phasing Plan;

- **Fig 5.7:** Street Hierarchy;
- **Fig 5.8:** Cycling and Footpath Network;
- **Fig 5.9:** Bus Access;
- **Fig 5.10:** Sustainable Drainage Strategy;
- **Fig 5.11:** Foul Drainage Strategy; and
- **Fig 5.12:** Landscape Framework.

Phase 1

5.5 The first phase of the PPIp scheme will comprise:

- around 500 homes, of which 25% would be affordable;
- a neighbourhood centre;
- associated open space, play areas and landscaping; and
- supporting infrastructure.

Post-PPiP Masterplan

5.6 Phases 6 and 7 of the masterplan would comprise around 2,300 homes, with supporting community facilities, services and infrastructure, as an extension of the PPIp scheme. The assumed mix and phasing of housing for the overall masterplan is set out in Table 5.1.

Table 5.1: Assumed Housing Mix and Phasing

		Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Sub Total	Phase 6	Phase 7	Total
One Bed	Flats	35	189	35	77	56	392	88	74	553
	Terrace	15	81	15	33	24	168	38	32	237
Two Bed	Flats	30	135	30	66	48	309	75	63	447
	Terrace	30	135	30	66	48	309	75	63	447
	Semi	40	180	40	88	64	412	100	84	596
Three Bed	Terrace	80	216	80	176	128	680	200	168	1048
	Semi	80	216	80	176	128	680	200	168	1048
	Detached	40	108	40	88	64	340	100	84	524
Four Bed	Terrace	25	90	25	55	40	235	63	53	350
	Semi	50	180	50	110	80	470	125	105	700
	Detached	50	180	50	110	80	470	125	105	700
Five Bed	Semi	5	18	5	11	8	47	13	11	70
	Detached	20	72	20	44	32	188	50	42	280
Total		500	1800	500	1100	800	4700	1250	1050	7000
Cumulative			2300	2800	3900	4700		5950	7000	

Layout, Access and Infrastructure

5.7 The PPIp scheme comprises a mosaic of five neighbourhoods and public spaces, linked by a coherent pattern of streets and pedestrian routes. Each neighbourhood would offer a mix of uses, with shops, parks, schools and other community facilities located within walking distance of the residential streets. The “town centre” would be located on the south-eastern part of the site, in order to meet the needs of new residents and to provide higher-order facilities for the wider Bridge of Don community.

- 5.8 The modular pattern of the masterplan provides a high degree of pedestrian access within each neighbourhood. This would be reinforced by a hierarchy of streets intended to optimise connections between neighbourhoods, the town centre and the surrounding area. The principal streets would be designed to accommodate bus services, which would provide access both within the overall development and externally to the city centre, the airport, Dyce station and the A90 corridor.
- 5.9 Pedestrian and cycle links would ensure a high degree of permeability, providing connections to the existing and aspirational core path network in the surrounding area. Vehicular access to serve the PPIp scheme would be provided via new junctions on Whitestripes Road, Whitestripes Avenue and the A90/Parkway. Vehicular access to Phase 1 would be provided off Whitestripes Avenue.
- 5.10 The masterplan allows for the incorporation of a sustainable drainage system based on the “management train” approach. This uses a hierarchy of measures to attenuate peak flows and protect water quality, whilst ensuring that runoff rates are no greater than those from a greenfield site. Existing watercourses and features such as the Manganese Pond would be retained and enhanced. A new trunk sewer would be constructed to connect the development to the Persley wastewater treatment works.
- 5.11 A Landscape Framework has been prepared, which seeks to retain key elements such as woodlands, tree belts and stone walls, whilst facilitating habitat creation, serving the recreational needs of the new community and mitigating any adverse impacts on existing residents and views.

Construction

- 5.12 Since the application is for planning permission in principle, a detailed construction strategy has yet to be developed; this will occur as the full application for each phase is brought forward and will depend in large part on the approach preferred by the relevant developers and contractors at the time.
- 5.13 For assessment purposes, a range of assumptions have been adopted where necessary, based on the sequence of activities and specific methods likely to be appropriate in this case, reflecting known site conditions and the type of development proposed. For example, it has been assumed that piling will generally not be required and that conventional foundations will suffice.
- 5.14 In addition, the assessment has assumed that best practice will be adopted to mitigate and manage environmental effects during construction, commensurate with relevant legislation and guidance, and in accordance with whatever controls the City Council and statutory consultees may reasonably require. Assumptions are set out in the technical chapters and annexes, and will form the basis for Construction Environmental Management Plans (CEMPs) or equivalent for each phase as it is brought forward.

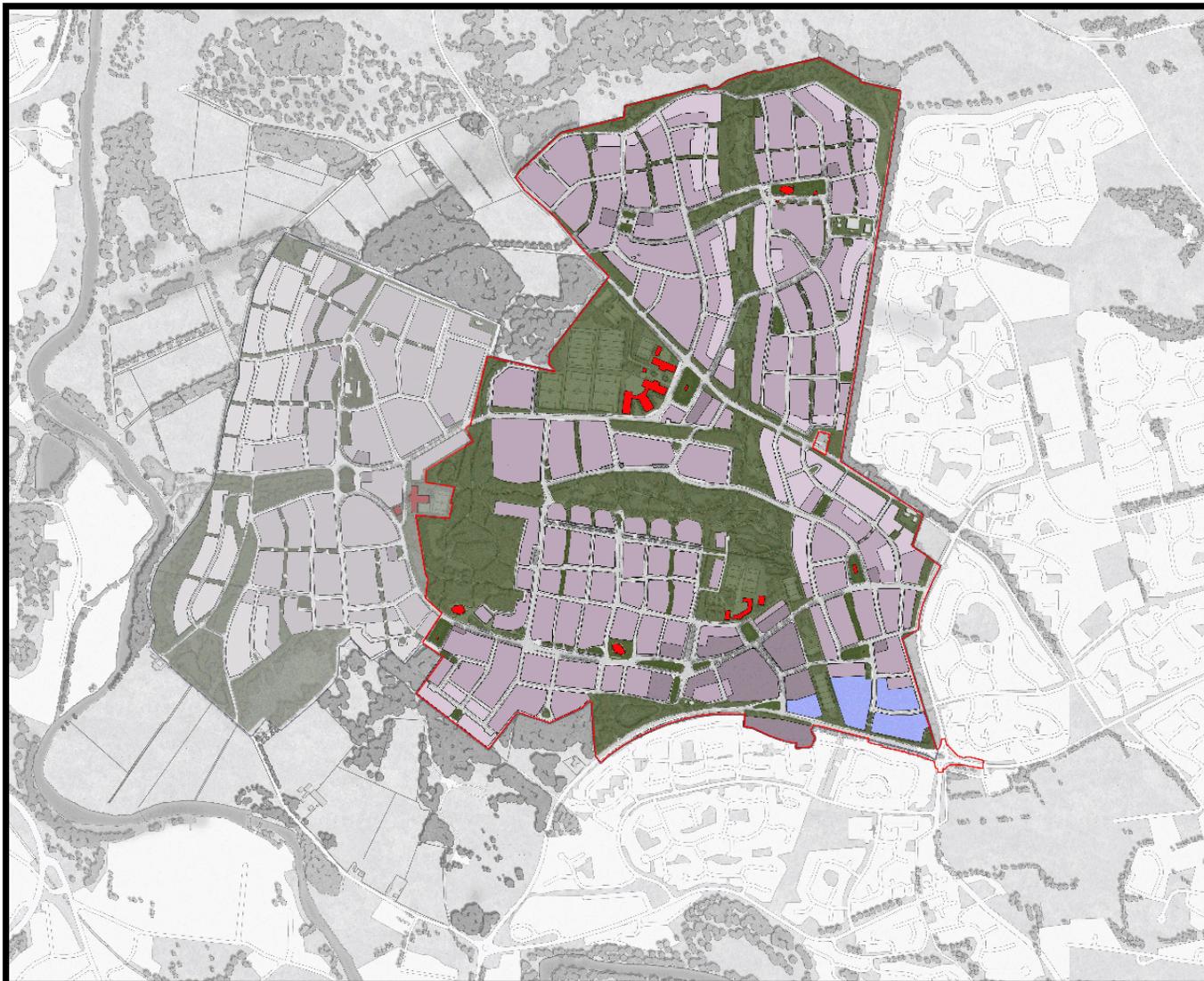


- Mixed-Use Buildings
- Office Buildings
- Single-Use Commercial Bldgs.
- Indicative Footprints
- Plots
- Schools
- Civic Buildings
- Existing Buildings
- Open Space
- SUDS
- Site Boundary

FIGURE 5.1

Indicative Masterplan





- T3- Sub-Urban
- T4- General Urban
- T5- Urban Centre
- SD- Special District
- CS- Civic Space
- CB- Civic Buildings

FIGURE 5.2

Regulating Plan



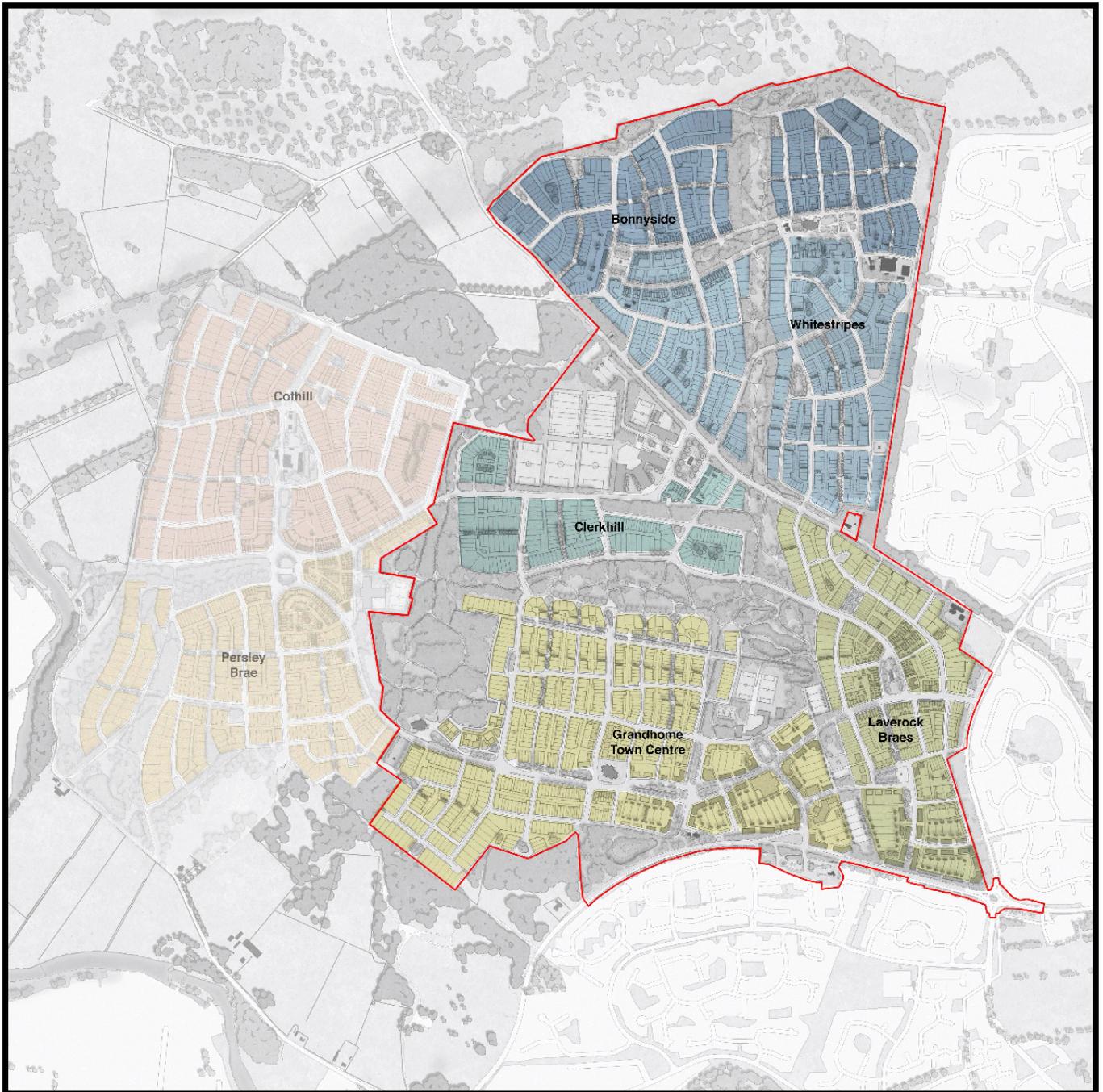
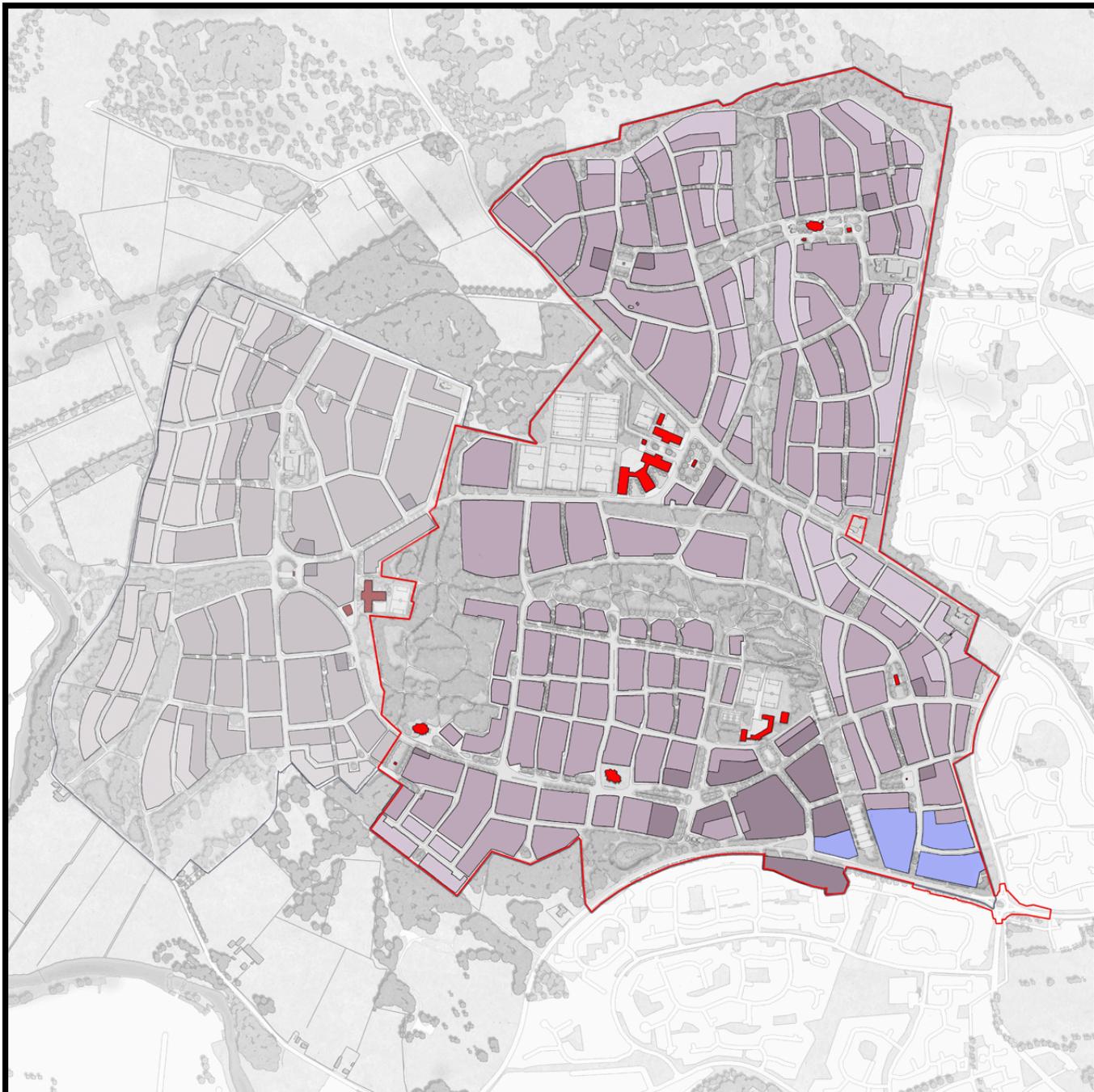


FIGURE 5.3

Neighbourhoods and Block Structure





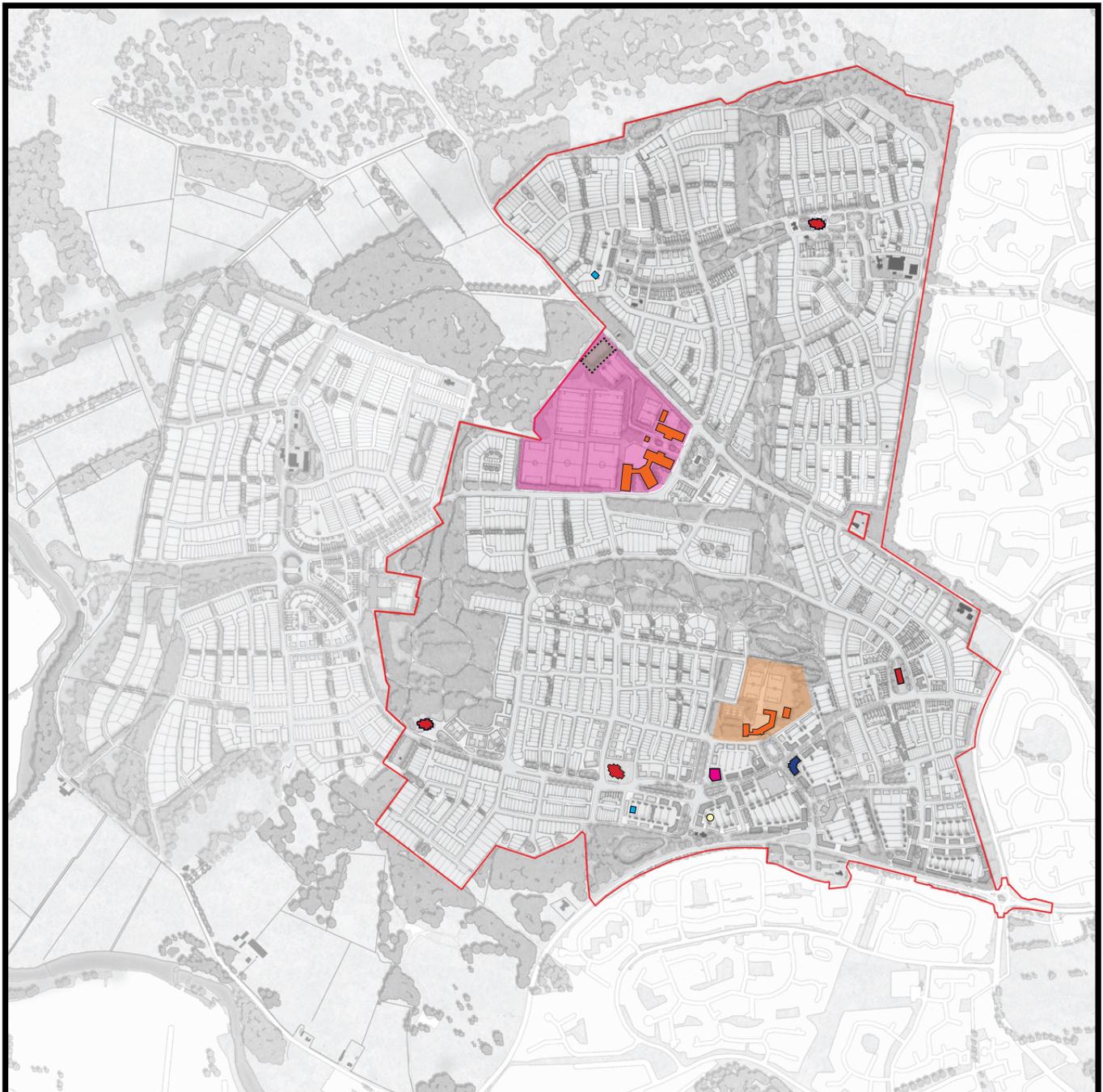
- T3- 1 to 2 storeys
- T4- 1 to 3 storeys
- T5- 2 to 3 storeys
- SD- 2 to 3 storeys

FIGURE 5.4

Building Heights



Job No 2278 - Not to scale - October 2013
 Reproduced from the ordnance survey map with the permission of the
 Controller of Her Majesty's Stationery Office. Crown Copyright reserved.



- | | |
|--|---|
|  Existing Buildings |  Small Cinema/ Theatre |
|  Community Primary School & Sports |  LDP required Gypsy and Traveller site |
|  Academy, Library, Community Campus, & Sports |  Health Centre |
|  Civic Building: |  Neighbourhood Recycling |
| 1. Religious Building |  CHP Facility |
| 2. Cover Market | |
| 3. Sites for Community Use | |
| 4. Civic Structure / Monument | |

FIGURE 5.5

Community Buildings



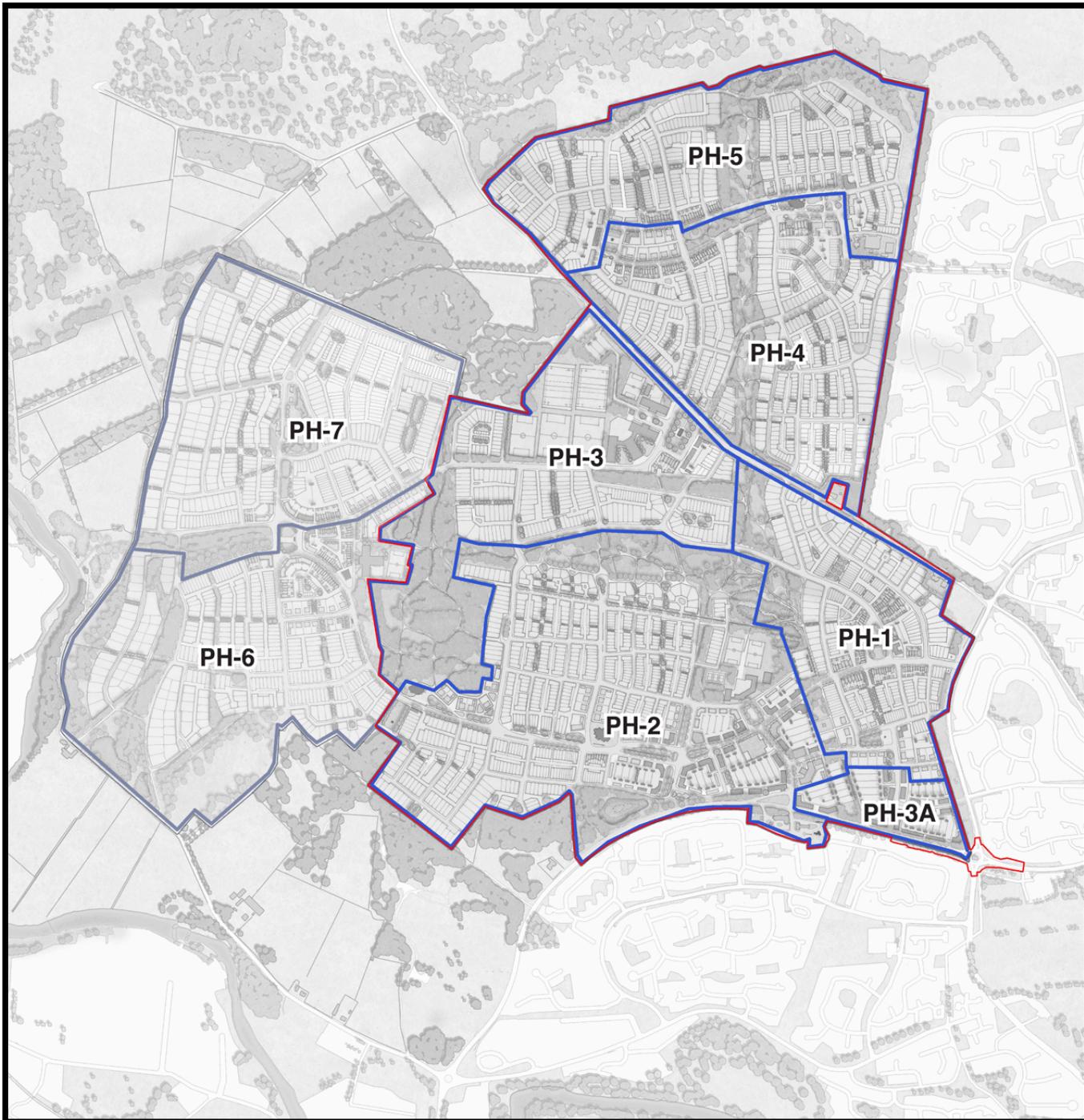
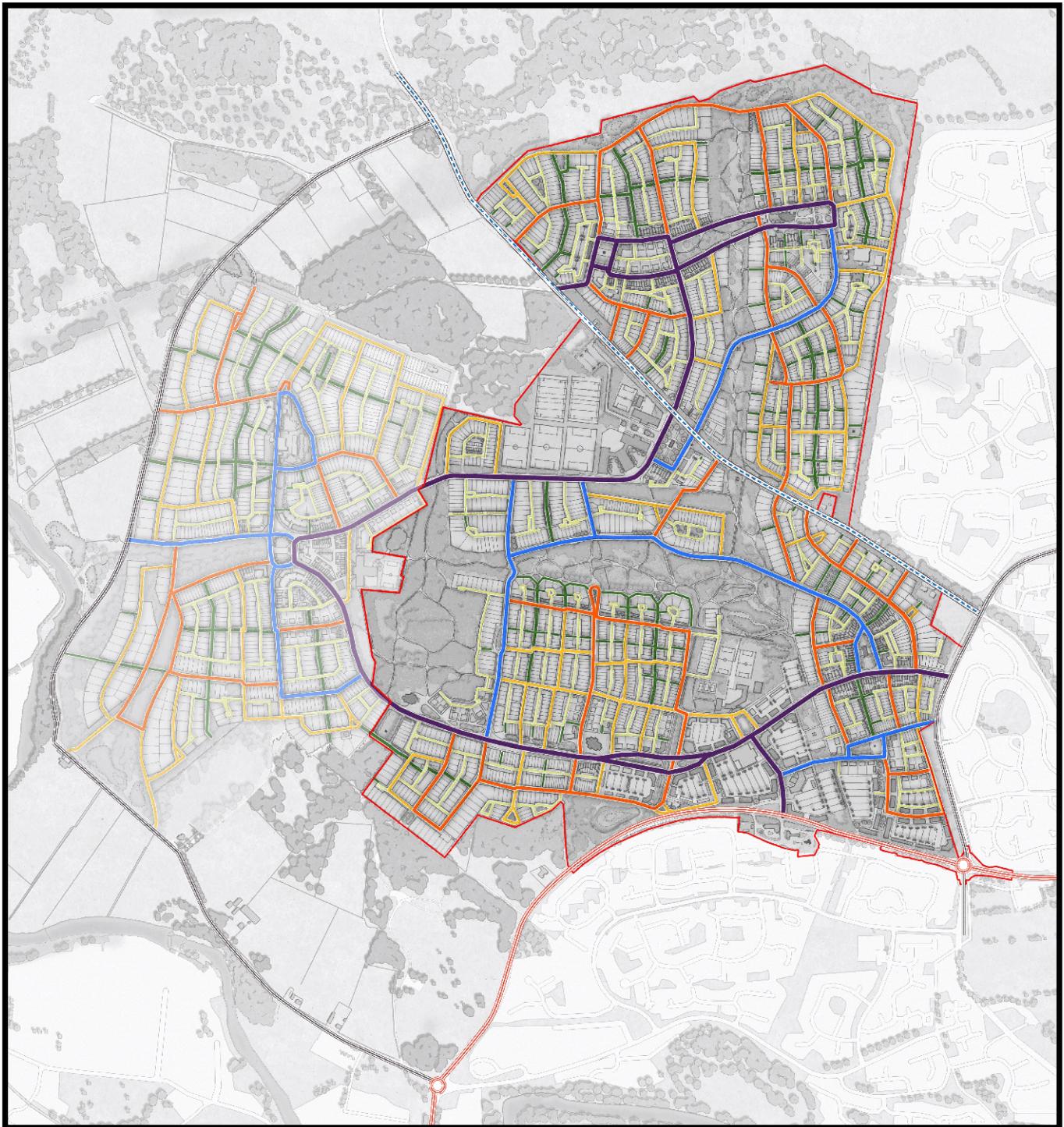


FIGURE 5.6

Phasing Plan



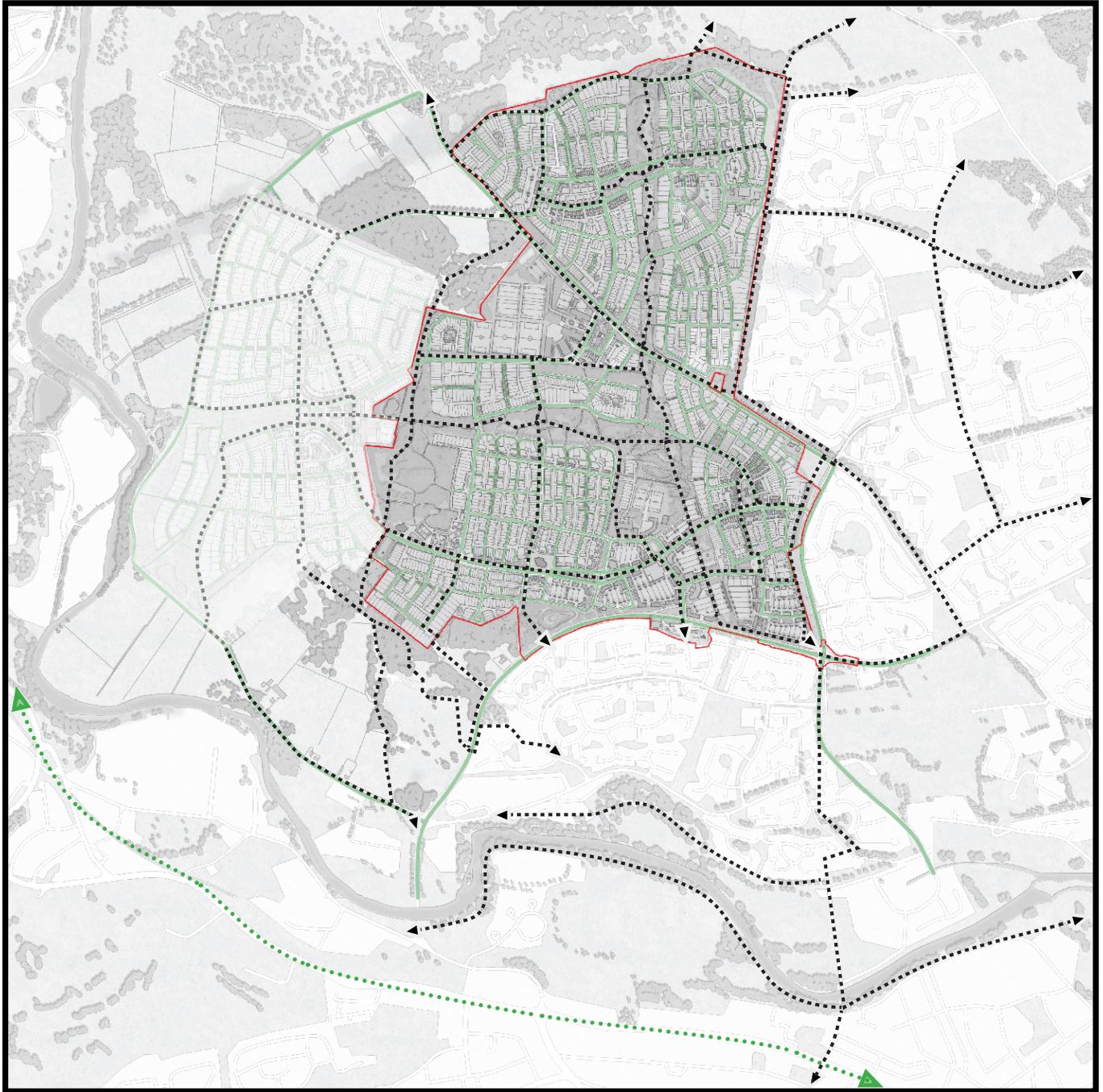


- | | |
|---|---|
|  Existing Bordering Thoroughfares |  Street |
|  Whitestripes Road
(Preferred AWPR Connection Strategy) |  Minor Street |
|  High Street
(Capable of being bus route) |  Lane / Court |
|  Main Street
(Capable of being bus route) |  Pedestrian Path |
| |  A90 |

FIGURE 5.7

Street Hierarchy



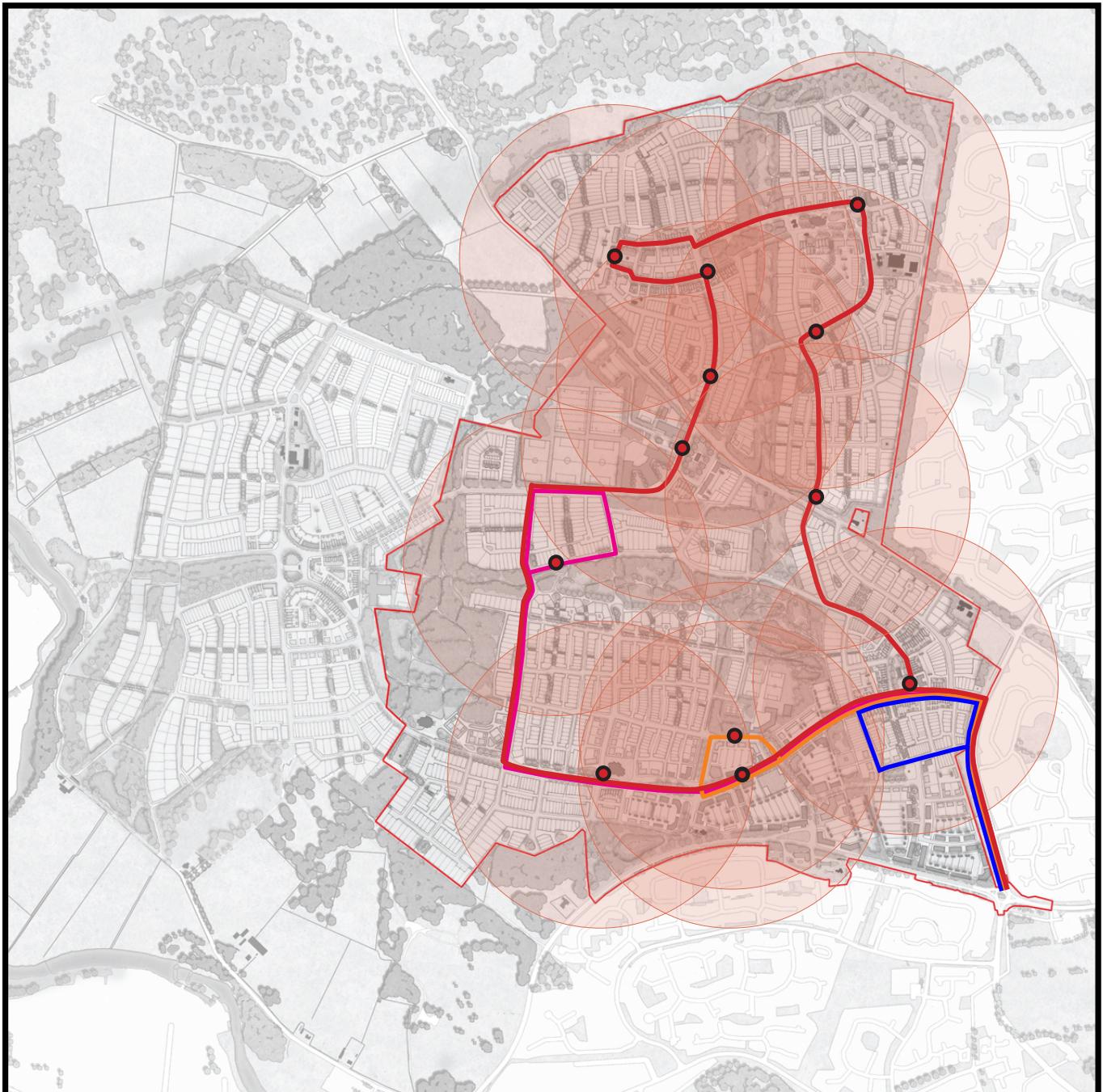


- ■ ■ Cycling and Footpath Routes
- ● ● NCN 1
- ■ ■ Site Boundary
- — — Other Pedestrian Connections

FIGURE 5.8

Cycling and Footpath Network



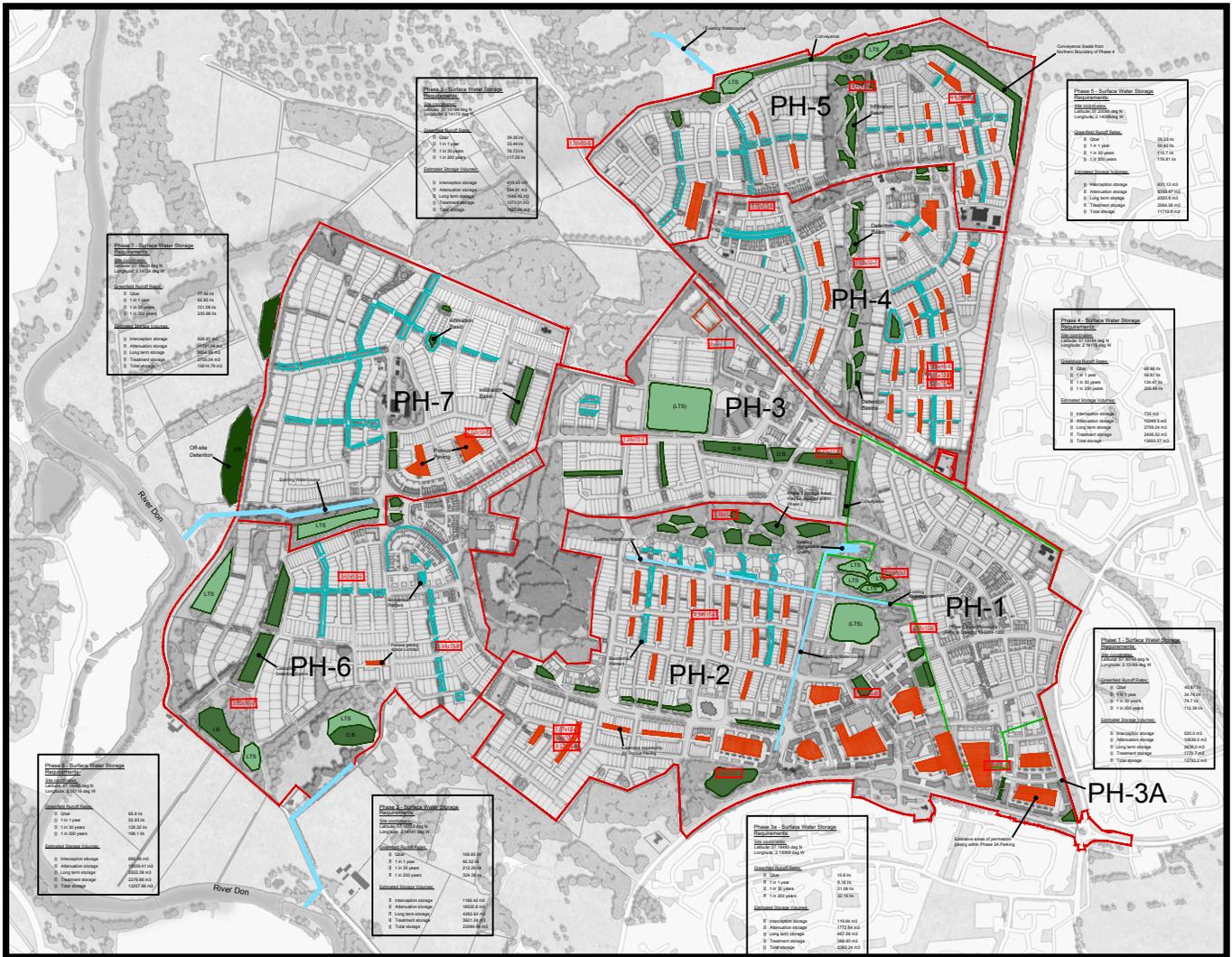


- Phase 1
- Phase 2
- Phase 3
- Phase 4-5
- Bus Stop
- Pedestrian Shed (400m)

FIGURE 5.9

Bus Access



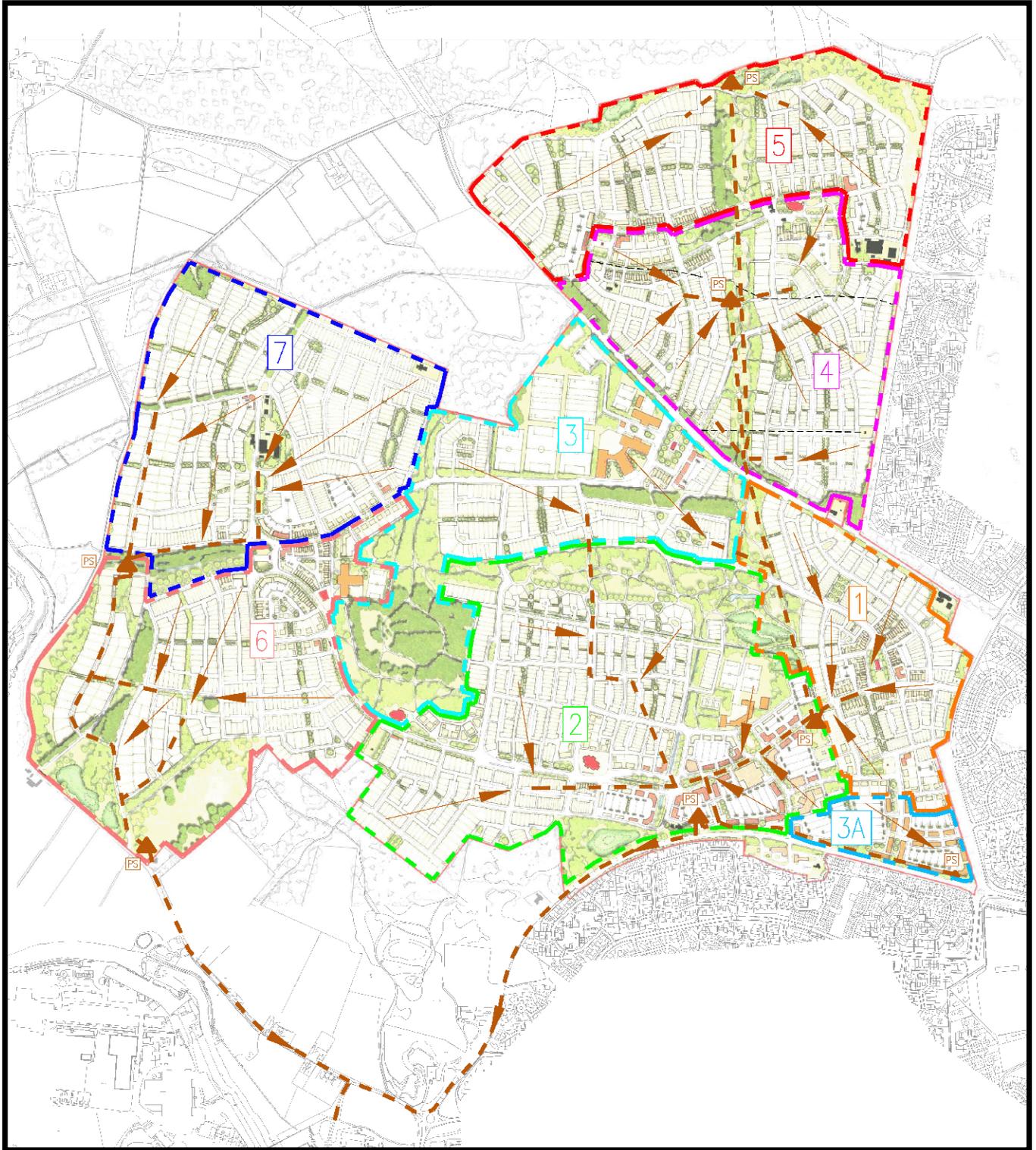


-  Existing Water Features
-  DB/IB Detention or Infiltration Basin dependant on location
-  LTS Long Term Storage
-  Indicates potential area of porous pavement Subject acceptance by A.C.C. (interception Storage / Detention Storage)
-  Indicates potential area of bioretention (Interception Storage)
-  1.92x10.6 Soil Infiltration Rate - As Tested

FIGURE 5.10

Sustainable Drainage Strategy





- Foul Sewer or Foul Sewer Pumping Main
- Direction of Foul Sewer Flow
- PS

 Pump Station

FIGURE 5.11

Foul Drainage Strategy





-  Phase 1
-  PPIP Boundary

FIGURE 5.12

Landscape Framework Plan



6. Air Quality

Introduction

- 6.1 This chapter assesses the potential air quality impacts associated with the development, primarily those relating to construction dust and traffic emissions. Impacts have been considered in relation to human health, annoyance and sensitive habitats. The key pollutants considered in this assessment are oxides of nitrogen (NO_x as NO₂) and fine particles (as PM₁₀ and PM_{2.5}), which are the primary pollutants arising respectively from the combustion of vehicle fuels and from construction activities. This chapter should be read in conjunction with the full assessment presented in **Technical Annex 2**.

Scope and Methodology

Construction Dust

- 6.2 Any form of demolition or construction activity has the potential to generate dust emissions and thereby cause annoyance to people in the vicinity of the site. The impact of dust generated during the demolition and construction phase of the development has been assessed using the methodology described by the Institute of Air Quality Management (IAQM) Construction Dust Guidance.
- 6.3 The most common impacts relating to construction activity are dust soiling and increased ambient PM₁₀ concentrations. Dust soiling is caused by the deposition of particles of all sizes, but mostly particles greater than 10 µm in diameter. For both dust soiling and PM₁₀ concentrations, the size of any impact is strongly related to the proximity to the source of the dust, but also the effectiveness of the dust control measures in force on the site.
- 6.4 Dust emissions can arise from demolition, earthworks, the construction of new facilities, and the 'track-out' of dust on vehicles. In this case, very little demolition will be required, and this has therefore not been assessed as a major source of dust.
- 6.5 The IAQM Guidance recommends that an assessment be carried out where there are sensitive receptors within 350m of the construction site boundary; or within 500m of the site entrance; or within 100m of a road used by construction traffic.
- 6.6 Sensitive receptors for the PPiP comprise residential properties to the immediate east within Middleton Park and to the immediate south at Danestone. In addition, as phases are constructed, residents of the earlier phases will become sensitive receptors for construction of subsequent phases. For the additional area of the overall masterplan (Phases 5 to 7) the closest sensitive receptors are the PPiP (Phases 1 to 5). Therefore, the risk of dust annoyance from construction activities at the site is potentially significant and further assessment of dust impacts is recommended.
- 6.7 For the PPiP, initial access to the site for construction purposes will be from Whitestripes Avenue, which runs along the eastern boundary of Phase 1. Later phases will be accessed from the north via Whitestripes Road. After implementation of the Aberdeen Western Peripheral Road (AWRP), it is anticipated that the main access to the development will be from the south via the A90/Parkway.
- 6.8 It should be noted that the IAQM distance criteria are deliberately conservative and that detailed assessments are required for most proposed developments, recognising that dust arising from construction activities within urban areas is a significant source of airborne particles. The three potential sources of dust and PM₁₀ (construction, earthworks and

track-out) are considered individually, adopting the methodology in the IAQM guidance, to assess the risk of dust annoyance (soiling) and adverse impact on human health due to elevated PM₁₀ concentrations. The assessment of risk is based on the scale and nature of the works as well as the proximity of sensitive receptors and professional judgement.

Construction and Operational Traffic

- 6.9 Screening of potential impacts on local air quality of traffic associated with the proposed development has been assessed using the UK Atmospheric Dispersion Modelling Highways Agency's Design Manual for Roads and Bridges (DMRB). The criteria for assessment as defined by the latest version of DMRB (HA 207/07) is that roads should be considered if:
- road alignment will change by 5 m or more; or
 - daily traffic flows will change by 1,000 annual average daily traffic (AADT) or more; or
 - heavy duty vehicle (HDV) flows will change by 200 AADT or more; or
 - daily average speed will change by 10 km/hr or more; or
 - peak hour speed will change by 20 km/hr or more.
- 6.10 A number of proposed improvements to the local road network will take place during the build-out of the development. These include the Third Don Crossing, the Aberdeen Western Peripheral Road (AWPR) and improvements to the congested Haudagain Roundabout. In addition, traffic movements on the local road network will change due to the introduction of the development traffic.
- 6.11 Traffic data for assessing air quality impacts associated with the proposed development has been provided by Fairhurst (refer to Section 4.2.1 of the Air Quality Technical Annex). This identified 19 road links along the A90 Parkway and associated road links. These indicate that for the majority of road links the development contributes over 1,000 AADT for the PPIp and overall masterplan forecast scenario. Therefore, for completeness all road links have been included in the air quality assessment.
- 6.12 The transport model used for the transport assessment does not include the Haudagain Roundabout or the AQMA along Auchmill Road, North Anderson Drive or Inverurie Road. Following discussions with the Local Authority Officer for Housing and Environment at ACC, it was agreed that the impact of the development on the Anderson Drive/ Haudagain roundabout/ Auchmill Road corridor and the potential AQMA on Ellon Road (refer to Section 4.2.2 of the Air Quality Technical Annex) should be included. Therefore, additional information (including traffic flows for these routes and speed information for all road links), was obtained from Fairhurst. The locations of the road links considered for the traffic-related air quality assessment are provided in Figure 4.1 of the Technical Annex.
- 6.13 Traffic movements along the road network considered are potentially significant according to the DMRB screening criteria. Therefore a more detailed assessment has been carried out for all of the road links using the UK Atmospheric Dispersion Modelling System (ADMS) Roads model (Version 3.1). The assessment has quantified the impact at sensitive receptors located close to the road links affected by the proposals.

- 6.14 The model simulates the dispersion of emissions using point, line, area and volume source models. It is designed to allow consideration of dispersion problems ranging from simple (e.g. a single isolated point source or a single road) to complex problems (e.g. multiple industrial and road traffic emissions over a large area). The assessment has utilised the 2013 UK EFT V5.2c emission factors.
- 6.15 Model verification was carried out using monitoring data for nine diffusion tubes. Annual mean model results were corrected using the adjustment factor generated by the verification process (refer Section 4.4 of the Technical Annex).
- 6.16 Ground-level concentrations of NO₂, PM₁₀ and PM_{2.5} have been predicted at sensitive receptor locations for five years of meteorological data from Dyce Airport (2002 to 2006). Multiple years of data are used to account for inter-annual variability in predicted concentrations and allow the worst case impacts to be determined. The sensitive receptors considered are presented in Figure 2.1 of the Technical Annex.
- 6.17 Sensitive habitat sites are some distance from the proposed development, the nearest being Scotstown Moor Local Nature Reserve (LNR) and Site of Special Scientific Interest (SSSI). The SSSI/LNR comprises species rich lowland heath, fen, marsh and swamp (wetland) and the location of the site is identified in Figure 2.1 of the Technical Annex. The most western area lies adjacent to Scotstown Road which will be affected by development traffic. Therefore, the impact of increased traffic movements on this area of the SSSI/LNR has been included in the assessment. Sensitive receptors are shown on **Fig 6.1**.

Policy and Guidance

European Air Quality Directive

- 6.18 Directive (2008/50/EC of the European Parliament and of the Council of 21st May 2008, on ambient air quality and cleaner air for Europe) sets legally binding Europe-wide limit values for the protection of public health and sensitive habitats. The Directive streamlines the European Union's air quality legislation by replacing four of the five original Air Quality Daughter Directives within a single, integrated instrument.

Air Quality Strategy for England, Scotland, Wales & Northern Ireland

- 6.19 The Government's policy on air quality within the UK is set out in the Air Quality Strategy, which presents an analysis of existing air quality for eight key pollutants and sets out a series of measures to improve concentrations of these pollutants in the future. The Air Quality (AQ) Strategy is regularly reviewed and updated, the most recent version being published in 2007.
- 6.20 Many of the objectives in the AQ Strategy were made statutory in Scotland by the Air Quality (Scotland) Regulations 2000 and the Air Quality (Scotland) (Amendment) Regulations 2002 for the purpose of Local Air Quality Management (LAQM).
- 6.21 The concept of LAQM was first introduced in the 1995 Environment Act Part IV. Local authorities are required to periodically review and assess the current and future quality of air in their areas. Where it is determined that an air quality objective is not likely to be met within the relevant time period, the authority must designate an Air Quality Management Area (AQMA) and produce a local action plan.

UK Air Quality Standards Regulations and Assessment Criteria

- 6.22 The EU Directive has been transposed into the Air Quality Standards (Scotland) Regulations 2010, which came into force on the 11th June 2010. However, due to the generally low background levels of PM₁₀ in Scotland, the Scottish Government has adopted more stringent limits for this pollutant as provided in The Air Quality (Scotland) Amendment Regulations 2002 for the purposes of Local Air Quality Management.
- 6.23 Air quality limit values and objectives for NO₂, PM₁₀ and PM_{2.5} appropriate for the assessment are summarised in Table 6.1.

Table 6.1: Air Quality Objectives and Limit Values for NO₂, PM₁₀ and PM_{2.5}

Pollutant	Averaging Period	Value ($\mu\text{g m}^{-3}$)
NO ₂	Annual mean	40
	1-hour mean not to be exceeded more than 24 times (a)	200
PM ₁₀	Annual mean	18
	24-hour mean not to be exceeded more than 7 times (b)	50
PM _{2.5}	Annual mean target value	12
(a) Corresponds to the 99.8 th percentile of 1-hour mean concentrations.		
(b) Corresponds to the 98 th percentile of 24-hour mean concentrations.		

Local Air Quality Management

- 6.24 Local authorities are required to periodically review and assess the current and future quality of air in their areas. Where it is determined that an air quality objective is not likely to be met within the relevant time period, the authority must designate an Air Quality Management Area (AQMA) and produce a local action plan.
- 6.25 Aberdeen City Council declared part of the City Centre an AQMA in June 2001 due to predicted exceedances of the national air quality objectives for nitrogen dioxide (NO₂) and particles (PM₁₀). Two further AQMAs; one for the Anderson Drive/Haudagain roundabout/Auchmill Road corridor and Wellington Road (Queen Elizabeth II Bridge-Balnagask Road) were declared in 2008, again due to exceedances of the NO₂ and PM₁₀ objectives. The area covered by the AQMAs is presented in **Fig 6.2**.

Environmental Protection UK Planning Guidance for Air Quality

- 6.26 Environmental Protection UK's (EPUK) Planning for Air Quality guidance provides criteria for determining the magnitude of the change in predicted concentrations and overall impact of a proposed scheme with respect to background air quality and air quality objectives/ limit values. These criteria are set out in Tables 2.5 to 2.7 of the Technical Annex.

ACC Supplementary Planning Guidance on Air Quality

- 6.27 Aberdeen City Council (ACC) has produced supplementary planning guidance on air quality. This provides information on when an air quality assessment is required, what should be included within an air quality assessment and information on appropriate

mitigation and funding. The requirements of this guidance document have been considered in the air quality assessment for the proposed development.

Baseline Conditions

Nitrogen Dioxide (NO₂)

- 6.28 Aberdeen City Council currently undertakes automatic monitoring of NO₂ at six locations in the city. Five of the monitoring sites are located within the three AQMA and are classified as roadside (R) sites. The remaining automatic monitoring site (Errol Place) is at an urban background (UB) location, where measured concentrations are likely to be typical of citywide background concentrations. The location of the monitoring sites is presented in Figure 2.4 of the Technical Annex.
- 6.29 Measured concentrations of NO₂ at these automatic monitoring sites are presented in Table 6.2. More detailed information on the monitor and results are presented in Section 2.5.2 of the Technical Annex.

Table 6.2: Annual Mean Nitrogen Dioxide Concentrations Measured by Automatic Monitors (µg m⁻³)

Site Name	Type	2010	2011	2012
Annual Mean				
Errol Place	Urban background	21	23	21
Union Street	Roadside	59	44	53
Market Street	Roadside	44	40	44
Anderson Drive	Roadside	27	23	30
Wellington Road	Roadside	52	51	59
King Street	Roadside	29	32	29

- 6.30 The automatic monitoring data show that annual mean nitrogen dioxide concentrations at roadside locations in the city centre are significantly above the air quality objective of 40 µg m⁻³. At the urban background site the average concentration between 2010 and 2012 was 22 µg m⁻³; just over 50% of the objective.
- 6.31 Ambient NO₂ concentrations are also measured by an extensive network of passive diffusion tubes. The locations of the diffusion tubes are presented in Figure 2.4. The majority of these are located within the city centre, with others located along the AQMAs. Although none of the diffusion tubes are located close to the proposed development site, there are a number located along roads that will be affected by traffic associated with the development. Measured concentrations of annual mean NO₂ at these locations are presented in Table 6.3 for 2010 to 2012.

Table 6.3: Annual Mean Nitrogen Dioxide Concentrations Measured by Diffusion Tubes (µg m⁻³)

Site Name	Type	2010	2011	2012
Annual Mean				
1. Bucksburn Primary School	Roadside	37	33	34
2. 885 Great Northern Road	Roadside	52	41	40

3. 549 North Anderson Drive	Roadside	42	28	29
4. 38 Ellon Road	Roadside	36	40	37
15. Northfield Swimming Pool	Urban background	18	11	13
23. 785 Great Northern Road	Roadside	45	32	33
24. 40 Auchmill Road	Roadside	44	41	47
39. 819 Great Northern Road	Roadside	55	55	69
40. 852 Fullerton Court (façade)	Façade	40	36	36
41. 852 Fullerton Court (roadside)	Roadside	48	22	30

- 6.32 In 2010 measured concentrations exceeded the air quality objective for six of the ten monitoring sites but at few sites for 2011 and 2012. At Site 39, measured concentrations for all three years are well in excess of the air quality objective. This is located close the Haudagain Roundabout. Measured concentrations (average for the three years of $14 \mu\text{g m}^{-3}$) at Northfield Swimming Pool (Site 15) are well below the air quality objective as would be expected for this urban background location.
- 6.33 For comparison with the measured data, ambient background concentrations of NO_2 have been obtained from the Defra UK Background Air Pollution Maps. These 1 km grid resolution maps are derived from a complex modelling exercise that takes into account emissions inventories and measurements of ambient air pollution from both automated and non-automated sites. The most recent datasets are based on monitoring data from 2010.
- 6.34 The mapped background NO_2 concentrations for the area surrounding the proposed development are presented as a contour plot in Figure 2.5 of the Air Quality Technical Annex. The annual mean mapped background NO_2 concentration at the development site is around $10 \mu\text{g m}^{-3}$ to $16 \mu\text{g m}^{-3}$. This is consistent with the measurements made at the background site at Northfield Swimming Pool (11 to $18 \mu\text{g m}^{-3}$), reflecting the less urban nature of the site. For the purposes of the assessment a baseline NO_2 concentration of $16 \mu\text{g m}^{-3}$ has been assumed.

Fine Particles (PM_{10} and $\text{PM}_{2.5}$)

- 6.35 Aberdeen City Council also undertakes routine monitoring of PM_{10} at all six automatic monitoring sites. More detailed information on monitoring carried out is provided in Section 2.5.2 of the Technical Annex. A summary of measured annual mean concentrations is presented in Table 6.4.

Table 6.4: Annual Mean PM_{10} Concentrations Measured by Automatic Monitors ($\mu\text{g m}^{-3}$)

Site Name	Type	2010	2011	2012
Annual Mean				
Errol Place	Urban background	13	14	12
Union Street	Roadside	18	22	21
Market Street	Roadside	22	22	23
Anderson Drive	Roadside	14	16	15
Wellington Road	Roadside	22	24	23

King Street	Roadside	18	19	19
-------------	----------	----	----	----

- 6.36 The monitoring data indicate that the annual mean air quality objective for Scotland ($18 \mu\text{g m}^{-3}$) is exceeded at Union Street, Market Street, Wellington Road and King Street. Measured concentrations at Anderson Drive and Errol Place (urban background) are well below the Scottish air quality objective. Measured annual mean PM_{10} concentrations are well within the EU limit value ($40 \mu\text{g m}^{-3}$) at all monitoring locations.
- 6.37 Annual mean concentrations of $\text{PM}_{2.5}$ are also measured at the Errol Place urban background site. Between 2010 and 2012 the annual mean concentrations ranged between 7 and $9 \mu\text{g m}^{-3}$, less than 75% of the Scottish annual mean air quality objective of $12 \mu\text{g m}^{-3}$ and 36% of the EU limit value of $25 \mu\text{g m}^{-3}$.
- 6.38 The Defra mapped PM_{10} and $\text{PM}_{2.5}$ concentrations for the area surrounding the proposed development site are presented in Figure 2.6 and Figure 2.7 of the Technical Annex.
- 6.39 The mapped annual mean background PM_{10} concentrations for the site are between 12 and $13 \mu\text{g m}^{-3}$. The mapped annual mean background $\text{PM}_{2.5}$ concentrations for the site are around $8 \mu\text{g m}^{-3}$. These are well below the relevant annual mean air quality objective/limit values. These are both in good agreement with the measured data at Errol Place. For the purposes of the assessment baseline PM_{10} and $\text{PM}_{2.5}$ concentrations of $14 \mu\text{g m}^{-3}$ and $9 \mu\text{g m}^{-3}$ have been assumed, respectively.

Critical Levels for the Protection of Habitat Sites

- 6.40 Critical levels are thresholds of airborne pollutant concentrations above which damage may be sustained to sensitive plants and animals. A summary of the critical levels relevant to the assessment is presented in Table 6.5. It should be noted that the critical level for NO_x should not apply to areas with significant sources of emissions (e.g. agglomerations, major highways).

Table 6.5: Critical Levels, Limit Values and Objectives for the Protection of Vegetation and Ecosystems ($\mu\text{g m}^{-3}$)

Pollutant	Description	Averaging Period	Concentration ($\mu\text{g m}^{-3}$)
Nitrogen Oxides (NO_x)			
Air Quality Strategy (a)	Objective	Annual mean	30
EU Directive on Ambient Air Quality / 2010 Air Quality Standards Regulations (b) (c)	Critical Level / Limit Value	Annual mean	30
(a) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. July 2007 (b) Directive 2008/50/EC of the European Parliament (c) The Air Quality Standards (Scotland) Regulations 2010			

- 6.41 In addition, a 24 hour critical level of $75 \mu\text{g m}^{-3}$ is provided in the Environment Agency's Environmental Permitting Regulations H1. Although not applicable to Scotland, this has been applied for assessing short-term impacts on habitat sites.
- 6.42 Background concentrations of NO_x for the assessment of impacts on habitat sites have been obtained from the Air Pollution Information System (APIS). Annual mean NO_x concentrations for the habitat sites are given as $11.7 \mu\text{g m}^{-3}$. Based on the annual mean,

a daily concentration of $13.8 \mu\text{g m}^{-3}$ is derived based on the methodology provided by the Environment Agency's H1 guidance.

Predicted Effects

Construction Dust

PPiP

- 6.43 Earthworks include excavation, tipping, stockpiling and similar activities. The dust emission class is based on the total site area, which in the case of the individual phases within the PPiP development are greater than $10,000 \text{ m}^2$ and therefore defined as "large". Due to the close proximity of receptors to the site boundary (20-50 m) the site is considered "high risk" with respect to earthworks. Therefore, mitigation measures will be required in order to minimise the impact of dust emissions on these receptors.
- 6.44 The risk of dust soiling and PM_{10} generation due to construction activities is assessed by the volume of buildings to be constructed. As for earthworks, for all phases these have been estimated as "large" dust emission sources. Residential properties at Middleton Park, Danestone and residents of the development are likely to be within 20 m and 50 m of construction activities and would be classed as at "high risk". Therefore, mitigation measures will be required in order to minimise the impact of dust emissions on these receptors.
- 6.45 Factors influencing the degree of track-out include vehicle numbers, size, speed, soil geology and duration. The number of construction vehicles associated with the site has not yet been confirmed however given the size of the development site, there is likely to be a significant number of vehicles accessing the site on a daily basis and on some days these are likely to be in excess of 100 HDV trips per day.
- 6.46 Vehicles that enter or leave the site from Whitestripes Avenue in a northerly and southerly direction will pass close to residential properties on Buckie Crescent, Ridgeway Grove and Valentine Drive (<20 m). For the later phases, vehicles are likely to access the site via Whitestripes Road. Existing residential properties and residents of Phase 1, Phase 3 and Phase 4 are adjacent to Whitestripes Road and some properties will be located <20m from the road. Therefore, there is the potential for re-suspended dust and there is a "medium to high" risk of track-out effects depending on the number of vehicles accessing the site.

Phase 1

- 6.47 The construction dust impacts for Phases 1 to 5 of the PPiP are summarised in the Section 3.3.4 of the Technical Annex. For Phase 1, there is a "high" risk associated with earthworks and construction due to the size of the development and the proximity of sensitive receptors. For track-out, the risk is identified as "high to medium" for Phase 1 given the proximity of existing residential properties to the main access route (Whitestripes Avenue).

Phases 6 and 7

- 6.48 Phases 6 and 7 are located to west of the earlier phases. Landscaping proposed between the PPiP area and Phases 6 and 7 would provide some separation between the two areas. This will reduce the impact of earthworks and construction activities for these phases to a "medium" risk. Given the proximity of existing and development sensitive

receptors to access roads, the risk from track-out would be assessed as “high/medium” depending on the number of construction vehicles.

Traffic Emissions

Scope and Information Sources

- 6.49 The greatest potential for impacts on air quality from traffic associated with the proposed development will be in the areas immediately adjacent to the principal means of access for construction traffic. However, compared with operational development flows, the number of vehicles associated with construction is not predicted to be significant in terms of total emissions (NO_x and PM₁₀). In addition, a Traffic Management Plan (TMP) would be required which provides measures to minimise congestion and manage traffic safely during the construction phases. Therefore, the impact of traffic on local air quality has focussed on operational traffic only.
- 6.50 Traffic data for assessing air quality impacts associated with the proposed development has been provided by Fairhurst. These identified 19 road links along the A90 Parkway and associated road links where traffic flows would be substantially affected by the development. Following discussions with the Local Authority Officer of Housing and Environment at ACC, it was agreed that the impact of the development on the Anderson Drive/ Haudagain roundabout/ Auchmill Road corridor and the potential AQMA on Ellon Road should be assessed. Therefore, additional information (including traffic flows for these routes and speed information for all road links), was obtained from Fairhurst. Traffic data provided by Fairhurst are presented in Annex A of the Technical Annex. The road links included are presented in Figure 4.1 of the Technical Annex.

PPiP

- 6.51 A summary of the input data for dispersion modelling (traffic flows, vehicles speeds and the percentage of HDVs) is provided in Annex B of the Technical Annex. For each receptor group, the maximum predicted concentration is presented and compared to the relevant air quality standards and objectives for human health impacts and critical levels for habitat impacts. Predicted ground level concentrations of NO₂, PM₁₀ and PM_{2.5} arising from vehicle emissions with (baseline + development) and without (baseline) the proposed PPiP development, in 2032, are presented in Annex C of the Technical Annex.
- 6.52 Partly due to the predicted improvements in vehicle emission control technologies over the next ten years, predicted annual mean NO₂ concentrations are substantially lower than current monitored concentrations. In particular, predicted NO₂ concentrations at the nine diffusion tube sites are all well below the air quality standard (AQS) of 40 µg m⁻³. Other influences on the reduction in concentrations include improvements to the road network including the AWPR, and various improvements to Haudagain Roundabout resulting in reduced congestion, reduced traffic flows and higher vehicle speeds. At all receptors, the impact of the PPiP development is assessed as negligible.
- 6.53 Predicted annual mean PM₁₀ concentrations are within the quality objective of 18 µg m⁻³ at all receptor locations. The highest contribution from the PPiP development occurs at North Anderson Drive at a concentration of 0.34 µg m⁻³. Combined with the background concentration this would be defined as a “small” impact and described as “slight adverse”. However, for the majority of receptors the impact of the PPiP development is assessed as negligible.
- 6.54 The increase in traffic associated with the development has no impact on the number of predicted exceedences of the 24-hour PM₁₀ objective, which are well within the 7

allowable. The predicted annual mean PM_{2.5} concentrations are within the air quality objective of 12 µg m⁻³ at all receptor locations. The highest contribution from the development to modelled annual mean PM_{2.5} is predicted at North Anderson Drive at a concentration of 0.19 µg m⁻³ (1.6% of the AQO). This would be defined as a “small” impact and described as negligible according to the significance criteria.

- 6.55 For assessing impacts on habitat sites, predicted ground level concentrations of NO_x with (baseline + development) and without (baseline) for the proposed PPIP development are presented in Table 4.6 of the Technical Annex. The predicted annual mean ground level NO_x concentration is well below the critical level of 30 µg m⁻³ and the total predicted concentration (baseline + development) is 50% of the critical level. The increases due to traffic emissions associated with the development are small (2.3% of the critical level) and very localised (e.g. at roadside). Across the majority of the habitat sites the predicted concentration would be substantially less than this. The 24-hour mean concentration at the SSSI/LNR is also well within the critical-level.
- 6.56 It can therefore be concluded that the PPIP would not have a detrimental impact on local air quality or sensitive habitat sites.

Phase 1

- 6.57 For each receptor group, the maximum predicted concentration is presented and compared to the relevant air quality standards and objectives for human health impacts and critical levels for habitat impacts. Predicted ground level concentrations of NO₂, PM₁₀ and PM_{2.5} arising from vehicle emissions with (baseline + development) and without (baseline) the proposed Phase 1 development, in 2018, are presented in Annex D of the Technical Annex.
- 6.58 Partly due to the predicted improvements in vehicle emission control technologies over the next five years, predicted annual mean NO₂ concentrations are substantially lower than current monitored concentrations. In particular, predicted NO₂ concentrations at the nine diffusion tube sites are all below the air quality standard (AQS) of 40 µg m⁻³ except at diffusion tube 39 (116% of the AQS). At all receptors, the impact is assessed as negligible.
- 6.59 Predicted concentrations of PM₁₀ are close to the AQO and at diffusion tube location 39 (Haudagain Roundabout) are predicted to exceed the AQO. This is due principally to the assumed high background concentration, heavy traffic flows on this road link and on the roundabout and low vehicles speeds. At this location, the development contributes 0.002 µg m⁻³ to the total PM₁₀. This would be defined as an imperceptible impact and described as negligible.
- 6.60 The increase in traffic associated with the development has no impact on the number of predicted exceedences of the 24-hour PM₁₀ objective, which are well within the 7 allowable. As for PM₁₀, there is a predicted exceedence of the AQO at diffusion tube location 39 (100.5% of the AQO). This would be defined as a small impact and described as slight adverse. However, the development contributes only 0.01 µg m⁻³ to the total PM_{2.5}. This would be defined as an imperceptible impact and described as negligible according to the significance criteria.
- 6.61 For habitat sites, there are no predicted increases in traffic flows along Scotstown Road as a result of the Phase 1 development. Therefore, it can be concluded that the Phase 1 development would not have a detrimental impact on local air quality or sensitive habitat sites.

Overall Masterplan

- 6.62 For each receptor group, the maximum predicted concentration is presented and compared to the relevant air quality standards and objectives for human health impacts and critical levels for habitat impacts. Predicted ground level concentrations of NO₂, PM₁₀ and PM_{2.5} arising from vehicle emissions with (baseline + development) and without (baseline) the proposed overall masterplan, in 2032, are presented in Annex E of the Technical Annex.
- 6.63 Partly due to the predicted improvements in vehicle emission control technologies over the next 25 to 30 years, predicted annual mean NO₂ concentrations are substantially lower than current monitored concentrations. In particular, predicted NO₂ concentrations at the nine diffusion tube sites are all well below the air quality standard (AQS) of 40 µg m⁻³. At all receptors, the impact of the overall masterplan development is assessed as negligible.
- 6.64 Predicted concentrations of PM₁₀ are close the AQO and at diffusion tube locations 39 (Haudagain Roundabout) and 23 (Great Northern Road) are predicted to exceed the AQO. This is due principally to the assumed high background concentration, heavy traffic flows on this road link and on the roundabout and low vehicles speeds at this location. At worst, highest predicted concentrations with the development are 107.0% of the annual mean air quality objective (AQO) (diffusion tube location 23). At this location, the development contributes 0.81 µg m⁻³ to the total PM₁₀ and is also the highest contribution from the development to modelled concentrations. This would be defined as a small impact and described as slight adverse. However, at the majority of sensitive receptors the impact is assessed as negligible.
- 6.65 The increase in traffic associated with the development has no impact on the number of predicted exceedences of the 24-hour PM₁₀ objective, which are well within the 7 allowable. The predicted annual mean PM_{2.5} concentrations are within the air quality objective of 12 µg m⁻³ at all receptor locations. The highest contribution from the development to modelled annual mean PM_{2.5} is predicted at Great Northern Road at a concentration of 0.44 µg m⁻³ (1.6% of the AQO). This would be defined as a *small* impact and described as slight adverse. However, at the majority of sensitive receptors the impact is assessed as negligible.
- 6.66 For habitat sites, the predicted annual mean ground level NO_x concentration is well below the critical level of 30 µg m⁻³ and the total predicted concentration (baseline + development) is 48% of the critical level (refer Table 4.8 of the Air Quality Technical Annex). The increase due to traffic emissions associated with the development are small (2.1% of the critical level) and very localised (e.g. at roadside). Across the majority of the habitat sites the predicted concentration would be substantially less than this. The 24-hour mean concentration at the SSSI/LNR is also well within the critical level.
- 6.67 Therefore, it can be concluded that the overall masterplan would not have a detrimental impact on local air quality or sensitive habitat sites.

Mitigation

Construction

- 6.68 It is not possible to eliminate emissions of dust from the construction activities completely. In order to minimise the impacts of construction, a mitigation programme will be developed to include the following site management practices:

- daily visual monitoring of dust-generating activities;
- machinery and dust causing activities will be located away from sensitive receptors;
- water suppression or dust extraction will be fitted to drilling and grinding equipment;
- drilling and excavation surfaces will be wetted, where appropriate;
- surfaces will be damped down prior to clearing;
- suitable measures will be taken during the construction period to prevent the deposition of mud and dirt on the public roads and to prevent the propagation of dust from the site (e.g. wheel wash facilities);
- sheeting of lorries during transportation of construction materials and spoil export;
- all containers will be totally enclosed or covered by tarpaulins / nets to prevent escape of dust or waste materials during loading and transfer from site;
- no bonfires will be allowed; and
- all site personnel will be fully trained and regular site inspections will be made and logged.

6.69 Tarmac laying and the associated use of hot bitumen can generate significant amounts of black smoke particles as well as odours. This can be minimised by the application of the following measures suggested by the Building Research Establishment:

- bitumen should not be overheated;
- pots and tanks containing hot bitumen should be covered to minimise fume production;
- spillages should be minimised; and
- where possible, bitumen should not be heated with open flame burners.

Operational Traffic

6.70 Measures for reducing emissions from operational traffic are inherent in the masterplan, notably by promoting sustainable travel choice that encourages the use of non-car modes. No further specific mitigation is considered to be necessary.

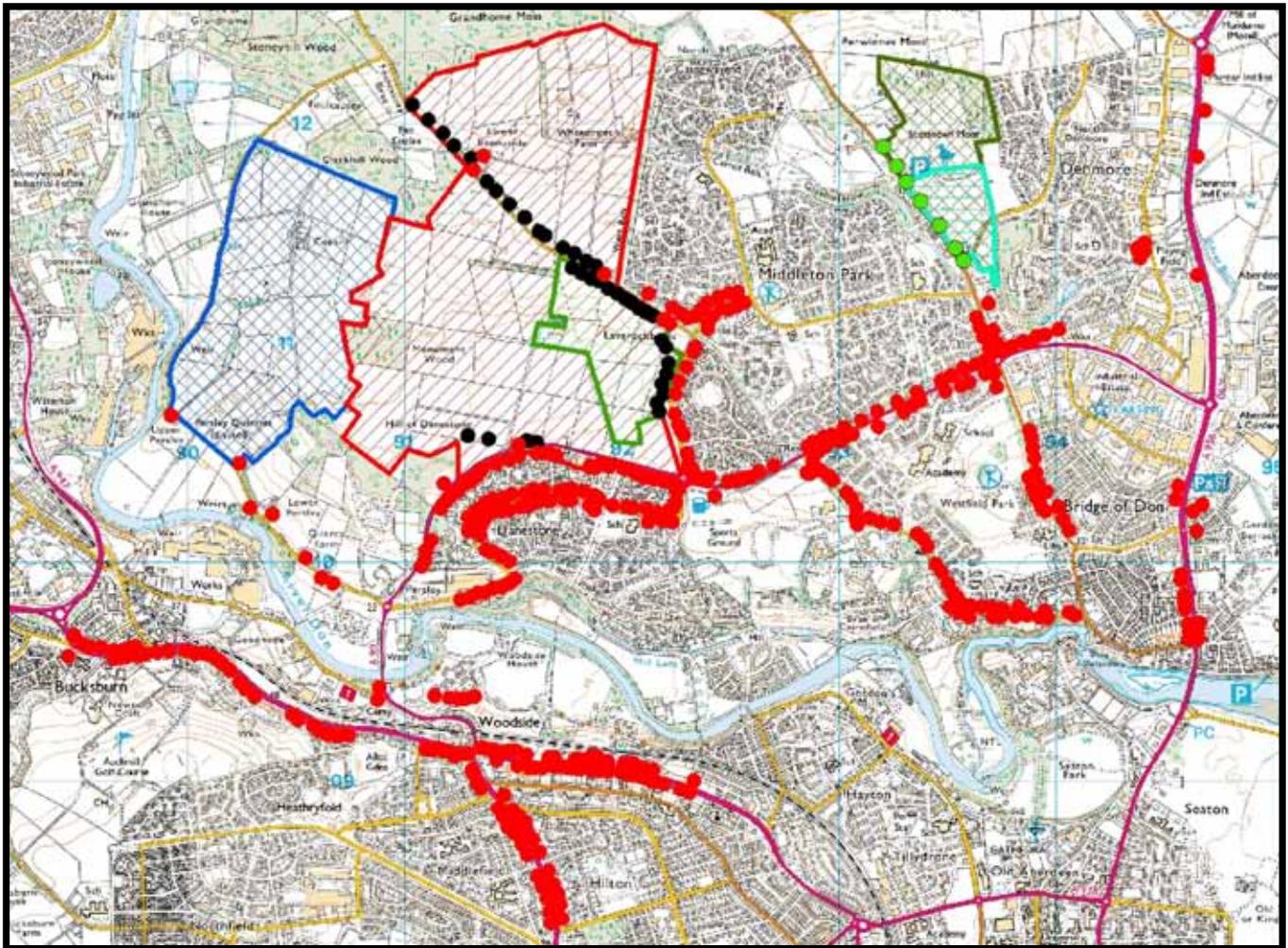
Residual and Cumulative Effects

6.71 With the proposed mitigation measures for minimising construction dust emissions, the residual impact would be reduced from high/medium to medium/low as summarised in Table 6.6.

Table 6.6: Summary of Potential Dust and PM₁₀ Effects following Mitigation

Source/ Receptor	PPiP	Phase 1	Overall Masterplan
Earthworks	Medium	Medium	Low
Construction	Medium	Medium	Low
Track-out	Medium/Low	Medium/Low	Medium/Low

- 6.72 Traffic data obtained from Fairhurst for the assessment has included vehicle movements for other permitted developments. Therefore, cumulative impacts have been considered. Developments included in the traffic data are for the former Davidson’s Mill, Dubford and Berryhill Business Park.
- 6.73 Other proposed developments with the potential for cumulative impacts include a biomass combined heat and power (CHP) plant at Stoneywood Mill. It is understood that a planning application has not been made for this development, although pre-application consultations have been held with ACC. As a consequence, there are no details on the air quality impacts associated with the proposal at this stage.
- 6.74 Stoneywood Mill is located on the west of the River Don, immediately west of Phases 6 and 7 of the overall masterplan. The distance between Stoneywood Mill and the Grandhome development would be 70m as a minimum. Therefore, it is likely that if the CHP development were to proceed, there would be some impact on air quality for the residents of the Grandhome development. However, the developers for the CHP plant would need to demonstrate via an environmental impact assessment that the development would not have a significant impact on local air quality, including the existing AQMAs.



- Existing Sensitive Receptors
- Development Receptors
- Habitat Receptors
- SSSI
- LNR

FIGURE 6.1

Sensitive Receptors



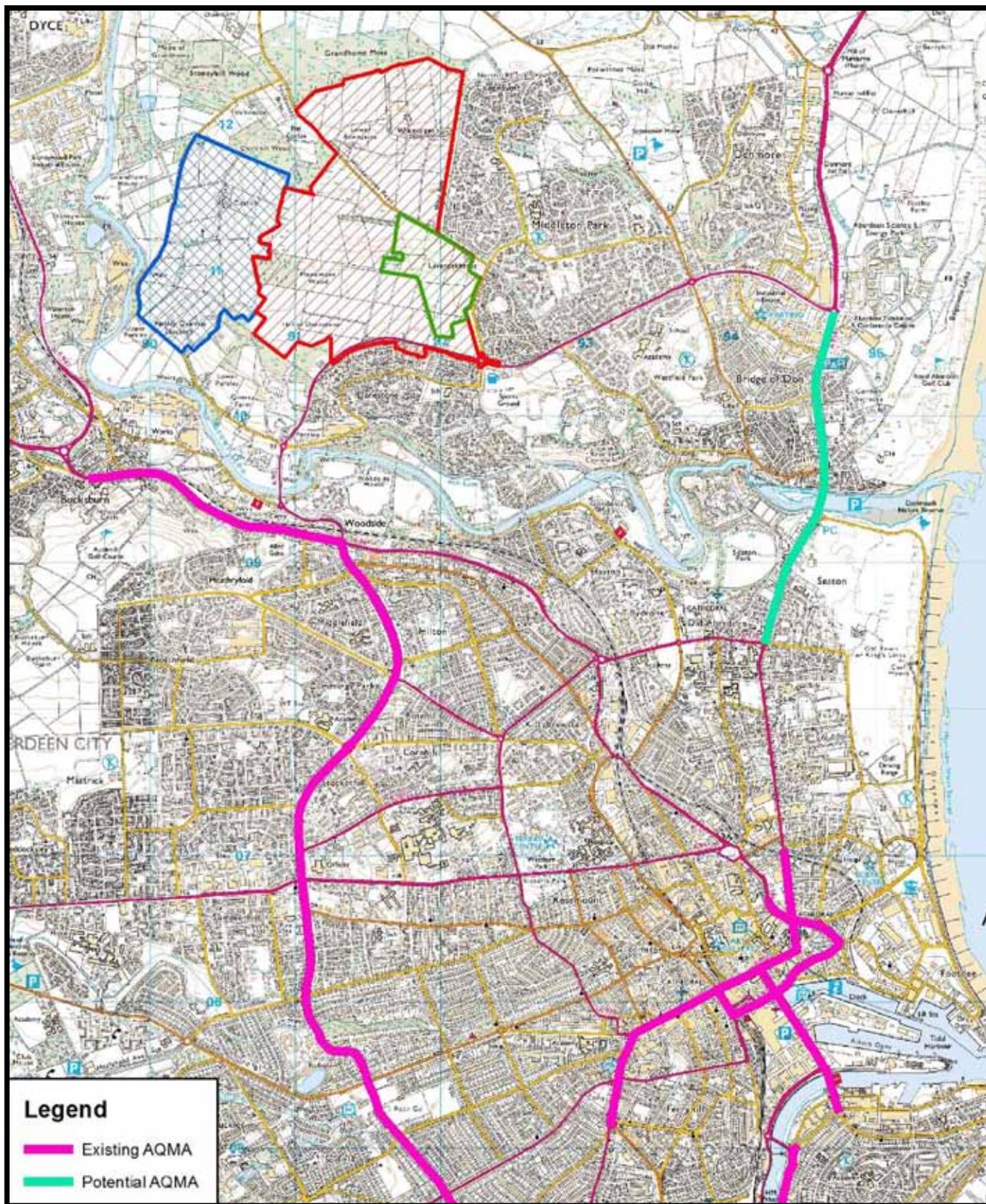


FIGURE 6.2

Air Quality Management Areas



7. Climate Change

Introduction

- 7.1 This chapter addresses the implications of the anticipated energy consumption and related green house gas (GHG) emissions arising as a consequence of the proposed development, and describes the mitigation measures proposed to reduce those emissions. It should be read in conjunction with the Outline Energy Strategy, which is presented in **Technical Annex 3**.
- 7.2 The Outline Energy Strategy provides an estimate of energy use and carbon emissions for the development. At this stage in the project and given the proposed flexible nature of future development plots the estimates provide a broad indication of future energy use and emissions. The energy strategy will be updated as detailed planning applications are made, with the latest policy summarised along with determination of the most appropriate balance between fabric improvements and renewable energy generation.
- 7.3 The Outline Energy Strategy is based on an energy hierarchy that sets the broad principles for reducing carbon emissions from the site. The hierarchy followed comprises: (1) minimise energy demand; (2) maximise the efficiency of energy supply; and (3) apply low and zero carbon energy generation on site. A range of possible low and zero carbon generation measures have been reviewed for the site, which include the possibility of utilising geothermal energy and the potential to connect to the Stoneywood Mill CHP plant.

Methodology

- 7.4 The assessment has considered GHG emissions relating to regulated space heating and energy use, together with carbon embodied within construction materials. The methodology for calculating likely indicative carbon emissions from the construction and operation of the development used data and modelled information covering:
- the current area of existing land use types;
 - the main construction materials to be used (concrete, steel, timber, aggregates) based on the Bath University inventory of embodied carbon and energy (ICE) version 1.6a (2008) for construction materials;
 - power used in the construction process (guidance developed by the Strategic Forum for Construction and the Carbon Trust); and
 - modelling of operational emissions based on nominal emissions per unit provided by White Young Green's (WYG's) infrastructure energy engineers.
- 7.5 IEMA's Climate Change Mitigation and EIA advice note (2010) makes clear that all new GHG emissions contribute to a significant negative environmental effect and that the significance of a new development's emissions should be based on its net GHG impact, which may be positive or negative. The magnitude of energy and GHG emission impacts for the proposed development of Grandhome was determined by considering the predicted deviation from baseline site conditions, both before and after additional mitigation. The magnitude and significance criteria defined below are based on the available IEA guidance and professional judgement, providing a summary of how

significance of impact was determined for each impact aspect under consideration. IEMA criteria for assessing the significance of GHG effects are set out in Table 7.1.

Table 7.1: IEMA Guidance on Estimating the Significance of Potential Effects from GHG Emissions

Magnitude of Impact	Description
Significant negative	Significant net increase in GHG emissions resulting from operation and construction of development (>1% of local existing GHG emissions)
Moderate negative	Moderate net increase in GHG emissions resulting from operation and construction of development (<1% of local existing GHG emissions)
Slight negative	Temporary increase in GHG emissions
Negligible negative, negligible or no impact	No net increase in GHG emissions
Moderate positive	Any net decrease in GHG emissions

7.6 The following sections explain how the approach to design, construction and operation of the proposed new development of Grandhome will work towards achieving as low a net residual negative impact as is reasonably possible, in full compliance with both current and incoming planning legislation and building regulations. Where GHG emissions remain significant, but cannot be further reduced - having considered: financial, operational, political and societal constraints - approaches to offsetting Grandhome’s remaining, residual emissions have also been considered within a wider, integrated approach to sustainability.

Policy Context

International

7.7 The UN Framework Convention on Climate Change (UNFCCC) signed in 1992 was the first international recognition of climate change and was developed in order to allow the international community to work together to limit climate change to no more than two degrees Celsius above a pre-industrial baseline. The UNFCCC led to the Kyoto Protocol, which was a legal binding agreement signed in 1997 mandating industrialised [Annex 1] nations to limit carbon dioxide (CO₂) emissions to 8% below a 1990 baseline between 2008 and 2012 (8% was the European target).

7.8 The UK has since fulfilled all obligations under the Kyoto Protocol. In the absence of a legally binding international agreement to supersede Kyoto, the 1997 Protocol has been extended to 2017, allowing for a new legally binding agreement to be developed under the 2011 Durban Platform for Enhanced Allowance (to be drafted before 2015 and enacted by 2020), and will include China, the US, India and Russia.

European

7.9 In support of these international frameworks the EU enacted the Energy Performance of Buildings Directive 2002 (update 2010): the Energy Performance of Buildings Directive is the primary driver behind changes to the Building Regulations in 2007, 2010 and 2013 along with the anticipated changes in 2016 (with the potential introduction of a ‘net zero-carbon’). The EU Renewable Energy Directive (RED) 2009 is the primary legislation that

is driving the UK toward a 15% contribution to energy supply from renewable sources by 2020 (the UK is currently at circa 6% and will have to work very hard to achieve 15%).

National

- 7.10 In addition to the national sustainable development strategy, other Scottish policy and legislation for guiding sustainable, low carbon development is largely enshrined in The Climate Change (Scotland) Act, 2009 and related Energy Efficiency Action Plan and Renewables Policy which in combination create a new approach to managing and responding to climate change in Scotland. The 2009 Act sets ambitious, legally binding targets to reduce GHG emissions on 1990 baseline levels by 42% by 2020 and 80% by 2050. It does this through strengthening the institutional framework and establishing clear and regular accountability to the Scottish parliament.
- 7.11 The Planning etc. (Scotland) Act 2006 and the second National Planning Framework (2009) set out objectives and recommendations for guiding the development of local planning policy. This includes a focus on how Development Plans will contribute to sustainable development, stopping short of requiring mandatory sustainability appraisal but requiring formal environmental assessment for major new developments such as Grandhome.
- 7.12 Launched in 2008, the Scottish Sustainable Communities Initiative (SSCI) was set up to transform the design, quality and environmental standards of new housing-led developments by helping to raise standards and to develop exemplar projects and skills in design, architecture and sustainable construction. SSCI's good practice approach and guidance was used in the Charrette series that initiated Grandhome's masterplanning process in May 2009. Masterplanning took place in tandem with the preparation of the Aberdeen City Local Development Plan (LDP) and the Grandhome site is identified as opportunity site OP12 in the LDP.
- 7.13 The 'Low Carbon Building Standards Strategy for Scotland', often referred to as the Sullivan Report was produced in December 2007. This report set out a series of tough challenges for future buildings in Scotland in the context of challenging carbon emission reduction targets which included net zero carbon buildings (regulated emissions from space and water heating, lighting and ventilation to be net zero carbon) by 2016/2017, if practical. Together with a UK wide target, this was hailed at the time as innovative and ambitious.
- 7.14 At the same time, in England and Wales the Code for Sustainable Homes (CSH) was introduced to address a wide range of sustainability issues in new homes and development of a route to zero carbon development by 2016 is ongoing. The Sullivan Report still carries weight in formation of policy, however, the targets of the report and the realities of continuing to build houses has lead to a gap between the proposals of the report and revisions to Building Regulations.
- 7.15 The Scottish Government is undertaking a call for candidate national developments that are of national importance and deliverable as part of the National Planning Framework 3. The criteria for assessment include the development making a significant contribution to several requirements, including assisting Scotland in delivering an 80% reduction in emissions by 2050 and achieving the renewable energy targets.

Local

- 7.16 The Aberdeen City and Shire Structure Plan (August 2009) sets out a vision for the future of the local area up to 2030. This spatial strategy identifies three strategic growth areas, including Aberdeen City and acknowledges the need to develop 17,000 homes by 2023. The Plan includes targets for carbon neutral buildings by 2016 and a percentage of the city region's electricity needs to be met by renewable resources by 2020 and identifies local development plans as the mechanism for achieving these targets.
- 7.17 The Aberdeen Local Development Plan (LDP) sets out a vision for the future of the local area up to 2023. This critical local-level plan outlines Aberdeen City's approach to sustainable planning and low carbon development in line with national planning principles for sustainable development, looking at the social, economic and environmental effects. The key policy relevant to the energy use and carbon emissions for Grandhome is Policy R7. This policy takes the proposed Section 7 Building Regulations and requires developments in Aberdeen to provide at least half of the predicted carbon emission reduction to be delivered through the installation of low and zero carbon generating technology (LZCGT).
- 7.18 The policy is further expanded in the supplementary planning guidance (SPG) 'Low and Zero Carbon Buildings, March 2012'. The document provides further guidance on Policy R7 from the LDP and provides the methodology for developers to demonstrate compliance with the policy. The SPG also provides guidance on achieving CO₂ savings for large developments and identifies that the use of decentralised and local renewable sources of heat and power becomes more viable.
- 7.19 The SPG also provides an alternative route to achieve compliance with the requirements of policy R7. The SPG states that the development will have deemed compliance with the requirement to install low and zero carbon generating technology if:
- 1) It can be demonstrated that the development will achieve a CO₂ saving greater than required by the current building standards (the minimum standard is likely to change over the life time of the plan as building standards are increased); or
 - 2) A financial contribution of £200 per housing unit or £200 per 140m² for all other developments is made towards the improvement of the energy performance of the existing housing stock.

Baseline Conditions

- 7.20 The PPIP site comprises mixed farmland and woodlands, with a small number of farms and dwellings. As a greenfield site with limited settlement, current levels of GHG emissions are very low, arising predominantly from private car traffic, domestic energy use and agricultural vehicles, plus soil to air releases of GHGs resulting from on-site arable cropping and rotational leys. The agricultural emissions resulting from fertiliser inputs and bi-annual tillage regimes are likely to comprise the largest existing emissions source.
- 7.21 The main greenhouse gases emitted by Scottish farming are carbon dioxide, methane and nitrous oxide. Methane has a warming potential 21 times that of carbon dioxide, and nitrous oxide 310 times the warming potential of carbon dioxide but it is far less persistent in the atmosphere. Scottish farming contributes 13% of total Scottish emissions. Farmland and forestry in Scotland, however, are estimated to absorb 89% of total emissions from farming, giving a net contribution of less than 3% of the Scottish total for all activities. For these reasons, the existing agricultural emissions on the proposed development site are considered to be low-level and seasonal, as set out in Table 7.2.

Table 7.2: Baseline GHG Emissions

Sources of site baseline emissions	Estimated Annual Emissions (tonnes CO2)		
	Phase 1	Planning Permission in principle	Overall Masterplan
Arable cropland, grass leys and permanent pasture*	24	199	280

*based on a mixed use farm with beef net CO2e emissions per annum

Predicted Effects during Construction

7.22 GHG emissions will be generated during construction from the following sources:

- combustion of fuel in transportation of people, plant and materials around the site and off site;
- energy embedded in the manufacture and transportation of building materials;
- use of light and other power in the welfare facilities, construction compound, and in the use of machinery around the site;
- use of minor quantities of other resource materials during the construction; and
- the removal, disturbance and disposal of embodied energy that is locked up within the existing materials present on the site (e.g. metal, brick, cement, stone, wood, living vegetation etc.).

7.23 The construction traffic and build activity impacts will be temporary and staged over the phasing of each area comprising the development. Whilst these emissions would be created locally as a result of constructing the proposed development, their impact would affect atmospheric receptors and contribute to global emissions impacts overall.

7.24 The bulk of emissions resulting from the construction of the development will come from the energy used to extract, process and manufacture the construction materials. Reference will be made to the BRE Green Guide, which is an online guide showing how to make the best environmental choices when selecting construction materials and components. In addition, the introduction of sustainable procurement methods and the use of sustainable supply chains will be used where appropriate. These measures will help to mitigate the embodied carbon within the construction materials used for the development.

7.25 A Site Waste Management Plan will be adopted for each phase of development; further details are provided in **Chapter 16**.

Predicted Effects of the Completed Development

7.26 The estimated regulated operational CO₂ emissions for the development (from a 2007 Building Regulations “reference case”) are shown in Table 7.3 below. This clearly shows that, using the IEMA Guidance, the site’s operational emissions are considerably higher than the pre-development baseline for Phase 1, PPIP and the Overall Masterplan, resulting in a ‘significant negative’ impact, i.e. >1% of local greenhouse gas emissions.

Table 7.3: Predicted Regulated CO₂ Emissions (2007 Building Regulations)

Phase	Regulated Electricity CO ₂ Emissions (kgCO ₂ /yr)	Regulated Gas CO ₂ Emissions (kgCO ₂ /yr)	Total Regulated Energy CO ₂ Emissions (kgCO ₂ /yr)
Phase 1 (500 units)	225,722	717,937	943,659
Remaining Resi Development (4,200 Units)	1,896,066	6,030,672	7,926,738
5ha Employment	672,100	574,200	1,246,300
Total PPIP	2,793,889	7,322,809	10,116,698
Further potential 2,300 dwellings	1,038,322	3,302,511	4,340,833
Overall Masterplan Development (7,000 units + employment)	3,832,211	10,625,320	14,457,530

7.27 Under current Building Regulations, it is possible to construct buildings with enhanced building fabric alone to improve energy efficiency. To mitigate operational emissions, Phase 1 of the development will likely solely utilise fabric efficiency measures in order to achieve compliance with current Building Regulations. This may also be further enhanced through the use of renewable energy technology if deemed appropriate at the time of construction. However, it is clear that future changes to Building Regulations will require a range of renewable and low carbon energy sources to be integrated into the development.

7.28 The Outline Energy Strategy provides a summary of potential low and zero carbon energy generating technologies that may be suitable for inclusion within the development at Grandhome, although the ultimate size and choice of renewable technologies will be determined through the detailed design stages as each phase prepares for construction. The Grandhome Trust will incorporate renewable energy technologies into the development based on the findings of updates to the energy strategy as the detailed design is prepared.

7.29 All dwellings and non-domestic units are assumed to be required to achieve a net-zero carbon standard from 2016 onwards in compliance with likely incoming building regulations, to help reduce operational emissions and mitigate the impacts of climate change. The Outline Energy Strategy includes a chapter entitled, ‘Low Carbon and Renewable Strategies’. The utilisation of onsite low and zero carbon generation, including low and zero carbon energy generation system forms part of the future phase’s site-wide energy strategy, which will be developed as part of the detailed design of each phase. District and community heating by gas, CCHP and/or biomass may also be developed. Some individual plots can accommodate solar photovoltaics and other micro-generation systems may be considered at an individual building plot level where feasible.

7.30 The results of the fabric improvements to Phase 1, along with the introduction of a range of possible low carbon energy measures for later phases are summarised in Table 7.4 below. For Phase 1, following mitigation, the regulated emissions will still be ‘Significant

Negative'. For all development post 2016, these measures will reduce the regulated emissions impact of the proposed development from significant negative to 'no impact' to comply with the anticipated change in Building Regulations.

Table 7.4: Regulated CO₂ Emissions following Mitigation

Phase	Total Regulated Energy CO ₂ Emissions (kgCO ₂ /yr)	CO ₂ Savings (kgCO ₂ /yr)	Total Regulated Energy CO ₂ Emissions (kgCO ₂ /yr)
Phase 1 (500 units)	943,659	283,098	660,561
Remaining Resi Development (4,200 Units)	7,926,738	7,926,738	0
5ha Employment	1,246,300	1,246,300	0
Total PPIP	10,116,697	9,456,136	660,561
Further potential 2,300 dwellings	4,340,833	4,340,833	0
Overall Masterplan Development (7,000 units + employment)	14,457,530	13,796,969	660,561

7.31 Whilst regulated emissions can be reduced to zero by adopting the proposed energy strategy, un-regulated emissions arising from electrically powered appliances and from traffic flows, will still need to be addressed. However, the residual level of carbon emissions following reasonable mitigation measures will not alter the outcome, due to the low level of site baseline emissions and the final impact of the development will remain at significant negative.

Incorporated Mitigation

7.32 Incorporating measures to adapt to the local impacts of climate change can enhance the cost-effectiveness of delivering acceptable levels of comfort for residents and businesses in the future. Based on the UKCP09 climate change data provided for the Grandhome area grid square, a range of adaptation measures will be adopted to increase the development's resilience to longer-term climate change impacts.

7.33 A sustainable rainwater management and drainage system will be developed that includes an allowance for climate change (see Chapter 10), whilst the Landscape Framework will allow for climate change in species selection and planting design (see Chapter 12).

7.34 Energy efficient materials, pre-fabricated methods of construction and similar cost-effective approaches will help keep buildings cooler during drier, hotter periods and increase the overall energy efficiency of the development. Designing-in roof overhangs to give additional shade to walkways and building entrances also provides more shelter in stormier seasonal weather events and during summer heat waves. Covered walkways into the car parking areas may also be included for similar reasons. Other features such as green roofs will be an integral design aspect for larger public buildings and possibly some commercial buildings. These features aid energy efficiency, thermal cooling in summer and also support water attenuation and rain-water harvesting measures.

Residual and Cumulative Effects

- 7.35 The residual net increase in GHG emissions - after all energy efficiency and energy system measures reduce regulated emissions to zero for post 2016 development and the overall development as a whole - will still result in a significant negative impact at >1% of the site's baseline GHG emissions. This residual emissions impact will be reduced through the introduction of low and zero carbon generating technology.
- 7.36 This approach will be further supported by national and local mitigation mechanisms including grid transmission de-carbonisation and de-centralised low to zero carbon energy networks. Technological advances in low to zero carbon vehicles and public transport systems will also help to reduce residual emissions over time. This is critical because traffic emissions are by far the dominant source of emissions requiring mitigation.
- 7.37 It is highly unlikely that there will be any local cumulative adverse effects in relation to GHG emissions over the operational phase of the development, post construction. The assessment shows that emissions from built development will decrease over the construction period and that emissions from construction activities will be temporary but well managed to minimise emissions from construction traffic and on-site plant. Emissions from traffic will be the biggest long-term source resulting from the proposed development.
- 7.38 Reducing motorised vehicle use will be tackled through effective design to encourage walking and cycling coupled with measures to encourage the use of car clubs, public transport and electric vehicles. It is important to note that electric vehicles are virtually zero carbon and their use in the locality should be encouraged to reduce the long term GHG impact of the development.
- 7.39 There will be increasing cumulative effects from climate change impacts generally due to rising global emissions generally. These likely impacts have been taken into account in the design of the proposed development and a strategy of 'adaptive resilience' will be an iterative feature of the detailed design process for each subsequent phase of the development post completion of Phase 1.
- 7.40 In conclusion, if the overall quantum of 7,000 homes were to be provided in the form of separate developments, rather than as a single integrated masterplan, it is unlikely that similar standards of mitigation and adaptation would be achieved. The scale of the development provides an opportunity to exceed, as well as meet, current and in-coming targets for carbon reduction.
- 7.41 The construction of this development will be phased over a decade so that more sustainable energy, water and waste-water systems can be integrated into the buildings and infrastructure to take advantage of technological improvements towards zero carbon living. The size and scale of the Grandhome masterplan will also enable the provision of a full range of community facilities and services designed to encourage low carbon living and healthy, active sustainable lifestyles – all of this will benefit people in the surrounding settlements as well as those living in Grandhome itself.
- 7.42 All three development scenarios would give rise to "slight negative" effects during construction (due to the temporary and relatively modest nature of construction emissions). Once completed and occupied, all three scenarios would amount to a "significant negative" effect on CO₂ emissions, since the proposed development is intrinsically more carbon-intensive than the current use of the site. However, with mitigation (high-performance building fabric, low carbon/renewable energy technology etc), the development would achieve significant reductions in regulated CO₂ emissions over the 2007 Building Regulations theoretical baseline. These reductions would amount to 30% for Phase 1, 93% for the PPIp and 95% for the overall masterplan. On the basis

of the IEMA guidance, any such reduction would be regarded as a "moderate positive" effect.

8. Cultural Heritage

Introduction

- 8.1 This chapter considers potential effects on archaeology and built heritage interests (i.e. cultural heritage assets). The assessment has been undertaken by CFA Archaeology Ltd (CFA), informed by information provided by Historic Scotland and Aberdeen City Council Archaeological Unit.
- 8.2 The specific aims of the cultural heritage study were to:
- identify the cultural heritage baseline within the overall masterplan area and assess its importance;
 - assess the overall masterplan area in terms of its archaeological and cultural heritage potential;
 - consider the effects of the PPIP scheme and overall masterplan on cultural heritage resources, within the context of relevant legislation and planning policy guidelines; and
 - propose measures, where appropriate, to mitigate any predicted significant adverse effects.
- 8.3 This chapter should be read in conjunction with the supporting appendices presented in **Technical Annex 4**. Appendix 2 provides a gazetteer of the cultural heritage assets located within the study area and an indication of the relative importance of each; the relationship of these assets to the PPIP, Phase 1 and overall masterplan boundaries is shown in **Fig 8.1**. Appendix 3 presents an assessment of indirect effects on assets within 2km of the overall masterplan area, which are shown on **Fig 8.2**.

Scope and Methodology

- 8.4 The baseline study was undertaken with reference to the Institute for Archaeologists' *Code of Conduct* (2012) and *Standard and Guidance for Archaeological Desk-Based Assessment* (2012).

Consultation and Desk-based Assessment

- 8.5 Historic Scotland and Aberdeen City Council Archaeological Unit were consulted to gain professional opinion on the probable effects of the overall masterplan, and to obtain information on relevant cultural heritage assets. Information was obtained from appropriate sources on the locations of cultural heritage assets with statutory protection and non-statutory designations both within the overall masterplan area and within a 2km radius.
- 8.6 Details of the locations and extents of Scheduled Monuments, Listed Buildings, Inventory Garden and Designed Landscapes and Conservation Areas were downloaded as GIS data from the Historic Scotland Data Warehouse (Historic Scotland 2012). Information on known cultural heritage assets within the overall masterplan area was obtained from Aberdeen City Council Sites and Monuments Record.
- 8.7 Additional information on the character and condition of known cultural heritage assets within the masterplan area was obtained from the Royal Commission on Ancient and

Historic Monuments of Scotland database (RCAHMS 2012a). Ordnance Survey maps (1st and 2nd Edition maps) and other historic maps held by the Map Library of the National Library of Scotland were examined to provide information on sites or features of potential cultural heritage interest and on historic land-use development.

- 8.8 An assessment was made of vertical aerial photograph collections held by the Royal Commission on the Ancient and Historic Monuments of Scotland (RCAHMS). Sorties dating from 1946, 1953 & 1966 were examined. In addition, modern aerial photographic imagery (Google Earth™, Bing™) was examined. Bibliographic references were consulted to provide background and historical information.
- 8.9 The Historic Land-Use Assessment (HLA) Map (RCAHMS 2012b) was consulted for information on the historic land use character of the overall masterplan area. The Scottish Palaeo-ecological Database (SPAD) (Coles *et al.* 1998) which records the distribution of known palaeo-ecological sites across Scotland was consulted for information on such sites within or adjacent to the proposed overall masterplan area.

Field Survey

- 8.10 A reconnaissance field survey was undertaken within the masterplan area in order to:
- assess the baseline condition of the known cultural heritage assets identified through the desk-based assessment;
 - identify any further cultural heritage assets not detected through the desk-based assessment; and
 - identify areas with the potential to contain currently unrecorded buried archaeological remains.
- 8.11 The position of identified assets (and where appropriate their extents) were logged using a FLINT S852 Handheld GNSS running Penmap encore v.9. 50 channel GPS+Galileo with SBAS and NTRIP (Trimble VRS service) data corrections via SIM card, it has a typical accuracy with NTRIP corrections of approximately. 0.6 - 1.2m.

Impact Assessment Methodology

Assessing the Importance of Cultural Heritage Assets

- 8.12 The importance of cultural heritage assets reflects the relative weight given to them in SPP and SHEP. Table 8.1 summarises the relative importance of relevant cultural heritage assets.

Table 8.1: Importance of Cultural Heritage Assets

Cultural Importance	Heritage	Definition
National / International		Cultural heritage assets of national or international importance, including: <ul style="list-style-type: none"> • Scheduled Monuments and sites proposed for scheduling • Category A Listed Buildings • Outstanding Conservation Areas (where this designation persists)
Regional		Cultural heritage assets of regional importance, including: <ul style="list-style-type: none"> • Archaeological sites and areas of distinctive regional importance

	<ul style="list-style-type: none"> • Category B Listed Buildings • Conservation Areas
Local	Cultural heritage assets of local importance, including: <ul style="list-style-type: none"> • Archaeological sites of local importance • Category C Listed Buildings • Unlisted buildings and townscapes with local (vernacular) characteristics
Lesser	Cultural heritage assets of little or no importance, including: <ul style="list-style-type: none"> • Artefact find-spots • Unlisted buildings of minor historic or architectural interest • Poorly preserved examples of particular types of feature

Assessment of Effects

8.13 Potential impacts, direct and indirect, were assessed using pre-defined criteria. They were assessed in terms of their longevity, reversibility and nature (beneficial/neutral/adverse), which allowed the magnitude of effect to be predicted for each cultural heritage asset. The significance of the predicted effects was assessed using two key criteria: the importance of the asset (Table 8.1) and the magnitude of effect. Magnitudes of effect were assessed as imperceptible, low, medium or high, as described in Table 8.2.

Table 8.2: Magnitude of Effect

Magnitude of Effects	Definition
High	Major effect fundamentally changing the baseline condition of the asset, leading to total or major alteration of character or setting.
Medium	Moderate effect changing the baseline condition of the asset materially but not fundamentally, leading to partial alteration of character or setting.
Low	Minor detectable effect which does not alter the baseline condition of the asset materially.
Imperceptible	A very slight and barely distinguishable change from baseline conditions.
None	No discernible change to the baseline condition of the character or setting of the asset.

Criteria for Assessing Significance

8.14 The importance of the asset (Table 8.1) and the magnitude of the predicted effects (Table 8.2) were used to determine the likely significance of direct effects, as set out in Table 8.3.

Table 8.3: Matrix for Assessing Significance

Magnitude of Effect ▼	Cultural Heritage Importance ►			
	National / International	Regional	Local	Lesser
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Imperceptible	Minor	Negligible	Negligible	Negligible

8.15 Major and moderate effects are considered to be 'significant' in the context of the Town and Country Planning (Environment Impact Assessment) (Scotland) Regulations 2011, and are shaded in the table. Minor and negligible effects are not considered to be significant. Direct effects are assumed to occur during the construction phase of the development, since this is when most ground disturbance would take place.

Assessment of Effects on Setting

- 8.16 Taking into account the nature and location of the proposed development, visual effects on the settings of cultural heritage assets within 2km were assessed. The relevant assets comprised Scheduled Monuments, Listed Buildings and Conservation Areas were considered. The 2km distance was considered to be the maximum over which significant effects were likely to occur.

Policy and Guidance

- 8.17 The Scottish Historic Environment Policy (SHEP) (Historic Scotland 2011) document sets out Scottish Ministers' policies for the historic environment. Scheduled Monuments are protected under the Ancient Monuments and Archaeological Areas Act 1979 (1979 Act) (The Scottish Office, 1994). Further information on development control procedures relating to Scheduled Monuments is provided in SHEP, Scottish Planning Policy (SPP) (Scottish Government 2010) and Planning Advice Note (PAN2/2011) (Scottish Government 2011).
- 8.18 Listed Buildings and Conservation Areas are protected under the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 (1997 Act). Government policy and guidance is also provided in SHEP and SPP. Other non-designated archaeological sites which do not have statutory protection are curated by the local planning authority. SHEP, SPP and PAN2/2011 provide national planning policy guidance and advice on the treatment of such resources.
- 8.19 PAN2/2011 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).
- 8.20 The desirability of preserving a monument (whether scheduled or not) is a material consideration and the objective should be to assure 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).
- 8.21 The Aberdeen City and Shire Structure Plan 2009 contains policies which provide a framework for protecting and improving valued assets and resources including cultural heritage. The Aberdeen Local Development Plan 2012 contains a range of policies related to cultural heritage, including Policy D5 Built Heritage. Further guidance relating to development affecting the archaeological resource is set out in Supplementary Guidance Archaeology and Planning.
- 8.22 Appendix 1 within Technical Annex 4 provides detailed information on the relevant legislative and planning policy framework.

Baseline Conditions

Overview

- 8.23 Thirty-eight cultural heritage assets have been identified within the overall masterplan area (**Fig 8.1**). Twenty-two sites are located within the PPIp boundary, of which three are located within the Phase 1 area. Sixteen of the sites are located within the Post 2023 Indicative Masterplan (Phases 6-7) area. Appendix 2 provides detailed gazetteer information on the character, history and baseline condition of each cultural heritage asset identified by the study, and provides an indication of their importance.
- 8.24 A range of key cultural heritage assets have been identified within 2km of the overall masterplan area (**Fig 8.2**). Numbers in bold and in brackets in the following sections refer to cultural heritage asset numbers identified on Figs 8.1 and 8.2 and in Appendices 2 & 3.

Cultural Heritage Assets within the Overall Masterplan Area

Statutorily Protected Sites

- 8.25 One cultural heritage asset within the proposed development area is subject to statutory protection: Category B Listed Grandhome Lodges and Gate (6). There are no other cultural heritage assets with statutory protection within the overall masterplan area.

Known and Suspected Prehistoric Sites

- 8.26 Prehistoric activity within the overall masterplan area is indicated by the presence of two possible henges (5 & 12) which have been identified from cropmarks visible on aerial photographs. These features can no longer be appreciated on the ground, although the more westerly example (**5**) occupies a slight rise in the field. If these sites are henges they are likely to be of Neolithic date, and would be of regional importance. Alternatively they may be enclosures dating from a later period, and would be of local importance.
- 8.27 An early Bronze Age bronze flat axe (16) was found within the overall masterplan area in 2003, although the exact location of this find is not recorded by the RCAHMS database. This find suggests Bronze Age activity in the area.

Medieval Activity

- 8.28 The Grandhome Estate has existed since at least the 17th century, and is shown on Roy's Military Survey Map of 1747-55 as being located within a relatively extensive designed landscape. Some cultural heritage assets associated with the estate lie within the overall masterplan area. The Grandhome Lodges and Gate (6), designated as a Category B Listed Building, stand at the northern boundary of the overall masterplan area. The buildings, which are currently occupied, stand either side of a tree-lined avenue and trackway which extends into Clerkhill Wood and corresponds with a road shown on the 1st Edition OS map.
- 8.29 Towards the southern end of the overall masterplan area is the former location of the 'law cairn' of the court of the Barony of Grandhome (17). The cairn was removed in the late 19th century and no remains of it are now visible.

Farmsteads and Other Agrarian Features

- 8.30 Five farmsteads are located within the overall masterplan boundary. Two of these, 'Cothill' (3) and 'Whitestripes' (formerly 'East Whitestripes') (13) continue to be occupied. The buildings of 'Laverockbraes' (14), a former farmstead, have been subject to considerable renovation and are now in use as a nursery. The farmstead of 'Danestone' (35) located at the south of the overall masterplan area also remains occupied, although its former sluice (as depicted on the 1st Edition OS map now lies beneath the modern A90 road). The farmstead of 'West Whitestripes' (20) which was depicted on the 1st Edition OS map fell into ruin during the 1960s, and its location is now occupied by a new dwelling and garage which is known as 'Lower Bonnyside'.
- 8.31 Seven other buildings or cottages are located within the overall masterplan area. Two of these buildings, which were depicted on the 1st Edition OS map, 'Craighaar' (1) and a cottage to the north-west of 'Lower Bonnyside' (7) are no longer visible as upstanding remains. Three others, 'Cothill' cottages (3), 'Clerkhill' (18) and 'Bonnyside' (19) continue to be occupied today. A cottage at 'Whitestripes' (9) which is depicted on the 1st Edition OS map has been replaced by a more recent building, which is on a different alignment; while a building at the southern end of the site (23), which was first depicted on the Ordnance Survey 2nd Edition map has been renovated and reoccupied since the 1960s when it was in a ruined condition. Many of these small cottages are located in proximity to one of the larger farmsteads and are likely to have been related to them.
- 8.32 An area of rig and furrow cultivation (8) which is visible just outside the northern overall masterplan boundary, is recorded by the SMR, who suggest the rig and furrow would originally have extended further south, into the overall masterplan area. No rig and furrow remains were identified by the field survey within the overall masterplan boundary. In addition, a number of clearance cairns (37) were recorded by the field survey. Whilst excavation would be required to determine the exact nature and date of these features, the majority of the cairns are located at the edge of enclosed areas of improved pasture, and the large size of the stones in these clearance cairns suggest that they are the result of modern attempts to improve the land.
- 8.33 Two areas (38) (to the north and south of Monument Wood (34), and depicted on Figure 8.1 as grey hatched areas), remain as unimproved land and are characterised by large quantities of cleared stones and are overgrown by gorse and other vegetation. These areas have remained unimproved since the surveying of the 1st Edition OS map. The possibility that the clearance cairns or the large amount of cleared material within these areas of unimproved land may disguise or hide other archaeological remains cannot be discounted.
- 8.34 A number of former trackways or 'green lanes' (36) which were depicted on the 1st Edition OS map survive as hollow-ways which are enclosed on either side by stone banks, or stone walls. The SMR record the location of two troughs (26 & 27) which were depicted on the Ordnance Survey 1st Edition map, but which are no longer in place today.

Industrial Features

- 8.35 Three quarries are located within the overall masterplan boundary. At the eastern edge of the overall masterplan boundary a manganese quarry (15) had fallen out of use prior to the surveying of the 1st Edition OS map. A second quarry (25) was opened during the late 19th century at Hill of Danestone (25). The majority of this quarry lies outwith the overall masterplan boundary; where the quarry lies within the overall masterplan area it has been reinstated as farmland. A third small area of quarrying (33), located at the eastern edge of the original extent of Monument Wood (34), was probably used as a source of stone to construct the dry-stone wall which encloses the wood.

Burial Ground

- 8.36 A burial ground (11) belonging to the Cassie family of Whitestripes is located within the northern part of the overall masterplan boundary. It comprises a circular mound of stones and boulders which are enclosed by a dry-stone wall, and surmounted by a single grave-marker which has broken into several pieces.

Modern and Miscellaneous Features

- 8.37 A wind pump (30) which survives as a small roofed building containing machinery was recorded by the field survey. Two cisterns (31) located to the east were also identified by the field survey. Two former schools (10 & 24) are located within the overall masterplan area. Both are now private residences. Two wells (2 & 22) are depicted on the 1st Edition OS map. No upstanding remains of them were identified by the field survey.
- 8.38 Two possible enclosures (28 & 29) were identified from aerial photography. No upstanding remains of them were identified by the field survey. A 'stone' (2) which is marked on the 1st Edition OS map was not identified by the field survey. The original (smaller) extent of Monument Wood as depicted on the 1st Edition OS map was found during the field survey to be enclosed by a dry-stone wall (34).

Archaeological Potential of the Overall Masterplan Area

- 8.39 The Historic Land use Assessment (HLA) Map of Scotland characterises the area as being used primarily for agricultural activity and described as planned fields laid out in the 18th or 19th centuries, some of which have become amalgamated fields during the 19th or 20th centuries. A limited area at the centre of the overall masterplan boundary was parkland and policies during the 17th -19th centuries before becoming new fields during the late 20th century. Field survey recorded two areas of unimproved land which contain much cleared material, where it is possible that low relief pre-improvement archaeological remains may be disguised, as indicated on Figure 8.1 as Site 38.
- 8.40 Limited evidence of prehistoric activity has been recorded within the overall masterplan boundary, although a number of prehistoric features are recorded in the wider area, including three hut circles in Clerkhill Wood (NJ91SW 58), one of which is designated as a Scheduled Monument (Index No. 12452), and another hut circle which is located in Stoneyhill Wood (NJ91SW 43). There is documentary evidence that a short stone cist containing an adult male skeleton and an urn of red clay, an arrowhead and a flint knife (NJ91SW 7) were found in Persley Quarry (to the south of the overall masterplan boundary) in 1868.
- 8.41 Other cultural heritage assets recorded within the wider area are primarily related to the agricultural exploitation of the land, and include farmsteads and areas of rig and furrow cultivation. To the west of the overall masterplan boundary are the grounds of Grandhome Estate, which has been occupied from at least the 17th century, including Category B Listed Grandhome House (Index No. 15673), and Grandhome Dovecot (Index No. 15675) and the Category C Listed Walled Garden and Sundial (Index No. 15676).
- 8.42 Taking into account the known cultural heritage assets within the wider area which date from the prehistoric period onwards, and the fact that the overall masterplan area has remained largely undisturbed by extensive modern development, the potential for previously unknown buried archaeological remains within the development site is considered to be high.

Predicted Effects

8.43 Using the assessment criteria described previously, Table 8.4 lists the predicted construction (direct) effects on cultural heritage assets within the overall masterplan area.

Table 8.4: Predicted Construction Effects on Cultural Heritage Assets

Cultural Heritage Asset No.	Name	Importance	Effect Type	Effect Magnitude	Significance of Effect
1	Craighaar; Cottage	Local	Direct	High	Moderate
2	Cothill; Stone (site of)	Lesser	Direct	High	Minor
3	Cothill; Farmstead	Local	None	N/A	N/A
4	Cothill; Cottages	Local	None	N/A	N/A
5	Grandhome estate; Enclosure, Henge (possible)	Unknown (Regional)	Direct	High	Unknown (Major)
6	Grandhome policies; Lodges and Gate	Regional	None	N/A	N/A
7	Lower Bonnyside; Cottage	Local	Direct	High	Moderate
8	Grandhome Moss; Rig and Furrow	Lesser	None	N/A	N/A
9	Whitestripes; Cottage	Lesser	None	N/A	N/A
10	Whitestripes; School	Local	None	N/A	N/A
11	Whitestripes; Burial Ground	Regional	None (site will be preserved <i>in situ</i>)	N/A	N/A
12	Whitestripes; Henge (possible)	Unknown (Regional)	Direct	High	Unknown (Major)
13	Whitestripes; Farmstead	Local	None	N/A	N/A
14	Laverockbraes; Farmstead	Local	None	N/A	N/A
15	Grandhome; Manganese Quarries	Lesser	None (area to be retained as parkland)	N/A	N/A
16	Grandhome; Axe-head (Artefact Find-spot)	Lesser	None	N/A	N/A
17	Cothill Farm; Cairn	Lesser	Direct	High	Minor
18	Clerkhill; Building	Local	None	N/A	N/A
19	Bonnyside; Building	Local	None	N/A	N/A
20	West Whitestripes; Farmstead	Lesser	None	N/A	N/A
21	Well	Lesser	Direct	High	Minor
22	Well	Lesser	Direct	High	Minor
23	Building, Enclosure	Lesser	None	N/A	N/A
24	School	Local	None	N/A	N/A
25	Hill of Danestone; Quarry	Local	Direct	Low (the area will be subject only to landscaping, building remains associated with the quarry lie outside the	Negligible

Cultural Heritage Asset No.	Name	Importance	Effect Type	Effect Magnitude	Significance of Effect
				masterplan area and will not be effected)	
26	Trough (site of)	Lesser	None	N/A	N/A
27	Trough (site of)	Lesser	None	N/A	N/A
28	Enclosure (possible)	Lesser	Direct	High	Minor
29	Enclosure (possible)	Lesser	Direct	High	Minor
30	Wind pump	Lesser	Direct	High	Minor
31	Cisterns	Lesser	Direct	High	Minor
32	Structure	Unknown	None (area to be retained as woodland)	N/A	N/A
33	Quarry	Lesser	None (area to be retained as woodland)	N/A	N/A
34	Monument Wood; Enclosed Woodland	Lesser	Direct	Low (area to be retained as woodland)	Negligible
35	Danestone; Farmstead, Sluice	Local	None	N/A	N/A
36	Trackway(s)	Lesser	Direct	Low (many of the alignments will be retained. As these trackways are green lanes there are unlikely to be any significant buried archaeological remains)	Negligible
37	Clearance cairn(s)	Lesser	Direct	High	Minor
38	Area of Stone Clearance	Unknown	Direct	Low (the area will be subject only to landscaping lying within the woodland / parkland area)	Unknown (Minor)

Direct Effects during Construction

- 8.44 Eighteen assets within the overall masterplan area would be directly affected during construction. These effects are assumed to be permanent and irreversible, but would be offset by mitigation. The effects relating to 14 assets are not predicted to be significant, either because of the importance of the asset, or because the development would only affect part of the cultural asset, with the remainder preserved *in situ*. An unknown but probably not significant (minor) effect is predicted on one asset: areas of stone clearance (38).
- 8.45 Two assets (1 & 7), the former locations of farmsteads, would undergo direct effects that are considered to be significant, since in each case any buried remains of these farmsteads would be substantially or wholly removed during construction. An uncertain, but potentially major, effect is predicted for two assets (5 & 12). These two possible henges are known only from cropmarks on aerial photography. Assuming that the buried

remains are henges, they would be considered of regional importance and would be subject to an effect of major significance.

- 8.46 Twenty assets either lie outside areas of built development or have already been destroyed by previous land use changes, and will not undergo any adverse environmental effects. The proposed development could have a direct and permanent adverse effect on any previously unknown buried archaeological remains which survive in areas where the development will have an impact on underlying deposits. It is not possible to predict where any such buried remains might survive.

PPiP

- 8.47 Twenty-three cultural heritage assets are located within the PPiP area, of which eight would be directly affected during construction. Effects which are not considered to be significant are predicted for six assets (21, 22, 29, 34, 36 & 39). An uncertain but probably not significant (minor) effect is predicted on one asset (38).
- 8.48 A significant (moderate) effect is predicted upon the former location of a farmstead (7). An uncertain, but potentially major effect is predicted for one asset (12), the location of a possible henge known only from cropmarks on aerial photography. Assuming the buried remains are of a henge, they would be considered of regional importance and would be subject to an effect of major significance.

Phase 1

- 8.49 Three cultural heritage assets are located within the Phase 1 area, but none would be significantly affected; they comprise Laverockbraes farmstead (14), part of the manganese quarry (15) and a trackway (36).

Phases 6 and 7

- 8.50 Sixteen cultural heritage assets are located within the remainder of the masterplan area, of which nine would be directly affected during construction. Effects which are considered to be not significant are predicted for seven assets (2, 17, 25, 28, 30, 31 & 36). A significant (moderate) effect is predicted on the former location of a farmstead (1). An uncertain, but potentially major effect is predicted for one asset (5), the location of a possible henge known only from cropmarks on aerial photography. Assuming the buried remains are of a henge, they would be considered of regional importance and would receive an effect of major significance.

Effects on Setting

- 8.51 Appendix 3 identifies designated cultural heritage assets within 2km of the proposed development, together with a summary assessment of the predicted effects on a site-by-site basis, using the criteria detailed in Tables 8.1 – 8.3 above. The predicted effects on the settings of external assets are assumed to be permanent.
- 8.52 The assessment of indirect effects is based on the overall masterplan, and therefore represents a “worst-case” scenario. The effects of the PPiP or Phase 1 schemes would be of no greater significance.
- 8.53 No significant effects on the settings of cultural heritage assets have been predicted. The scheduled monument of hut circle 250m SSE of Foucausie (Index No. 12452) was highlighted by Historic Scotland as requiring particular consideration, and is discussed in further detail below.

Foucausie Hut Circle

- 8.54 The hut circle is visible as a low pen-annular stony bank covered with trees and scrub, and lies within an area of deciduous woodland. It forms part of a larger group of three hut circles, one lying approximately 5m to the NNE and the other approximately 60m to the south. These other two hut circles are undesignated. Hut circles are an unusual survival in this area, where much of the surrounding lowland area has been heavily improved.
- 8.55 The hut circle's setting is in relation to the other (undesignated) hut circles, and any relationships which it may have had with the wider landscape are now difficult to interpret or understand due to the surrounding deciduous woodland which obscures views. The woodland surrounding the monument will screen views of the proposed development. It is considered therefore that the proposed development will have an impact of imperceptible magnitude and negligible significance upon the setting of the Foucausie hut circle.

Mitigation

- 8.56 In order to comply with the requirements of the Structure Plan and with Local Plan Policy 16, a programme of archaeological mitigation works would be carried out to offset the predicted direct effects on archaeological resources within the site. All work would be conducted to relevant Institute for Archaeologists Standard and Guidance Documents (Archaeological Field Evaluation, Archaeological Excavation and Archaeological Watching Brief).
- 8.57 Aberdeen City Council Archaeologist has confirmed that an archaeological trial trenching evaluation conducted as a planning condition on development areas and areas of landscaping would represent an appropriate mitigation response. The mitigation measures would be presented for approval by the planning authority in one or more Written Schemes of Investigation (WSIs), and carried out prior to and during construction, as appropriate. The WSIs would make provision for further excavation, post-excavation analyses and dissemination of the results of the mitigation works, as well as for archiving of the project materials and records, as appropriate.
- 8.58 Written guidelines would be issued for use by all construction contractors, outlining the need to avoid unnecessary damage to known archaeological sites. Those guidelines would contain arrangements for calling on retained professional archaeological support in the event that buried archaeological remains of potential interest were discovered in areas not subject to archaeological monitoring. The guidance would make clear the legal responsibilities placed upon those who disturb artefacts or human remains.

Residual and Cumulative Effects

- 8.59 The completion of a programme of archaeological mitigation works would offset the loss of archaeological resources that would occur as a result of the construction of the proposed development, but would not alter the significance of the effects.
- 8.60 No potential has been identified for cumulative effects to occur in relation to other developments.

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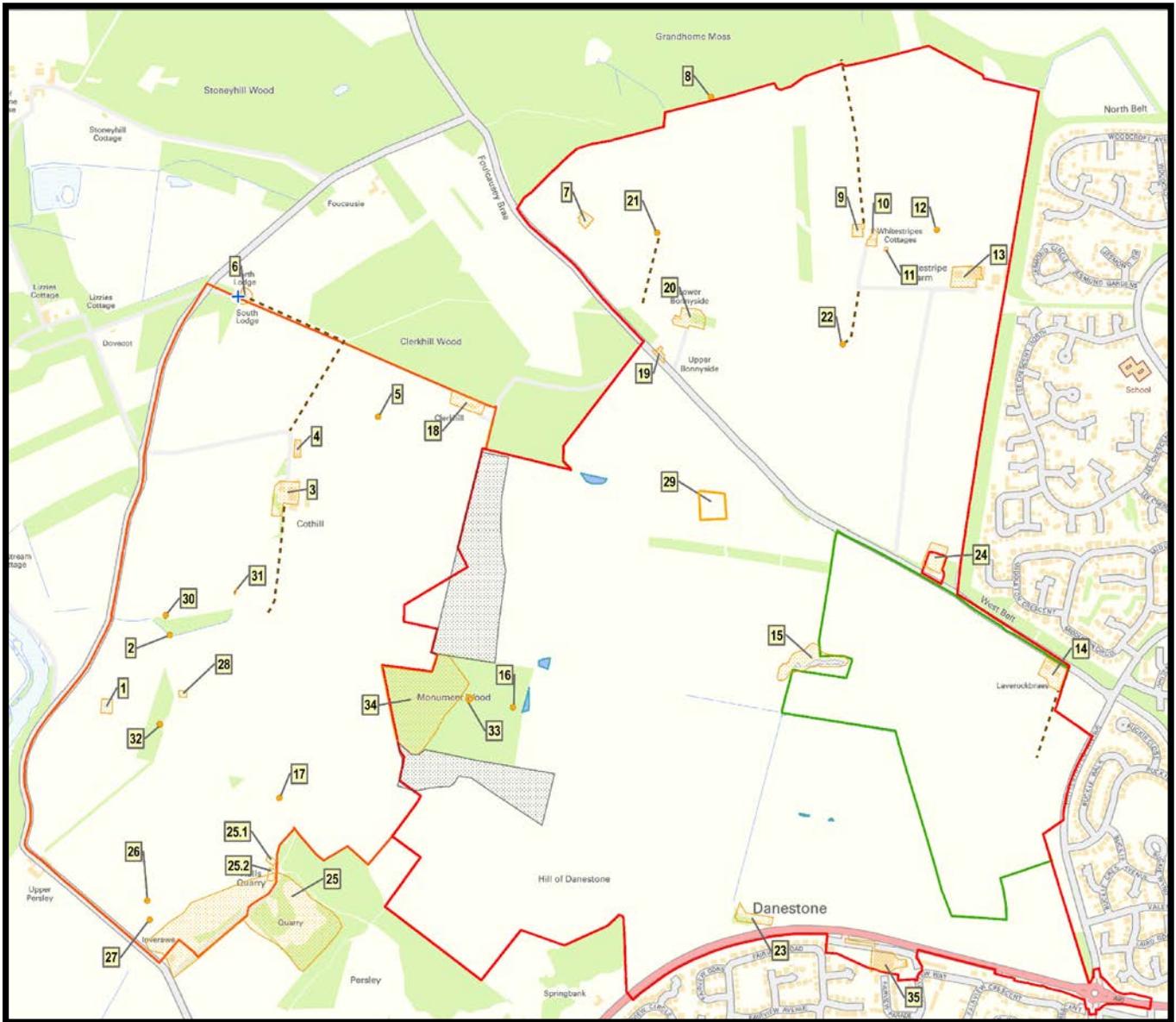
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Sortie	Date	Frame Run	Scale	Library Ref
58/1109	1953	0084, 0086, 0088 (f22)	1:10,000	B_0357
58/3619	1966	0094-0101 (f21)	1:10,000	B_0487



- Post 2023 Indicative Masterplan (Phases 6-7)
- Planning in Principle Application (Phase 1-5)
- Phase 1 Boundary
- + Listed Building Category B
- Cultural Heritage Site (point)
- Cultural Heritage Site (linear)
- Trackways shown on Ordnance Survey 1st Edition which remain visible as holloways
- Cultural Heritage Site (area)
- Clearance Cairn (Site 37)
- Area of Stone Clearance (Site 38)

FIGURE 8.1

Cultural Heritage Assets within the Masterplan Area



9. Ecology

Introduction

- 9.1 This chapter provides an ecological impact assessment (EclA) of the proposed development. It should be read in conjunction with the ecology and biodiversity baseline surveys presented in **Technical Annex 5**.

Scope

- 9.2 The scope of the assessment has been informed by the results of a North East Scotland Biological Records Centre (NESBReC) biological records search, a walkover ecology survey of the site completed by two ecologists in August 2011 (reported separately¹) and scoping opinions provided by Aberdeen City Council, Scottish Natural Heritage (SNH) and Scottish Environmental Protection Agency (SEPA). Detailed survey methodologies have also been agreed in consultation with SNH.
- 9.3 Scoping responses can be summarised as the need to ensure that the EclA includes an assessment of the effects of the development on: protected wildlife sites; important semi-natural habitat types; and species with high individual nature conservation value by virtue of being legally protected and/or species of conservation concern.

Survey Methodology

- 9.4 Standard best practice ecology survey approaches have been followed where appropriate and applicable. These include methodologies for habitat survey and mapping described by JNCC², vegetation assessment and description in accordance with the NVC system and the Functional Wetland Typology for Scotland (SNIFFER)³.
- 9.5 Bird survey has been completed following a repeat transect approach based on an adaptation of the national Breeding Bird Survey (BBS) survey methodology. Bat survey work was conducted in accordance with the Bat Conservation Trust (BCT)⁴ best practice survey guidance. Badger survey has included field sign and bait-marking survey to establish the extent and location of badger setts and territories. Red squirrel survey was completed in accordance with Forestry Commission Practice Note of September 2001⁵. Great crested newt survey was conducted in accordance with methodological guidance produced by English Nature⁶.

¹ Applied Ecology Ltd (September, 2011) *Grandhome Estate – Ecology Appraisal Report*. Report for the Grandhome Trust issued 18 September 2011.

² Joint Nature Conservation Committee (1993) *Handbook for Phase 1 habitat survey – a technique for environmental audit*. JNCC. Peterborough.

³ SNIFFER (2009) WFD95: *A Functional Wetland Typology for Scotland – Field Survey Manual*. Version 1. ISBN:978-1-906934-22-4.

⁴ Bat Conservation Trust (2007) *Bat Surveys – Good Practice Guidelines*. Bat Conservation Trust, London.

⁵ Gurnell, J., Lurz, P. & Pepper, H. 2001 *Practical Techniques for Surveying and monitoring Squirrels*. Forestry Commission 2001

⁶ English Nature (2001) *Great Crested Newt Mitigation Guidelines*, August 2001. English Nature, Peterborough.

Assessment Methodology

- 9.6 Ecological Impact Assessment is based on a number of factors, primarily consideration of the value of a site or feature being assessed, and the anticipated magnitude of the resulting impact. The Institute of Ecological and Environmental Management (IEEM) has produced guidelines⁷ to assist with ecological evaluation and impact assessment which have been adapted by AEL and are used only as a general guide in this assessment. These guidelines have no legal standing and are not a substitute for professional judgement and interpretation, particularly where the ecological value of a site and/or impact magnitudes are not clear or are borderline.
- 9.7 Ecological receptors are normally valued according to the specific 'biodiversity benefits' that they provide to the environment, people or wider society. These benefits can include the conservation of genetic diversity, people's enjoyment or understanding of biodiversity, or the health benefits of biodiversity. A summary of the approach to valuing ecological receptors used in this assessment is presented below:
- International - e.g. an internationally designated site (SAC, SPA, Ramsar site, Biogenetic Reserve).
 - National (Scotland) - e.g. a nationally designated site (SSSI).
 - Regional (North-East Scotland) - e.g. sites that exceed the county-level designation but fall short of SSSI selection guidelines.
 - County - e.g. County Wildlife Sites (usually referred to as Local Sites) which the designating authority has determined meet the published ecological selection criteria for designating Local Sites.
 - District - e.g. habitats that appreciably enrich the habitat resource within the context of the District.
 - Local - e.g. – habitats that appreciably enrich the habitat resource with the context of the Local area.
 - Within zone of influence only (Site level) – e.g. habitats that appreciably enrich the habitat resource at the Site level.
 - Negligible – e.g. habitats of little or no ecological value such as amenity grassland and hard-standing.
- 9.8 The assessment of impacts should be undertaken in relation to the baseline conditions within the zone of influence that are expected to occur if the development were not to take place. The resultant changes to valued ecological receptors should be described and assessed. It is important to consider the likelihood that a change/activity will occur as predicted, and also the degree of confidence in the assessment of the impact on ecological structure and function, as follows:
- Certain/near-Certain: probability estimated at 95% chance or higher.
 - Probable: probability estimated above 50% but below 95%.

⁷ Institute of Ecology and Environmental Management (26 June 2006) Guidelines for the Ecological Impact Assessment in the United Kingdom. Approved Version

- Unlikely: probability estimated above 5% but less than 50%.
- Extremely Unlikely: probability estimated at less than 5%.

- 9.9 When describing changes/activities and impacts on ecosystem structure and function, reference should also be made to the following parameters: positive or negative; magnitude; extent; duration; reversibility; and timing and frequency.
- 9.10 An ecologically significant impact is defined by the IEEM guidance as an impact (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area. Previous methodologies for EclA included matrices of impact magnitude but the new IEEM guidance does not support this method.
- 9.11 Significant impacts on features of ecological importance should be mitigated (or compensated for) in accordance with guidance derived from policies applied at the scale relevant to the value of the feature or resource. Any significant impacts remaining after mitigation (the residual impacts), together with an assessment of the likelihood of success in mitigation are the factors to be considered against legislation, policy and development control in determining the application.
- 9.12 For reference Table 9.1 below provides a comparison matrix to relate Impact Assessment with guidance provided by IEEM.

Table 9.1: Comparison of Terminology

Terminology	Assessment based on IEEM guidance
Negligible	An ecologically significant negative impact assessed as an impact at a local/district scale which does not trigger development control is considered as being of negligible importance.
Minor – Moderate	An ecologically significant negative impact assessed as an impact at a District or higher level, which would trigger development control, and would relate to minor to moderate level of significance if mitigation measures can address the impacts.
Moderate – Major	An ecologically significant negative impact assessed as an impact at a District or higher level, which would trigger development control, would relate to moderate or major impact if mitigation measures cannot reduce the residual impact, and would result in a net loss of biodiversity.

Policy Context

European

- 9.13 In May 1992, the UK and other European Union governments adopted legislation to protect Europe’s most important habitats and species. The so-called ‘Habitats Directive’ complements the earlier ‘Birds Directive’ adopted in 1979. At the heart of both Directives is the creation of a Europe-wide network of sites called Natura 2000. The Birds Directive requires the establishment of Special Protection Areas (SPAs) of ornithological importance, and the Habitats Directive requires Special Areas of Conservation (SACs) to be designated for other animal species, and habitats. Together, both SPAs and SACs make up the Natura 2000 series.
- 9.14 The Habitats Directive was adopted into national legislation in 1994 in the form of the Conservation (Natural Habitats etc.) Regulations 1994 (hereafter referred to as the

Habitats Regulations). In the UK, all terrestrial Natura 2000 sites are already notified Sites of Special Scientific Interest (SSSIs).

National

- 9.15 The Site of Special Scientific Interest (SSSI) is the main statutory nature conservation designation in the UK. Such sites are special for their plants, or animals, or habitats, their geology or landforms, or a combination of these. Scottish Natural Heritage (SNH) is the key statutory agency in Scotland for advising Government, and for acting as the Government's agent in the delivery of statutory nature conservation designations in Scotland.
- 9.16 Designation of a SSSI is a legal process, by which sites are notified under the Wildlife and Countryside Act 1981. The 1981 Act makes provision for the protection of sites from the effects of changes in land management, and owners and occupiers receive formal notification specifying why the land is of special scientific interest, and listing any operations likely to damage the special interest.
- 9.17 The Nature Conservation (Scotland) Act 2004 introduces significant changes to the existing arrangements for the establishment and protection of SSSIs by updating most of Part II of the Wildlife and Countryside Act 1981, and extending the protection of birds, animals and plants by revising Part I of the 1981 Act. The Act also strengthens the Protection of Badgers Act 1992, which protects badger *Meles meles* and its setts.
- 9.18 Scottish Planning Policy (February, 2010) gives a statement of the Scottish Government's Policy on land use planning, including Landscape and Natural Heritage (paras 125 – 148) and covers policies relating to International Designations, National Designations, Local Designations, Protected Species and Trees and Woodland.

Development Plan

- 9.19 The Aberdeen City and Shire Structure Plan (August 2009) sets a clear direction for the future development of the north east and includes strategic objectives in relation to the quality of the environment. The Aberdeen Local Development Plan 2012 sets out a number of policies related to biodiversity and nature conservation.

Baseline Conditions

Designated Sites

- 9.20 There are no statutory or non-statutory wildlife sites within the site. The closest statutorily designated site is the Corby, Lily and Bishops Lochs SSSI located 1.9km to the north (see **Fig 9.1**). Four non-statutory sites adjoin the Grandhome site along or close to its boundary. These are Grandhome Moss Local Nature Conservation Site (LNCS) (also included in the raised bog inventory), Stoneyhill Wood LNCS, the River Don Corridor LNCS and the Aberdeen – Inverness & Kittybrewster Railway Line LNCS. These sites are shown on **Fig 9.2**.

Protected and Notable Species

- 9.21 A number of historic records of protected or notable species were provided by NESBReC within the local area as follows:
- Song thrush (UK Biodiversity Action Plan);

- Red squirrel (UK BAP);
- Yellowhammer (UK BAP);
- Skylark (UK BAP);
- Wych elm (North-East Scotland Local BAP);
- Large-flowered hemp nettle (Scottish Biodiversity List); and
- Wild pansy (SBL).

Habitats

- 9.22 The following description refers to a wider study area that extends beyond the overall masterplan to include surrounding features of interest, such as Clerkhill Wood, Persley quarry and woods, and policy belts. The main habitats are shown on **Fig 9.3**.
- 9.23 The area is dominated by agricultural land (82% of total survey area) made up of arable fields, and improved and species poor semi-improved grassland pasture that typically support species-poor plant assemblage's characteristic of nutrient-rich and intensively managed farmland. Individual noteworthy arable weed species include corn spurrey *Spergula arvensis* (a Nationally Vulnerable plant species) which was recorded in a number of spring cereal crop fields in the western half of the site, and a few plants of wild pansy *Viola tricolor* (a species listed on the Scottish Biodiversity List).
- 9.24 Three relatively extensive areas of semi-natural broad-leaved woodland are present within the study boundary, namely Persley Quarries, Clerkhill Wood and Monument Wood. Parts of these woodlands are classified as long established woodland of plantation origin on the Ancient Woodland Inventory. All of these woodlands have been subject to past tree planting, and a long-history of intensive forestry and/or amenity management.
- 9.25 They lack species-rich ground floras indicative of ancient woodland and do not support large numbers of ancient woodland higher plant indicator species that would otherwise make them good candidates for woodland restoration to meet nature conservation objectives. A narrow belt of broad-leaved woodland, dominated by mature beech forms much of the eastern boundary of the study area, along with a number of mature Scots' pine plantation woodland belts located more centrally
- 9.26 A single standing water pond, a former manganese quarry, and two closely located shallow and steeply embanked agricultural drainage ditches provide the only standing water features within the study area. The manganese pond supports an assemblage of submerged aquatic plant species and provides a source of winged insect food for foraging bats. No evidence of water vole or otter was found in association with the pond or ditches.

Fauna

- 9.27 The site supports an assemblage of animal species that are typical of lowland agricultural land use in North East Scotland, The Grandhome site was found not to support a particularly large or important wintering or breeding bird assemblage and the character of bird populations may be considered typical for the mixed agricultural and urban fringe landscape.
- 9.28 The declining (Red List) bird species house sparrow, linnet, skylark, tree sparrow and yellowhammer, were recorded in low numbers as resident breeders on site, and confer the site with Local importance with respect to its farmland bird assemblage. Roosting barn owl was also recorded within the farm building complex at Cothill throughout the wintering and breeding period, but no evidence was found to suggest it bred there. The barn owl

population in this part of Scotland is small and the presence of this species is of county importance.

- 9.29 A number of badger social groups have parts of their territorial ranges within the site, and small numbers of both red and grey squirrel are present in parts of the site
- 9.30 Bats make low level use of a few buildings within the study area for summer (non-breeding) roosting, and use woodland and standing water habitat for foraging and woodland edge for commuting. Overall levels of bat activity recorded across the site was low, as might be predicted in a landscape dominated by large open agricultural fields. The species assemblage was dominated by small numbers of common and soprano pipistrelle, and individual Nathusius's pipistrelle and *Myotis* bats. A total of three separate buildings across the study area possessed bat dropping evidence indicating that they supported small summer roosts of pipistrelle bat species.

Value of Ecological Receptors

- 9.31 The value of the ecological receptors described Technical Annex 5 is summarised below for the purposes of this assessment. In general, only those receptors valued at District or higher level (shaded in Table 9.2) are considered in further detail by this assessment.

Table 9.2: Value of Ecological Receptors

Ecological Receptor	Value
Habitats	
Amenity grassland	Negligible
Arable land (all types including improved grassland)	Negligible
Bare ground	Negligible
Broadleaved plantation woodland	Local
Broadleaved semi-natural woodland	Local
Buildings, tracks, roads and hard standing	Negligible
Coniferous plantation woodland	Local
Recently felled coniferous plantation woodland	Site
Dense bracken dominated habitat with or without scrub and trees	Site
Scrub	Local
Ephemeral /short perennial	Site
Introduced shrub	Site
Mixed plantation woodland	Local
Poor semi-improved grassland with or without scrub and trees	Site
Scattered broad-leaved trees	Site
Standing water	District
Tall ruderal with or without scrub and trees	Site
Species	
Arable weeds - corn spurrey and wild pansy	Local
Farmland bird assemblage	District
Barn owl	County
Bat commuting and foraging habitat	County
Badger	District
Red squirrel	District

Predicted Effects of the PPIp

Mitigation during Construction

- 9.32 Important wetland and terrestrial habitats, and places used by protected animal species for shelter that are to be retained within the masterplan including, for example, the manganese pond and most woodland, would be protected from accidental machine incursion and disturbance during site clearance and construction operations by temporary fencing constructed and monitored, as considered necessary, by an Ecological Clerk of Works (ECoW).
- 9.33 Best practice construction standards would also be followed with respect to the storage and handling of fuel, oils and other chemicals in order to minimise the risk of pollution. Silt-laden run-off would also be prevented during site clearance and construction by the use of strategically located silt interception traps across the site to prevent damage to important habitat types.
- 9.34 A separate confidential badger protection plan report has been produced to ensure that the welfare of badgers within the site is maintained during construction and operation of the development.
- 9.35 Site clearance operations would be conducted, where practicable, at times that minimise adverse impacts on nesting birds (September-March) or only after land areas and buildings have been deemed to be free of nesting birds and their dependent young by the ECoW during the nesting season (April-August).

Landscape Framework

- 9.36 Mitigation and compensation has been incorporated into the development by the retention and protection of existing landscape features and ecological receptors considered to be of importance in landscape and biodiversity terms.
- 9.37 The landscape framework strategy seeks to protect and enhance existing landscape and biodiversity features of importance and create new complementary habitats and wildlife corridors across the site. The landscape framework is shown in **Fig 5.12**. The total area of new habitat that will be created as part of the landscape framework is extensive and is summarised in Table 9.3.

Table 9.3: New Habitats to be created as part of the PPIp

Habitat	Area (ha)
Allotment	1.8
Buffer landscape	15.4
Meadow / Copse Parkland	20.5
Parkland	10.6
Tree belts	3.2
Village green	2.0
Woodland	8.9
Wetland (Sustainable Urban Drainage)	3.3
Total	65.7

- 9.38 The new habitat creation and supplementary planting of existing habitats would compensate for the large-scale permanent loss of farmland habitat that would result, provided that the new landscape is managed and maintained appropriately to meet landscape and biodiversity objectives in the long-term.

Effects on Protected Sites

- 9.39 No significant adverse impacts (direct or indirect) are predicted on the Corby, Lily and Bishops Lochs SSSI, since it is located 1.9 km to the north of the site in a separate hydrological catchment.
- 9.40 No significant adverse effects (direct or indirect) are predicted on the Grandhome Moss LNCS, Stoneyhill Wood LNCS, River Don Corridor LNCS or the Aberdeen – Inverness & Kittybrewster Railway Line LNCS, since these sites will be protected from direct damage during construction as outlined above.
- 9.41 The risk of potential indirect adverse impacts on Grandhome Moss as a result of changes in the pattern and quality of ground and surface water movement will be minimised by the design of a hydrological system that maintains (or potentially enhances) the existing hydrological connectivity and quality of water movement between the two sites.

Effects on Habitats and Protected Flora

- 9.42 The main effects of the development in relation to ecological and biodiversity receptors relate to on-site habitat and species loss, and damage and disturbance during construction. The total area of permanent habitat loss that would result from construction of the urban areas as indicated on the landscape framework plan is presented in Table 9.4 below.

Table 9.4: Summary of Habitat Loss within the PPIp

Habitat Type	Existing area (m ²)	Area lost to built development (m ²) & % composition of built development by habitat type
Amenity grassland	3,683	2,508 (0.1%)
Arable	115,7904	968,640 (57.8%)
Bare ground	1,399	1,399 (0.1%)
Broadleaved plantation woodland	2,120	543 (0.0%)
Broadleaved semi-natural woodland	47,221	6,121 (0.4%)
Building, tracks, road and hard standing	42,392	31,353 (1.9%)
Coniferous plantation woodland	27,979	4,465 (0.3%)
Recently felled coniferous plantation woodland	10,666	0
Dense bracken with or without scrub and trees	7,438	4,294 (0.2%)
Scrub	18,920	5,644 (0.3%)
Ephemeral / short perennial	0	0
Improved grassland	713,704	540,573 (32.2%)
Introduced shrub	597	597 (0.0%)
Mixed plantation woodland	0	0
Poor SI grassland with or without scrub and trees	212,662	80,359 (4.8)
Scattered broad-leaved trees	1,735	1,189 (0.1%)
Standing water	762	0
Tall ruderal with or without scrub and trees	493	493(0.0%)

- 9.43 The habitat loss figures exclude habitat loss/change that would result from reversion of land to new habitat types, e.g. the reversion of arable to parkland and supplementary planting/management of retained habitats. Similarly, no attempt has been made to differentiate permanent surface habitat loss from temporary construction-related disturbance, as this is not possible to assess with any accuracy.

9.44 No habitat types of district or higher value would be lost as a result of the PPIp development. Around 95% of the existing habitat that will be permanently replaced with built infrastructure is comprised of agricultural land of relatively low biodiversity value (arable 57.8%, improved grassland 32.2%, and species poor semi-improved grassland 4.8%). This will result in a permanent loss of characteristic farmland plant and animal species from the PPIp land area as the development is built out. The Nationally Vulnerable plant corn spurrey *Spergula arvensis*, and wild pansy *Viola tricolor* (a species listed on the Scottish Biodiversity List) are arable weed species that are likely to persist and spread within the construction site as a result of ground disturbance. However, in the long term, construction will result in the decline and permanent loss of both species from the site.

Birds

9.45 Key farmland bird species present within the site that are reliant on open fields and field edge habitats for wintering and breeding (e.g. lapwing, skylark and yellow hammer), will permanently lose their preferred habitat and these species are likely to be permanently lost from the site in the long-term.

9.46 The PPIp development will have no direct impact on farm buildings currently used by barn owl. However, the loss of farmland habitat from the PPIp area could reduce the extent of barn owl hunting territory around Cothill, which could result in the displacement of barn owl from the study area in the long-term.

9.47 The presence of groups of mature trees, often in association with houses or groups of buildings and their gardens, are important for Red-listed bird species within the site, notably house sparrow and tree sparrow. These features would be largely retained and incorporated within the new development. Tree sparrow is likely to continue to nest in retained old trees, even when set within an urban environment, especially if a suitable food supply is present within commuting distance.

9.48 Other operational impacts on birds relate to increases in disturbance resulting from recreational use of the site by the new residential population and predation by increased numbers of domestic pets (particularly cats). The extent and significance of this potentially negative impact on wintering and breeding birds is not possible to predict with any certainty. However, in overall terms, it is considered that negative impacts are likely to be most prevalent in urban centres and gardens only and are unlikely to be of high significance in the wider landscape.

Bats

9.49 The existing agricultural landscape that dominates the PPIp area is not well used by bats for foraging and commuting and the higher value habitats in terms of their attractiveness to bats (notably the manganese pond and woodland and woodland edge habitats) will not be significantly adversely impacted as the PPIp will result in a 0.7 ha loss of existing broadleaf woodland which represent only 7% of the total existing broadleaf woodland component.

9.50 The overall value of the site for bats is likely to be enhanced above current levels in the long term by the planting of new woodland (12.1 ha of new woodland and tree belts), creation of new wetland (3.3 ha of SUDs) and other bat friendly habitats that will increase the connectivity of bat habitat across the site. However, the use and attractiveness of the retained and new landscape to bats will be critically dependent upon the degree to which the new habitats can be retained as dark corridors un-illuminated after dark (directly and

indirectly) by surrounding street and other lighting associated with adjoining built development and roads which is not known at this stage.

- 9.51 No buildings within the PPIp area contain any evidence of roosting bats. However, additional bat activity survey work will be necessary moving forward, in order to verify bat roosting absence from buildings that are scheduled for demolition and/or renovation as the majority of the buildings within the PPIp possessed features of potential value to roosting bats. If evidence of roosting bats is found, appropriate and reasonable mitigation and compensation for the loss of bat roosts provided under the auspices of a European Protected Species licence will need to be provided as necessary. Given the nature of the development, it will be entirely feasible to incorporate bat roost features into new buildings within the site such that there will be no net loss of bat roosting opportunity within the PPIp area.
- 9.52 The removal of trees with features that could be used by tree roosting bats (holes, splits, lifting bark plates etc.) could result in adverse impacts on tree roosting bats. The majority of the trees with the greatest tree roosting bat potential are mature broadleaf trees and would be largely retained because of their high landscape and arboricultural value.

Badger

- 9.53 The masterplan has been designed to retain all on-site main setts and the majority of low status outlying setts, and to retain and enhance safe access routes to forage areas within and off site. A four-hole subsidiary badger sett occurs within the PPIp construction working area and will need to be closed and destroyed under licence. A further seven low status outlier setts belonging to a different badger group occur within the PPIp but they all occur in locations where it will be possible to retain and protect them as part of the development, and it is the intention to retain and protected badger setts as far as is practicable to do so moving forward.
- 9.54 Permanent habitat loss resulting from new urban development will result in a reduction in foraging habitat available to the four badger groups currently holding territories within the site. Details of development impacts on badger and the mitigation and compensation proposals necessary to avoid adverse impacts on the welfare of badger are dealt with in a separate confidential badger protection plan report.

Red Squirrel

- 9.55 Significant adverse impacts on red squirrel are not predicted to occur as very little woodland habitat and tree loss will take place as part of the development, and all new woodland planting will be designed to maximise its attractiveness to red squirrel by maintaining a high proportion of mixed coniferous species. A precautionary approach to tree removal will be followed, with all trees that are scheduled for removal to be checked carefully in advance of felling for the presence of red squirrel dreys and an SNH licence applied for to legally enable the damage or disturbance of a drey as necessary.

Additional Mitigation and Compensation

Bats

- 9.56 Existing woodland and important bat forage areas would not be illuminated after dark (directly or indirectly) by surrounding street and other lighting associated with adjoining built development and roads. Latest best practice guidance with respect to development lighting and bats would be incorporated into lighting design.

- 9.57 Bat activity surveys in accordance with best practice guidance (BCT, 2012) would be completed in advance of any demolition or significant renovation of existing buildings with bat roost potential, as necessary, to inform the need and scope of bat roost mitigation and compensation as construction phases come on line. Negative impacts on roosting bats that would result from building demolition and redevelopment (i.e. that cannot be avoided by design) would take place under the auspices of a European Protected Species licence as necessary.
- 9.58 As bats will regularly switch between different tree roosts, a precautionary approach to tree felling and tree surgery in general would be adopted to minimise the risk of such work harming bats. All mature trees that are to be felled to enable development would be surveyed for the presence of bat roost features and the presence of bats in advance of being felled by a licenced bat worker. Trees with features of value to roosting bats would be checked immediately prior to their removal for bats, and appropriate mitigation and roost compensation measures agreed if bat presence is suspected or confirmed.

Biodiversity Action Plan

- 9.59 A Biodiversity Action Plan (BAP), based on the landscape framework strategy, would be developed for the overall masterplan area. Target habitats and species would be identified within the BAP, including wetland and flowing water habitats, woodland, birds, bats and red squirrel.
- 9.60 The BAP would be updated every five years and would set out specific habitat creation and monitoring objectives and targets to maintain and enhance the extent, quality and abundance of BAP target habitats and species across the site. Specific recommendations in relation to BAP target species that could directly benefit from the development are outlined below.

Birds

- 9.61 Many of the farmland bird populations, especially species that are dependent on habitat mosaics rather than arable land per-se, are likely to be enhanced by the general habitat improvements outlined in the landscape framework. However, specific enhancements for the high value species would also be implemented. These species would become Grandhome BAP target species and would include house sparrow and tree sparrow.
- 9.62 Nest boxes suitable for tree sparrow would be provided in appropriate locations across the site in three suitable areas. Each nest box grouping would consist of a minimum of 25 boxes per area, to be maintained and monitored in perpetuity. New dwellings would be constructed with an integrated bird nest brick suitable for a range of species, but particularly house sparrow, tits, and common swift, in agreed locations. One in every three buildings would have a nest box or brick. Barn owl nest boxes would be incorporated into the wider site to enhance the local barn owl population.

Bats

- 9.63 New buildings fronting open countryside, parkland, small holdings, landscape corridors and buffers would have enclosed bat boxes and other bat roost features incorporated into their external fabric (applicable to one in every three buildings). Bat boxes would also be installed on trees and posts in woodland and close to wetland habitat areas. A minimum of 25 boxes will be installed per area, to be maintained and monitored in perpetuity.

Red Squirrel

- 9.64 As highlighted previously, all new woodland planting would be designed and planted with a high proportion of mixed coniferous species for the benefit of red squirrel. Working with the local Saving Scottish Red Squirrel Project Officer, a strategy for the control of grey squirrel and monitoring of red squirrel within the site will be developed.

Summary of PPIP Effects

- 9.65 The effects of the PPIP scheme are summarised in Table 9.5 below.

Table 9.5 Summary of PPIP Effects

Receptor	Construction effect	Operational effect	Value	Significance	Mitigation	Compensation	Residual Effects
Arable weeds – crop spurrey & wild par	Habitat loss	n/a	Local	Certain Minor Negative	Not possible to mitigate	Creation and management of new habitat types as part of Landscape Framework Strategy and Grandhome BAP	Negligible
Standing Water (manganese port)	None	None	District	Not significant	n/a	n/a	n/a
Farmland Birds	a) Habitat loss	b) Habitat disturbance & pet predation	District	a) Certain Moderate Negative b) Probable Minor Negative	a) Breeding birds protection incorporated during construction b) Various bird species recommended to be Grandhome BAP target species	a & b) Birds will benefit from LFS	Probable Moderate Negative
Barn Owl	a) Habitat loss – for habitat only	n/a	County	Probable Moderate Negative	a) Breeding bird protection incorporated during construction b) Barn Owl is recommended to be a Grandhome BAP target species	a & b) Barn Owl will benefit from LFS	Probable Minor Positive
Bat roosts	a) Building & tree loss /	b) Illumination of roosts after d	District	Unlikely Moderate Negative	a & b) specific additional mitigation recommended	Bats will benefit from Landscape Framework	Probable Moderate Positive

	damage				in the form of follow-up survey of buildings to demolished or renovated and trees to be felled the summer prior to works commencing.	Strategy (LSF) Bats are recommended to an Grandhome B target taxa	
Bat commuting & foraging habitat network	a) Habitat loss	b) Illumination of habitat after dark	County	a) Unlikely Minor Negative b) Probable Major Negative	a & b) retention of existing woodland and stream water. Develop bat friendly lighting strategy. New bat friendly habitat creation	Bats will benefit from LFS Bats are recommended to an Grandhome B target taxa	Probable Moderate Positive
Badger	a) Low status sett & b) territory loss / damage	c) Sett disturbance	District	a) Certain Moderate Negative b) Probable Moderate Negative c) Probable Minor Negative	Badger protection plan	Badger protection plan	Probable Negligible
Red squirrel	a) Habitat loss b) Increased risk of colonisation by grey squirrel	c) Increased risk of colonisation by grey squirrel	District	a) Unlikely Minor Negative b & c) Unlikely Moderate Negative	a) red squirrel friendly woodland planting b) red squirrel is recommended to be a Grandhome BAP target Species c) grey squirrel control	Red squirrel will benefit from LFS	Probable Moderate Positive

Predicted Effects of Phase 1

Incorporated Mitigation and Compensation

- 9.66 The incorporated mitigation and compensation described previously for the PPIP development applies equally to Phase 1.

Protected Sites

- 9.67 No significant adverse impacts (direct or indirect) are expected to occur to any statutory or non-statutory wildlife site as a result of the Phase 1 development.

Habitats and Plants

- 9.68 The main effects of Phase 1 relate to on site habitat and species loss, damage and disturbance during construction. The total area of permanent habitat loss that would result from construction of built development, as indicated on the landscape framework plan, is set out in Table 9.6.

Table 9.6: Habitat Loss within Phase 1

Habitat type	Area (m ²)	Area lost to hard development (m ²) & % composition of built development by habitat type
Amenity grassland	479	403 (0.1%)
Arable	26,703	24,457 (11.2%)
Bare ground	0	0
Broadleaved plantation woodland	608	540 (0.2%)
Broadleaved semi-natural woodland	0	0
Building, tracks, road and hard standing	4,737	3,646 (1.6%)
Coniferous plantation woodland	17	0
Recently felled coniferous plantation woodland	0	0
Dense bracken with or without scrub and trees	0	0
Scrub	0	0
Ephemeral / short perennial	0	0
Improved grassland	240,116	187,622 (85.8%)
Introduced shrub	0	0
Mixed plantation woodland	0	0
Poor SI grassland with or without scrub and trees	5,864	1,955 (0.9%)
Scattered broad-leaved trees	0	0
Standing water	0	0
Tall ruderal with or without scrub and trees	0	0

- 9.69 As described previously, the habitat loss figures exclude habitat loss/change that would result from reversion of land to new habitat types, and no attempt has been made to differentiate permanent surface habitat loss from temporary construction related disturbance.
- 9.70 Arable (11.2%) and improved grassland (85.8%) of negligible biodiversity value make up the biggest total proportion (97%) of existing habitats permanently replaced by built

development. No habitat types of district or higher value would be lost as a result of the Phase 1 development.

Birds

- 9.71 The Phase 1 site mainly comprises agricultural, and with the exception of a small area of land around the manganese pond, does not support large numbers of breeding or wintering birds or important assemblages of notable bird species. Any adverse impacts on birds as a result of the Phase 1 development are not considered to be significant.

Bats

- 9.72 The Phase 1 site includes one group of buildings (Laverockbraes) that contained no obvious evidence of roosting bats during the baseline survey, together with land that does not possess high forage value for bats. As a result, significant adverse impacts on bats as a result of the Phase 1 development are not predicted to occur. However, follow-up verification survey the summer before any building demolition/renovation work or tree felling would be completed to verify this.

Badger

- 9.73 The confidential badger protection plan confirms that the Phase 1 site possesses no badger setts, and that the development would result in the loss of only a small overall proportion (3.6%) of the territory of a single badger social group. No significant adverse impacts on badgers are predicted to occur as a result of the Phase 1 development.

Red Squirrel

- 9.74 Significant adverse impacts on red squirrel are not predicted to occur, as very little woodland habitat and tree loss will take place as part of the Phase 1 development, and all new woodland planting would be designed to maximise its attractiveness to red squirrel by maintaining a high proportion of mixed coniferous species. A precautionary approach to tree removal would be followed. All trees that are scheduled for removal would be checked carefully in advance of felling for the presence of red squirrel dreys and an SNH licence would be obtained if necessary to legally enable the damage or disturbance of a drey.

Additional Mitigation and Compensation

- 9.75 The additional mitigation and compensation described previously for the PPIP scheme would be implemented within Phase 1.

Table 9.7 Summary of Phase 1 Effects

Receptor	Construction effect	Operational effect	Value	Significance	Mitigation	Compensation	Residual Effects
Arable weeds – spurrey & wild p	Habitat loss	n/a	Local	Certain Minor Negative	Not possible to mitigate	Creation and management of new habitat types as per Landscape Framework Strategy and Grandhome BAP	Probable Moderate Positive
Farmland Birds	a) Habitat loss	b) Habitat disturbance & pet predation	District	a) Certain Minor Negative b) Probable Minor Negative	a) Breeding birds protection incorporated during construction b) Various bird species are recommended to be Grandhome BAP target species	a & b) Birds will benefit from LFS	Probable Moderate Positive
Bat roosts	a) Building & tree loss / damage	b) Illumination of roosts after dark	District	Unlikely Moderate Negative	a & b) specific additional mitigation is recommended in the form of follow-up bat survey of buildings to be demolished or renovated and trees to be felled the summer prior to work commencing.	Bats will benefit from Landscape Framework Strategy (LSF) Bats are recommended to be an Grandhome BAP target taxa	Probable Moderate Positive
Bat commuting & foraging habitat network	a) Habitat loss	b) Illumination of habitat after dark	County	a) Unlikely Minor Negative b) Probable	a & b) retention of existing woodland and standing water. Develop bat friendly lighting strategy. New bat friendly habitat creation	Bats will benefit from LFS Bats are recommended to be an Grandhome BAP target taxa	Probable Moderate Positive

				Major Negative			an Grandhome B target taxa	
Badger	a) Low status sett & b) territory loss / damage	c) Sett disturbance	District	a-c) no adverse impact predicted	Badger protection plan	Badger protection plan	Badger protection plan	Probable Negligible
Red squirrel	a) Habitat loss b) Increased of colonisation by grey squirrel	c) Increased of colonisation by grey squirrel	District	a) Unlikely Minor Negative b & c) Unlikely Moderate Negative	a) red squirrel friendly woodland planting b) red squirrel is recommended to be an Grandhome BAP target Species c) grey squirrel control	Red squirrel will benefit from LFS	Red squirrel will benefit from LFS	Probable Negligible

Predicted Effects of Phases 6 and 7

Incorporated Mitigation and Compensation

- 9.76 The incorporated mitigation and compensation described previously for the PPIp area applies equally to the remainder of the masterplan.

Protected Sites

- 9.77 No significant adverse impacts (direct or indirect) are predicted to occur to any statutory or non-statutory wildlife site as a result of development of the remainder of the masterplan.

Habitats and Plants

- 9.78 The main effects of the remainder of the masterplan relate to on-site habitat and species loss, damage and disturbance during construction. The total area of permanent habitat loss that would result from construction of built development, as indicated on the landscape framework, is set out in Table 9.8.

Table 9.8: Habitat Loss associated with the Overall Masterplan

Habitat type	Area (m ²)	Area lost to built development (m ²) and % composition of hard development by habitat type
Amenity grassland	6,963	4,962 (0.2%)
Arable	199,4270	161, 4161 (68.7%)
Bare ground	2,253	2,029 (0.1%)
Broadleaved plantation woodland	27,848	8,442 (0.4%)
Broadleaved semi-natural woodland	48,172	6,998 (0.3%)
Building, tracks, road and hard standing	58,134	42,473 (1.8%)
Coniferous plantation woodland	29,250	4,465 (0.2%)
Recently felled coniferous plantation woodland	10,666	0
Dense bracken with or without scrub and trees	8,180	4,316 (0.2%)
Scrub	19,654	6,052 (0.3%)
Ephemeral / short perennial	0	0
Improved grassland	714,465	541,272 (22.8%)
Introduced shrub	597	597 (0.0%)
Mixed plantation woodland	4,712	112 (0.0%)
Poor SI grassland with or without scrub and trees	233,891	80,375 (3.4%)
Scattered broad-leaved trees	1,735	1,189 (0.1%)
Standing water	762	0
Tall ruderal with or without scrub and trees	4,941	2,785 (0.1)

- 9.79 Arable (68.7%) and improved grassland (22.8%) make up the biggest total proportion (92%) of existing habitats permanently replaced by hard development infrastructure. No habitat types of district or higher value would be lost as a result of development of the remainder of the masterplan.

Fauna

- 9.80 The impacts on animal taxa that would result from development of the remaining masterplan are broadly the same as described previously for the PPIP development. Renovation of the Cothill farm building complex is likely to result in the displacement of roosting barn owl from the site (if the species has not already abandoned the site as a result of the PPIP development), and the loss of a suspected small summer roost of a pipistrelle bat or bats from South Lodge and a barn at Cothill.

Additional Mitigation and Compensation

- 9.81 The additional mitigation and compensation recommendations described previously for the PPIP would be implemented for the remainder of the masterplan.

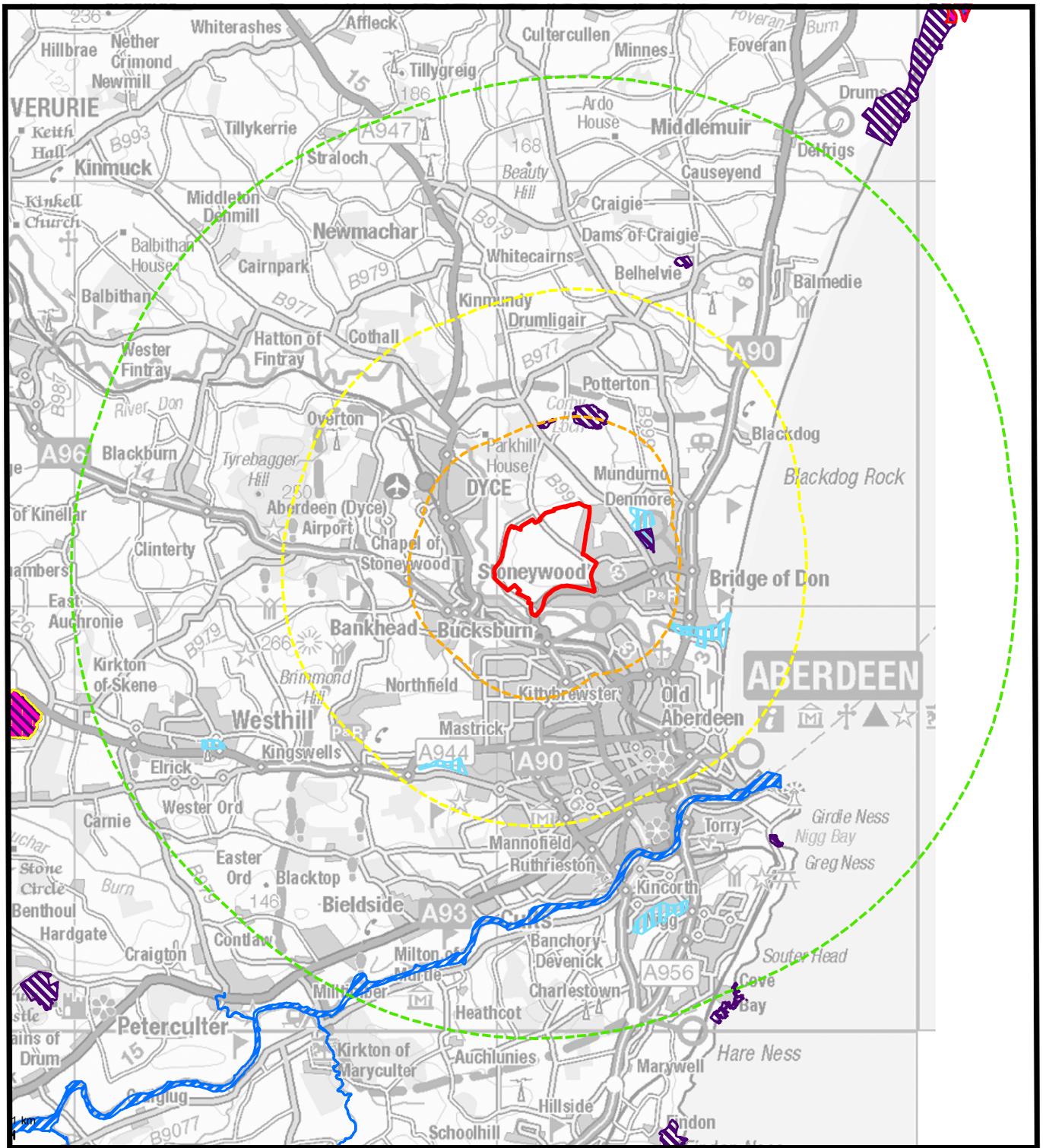
Residual and Cumulative Effects

Residual Effects

- 9.82 The permanent loss of farmland habitat will result in reductions of species that are dependent on agricultural land use practice and will result in the permanent loss of arable weed species, and assemblages of farmland birds with high relative nature conservation value. The residual ecological effects of the development are assessed as neutral to moderately positive, as existing habitats of high relative biodiversity value will be retained and new habitats with increased biodiversity compared to intensively managed farmland will be created and managed.

Cumulative Effects

- 9.83 Cumulative development effects relate to the potential loss of badger territory that overlaps the Grandhome site with off-site development land. Significant off-site developments within close proximity (badger range) of Grandhome are not anticipated, and significant cumulative impacts on badgers are therefore not predicted to occur.

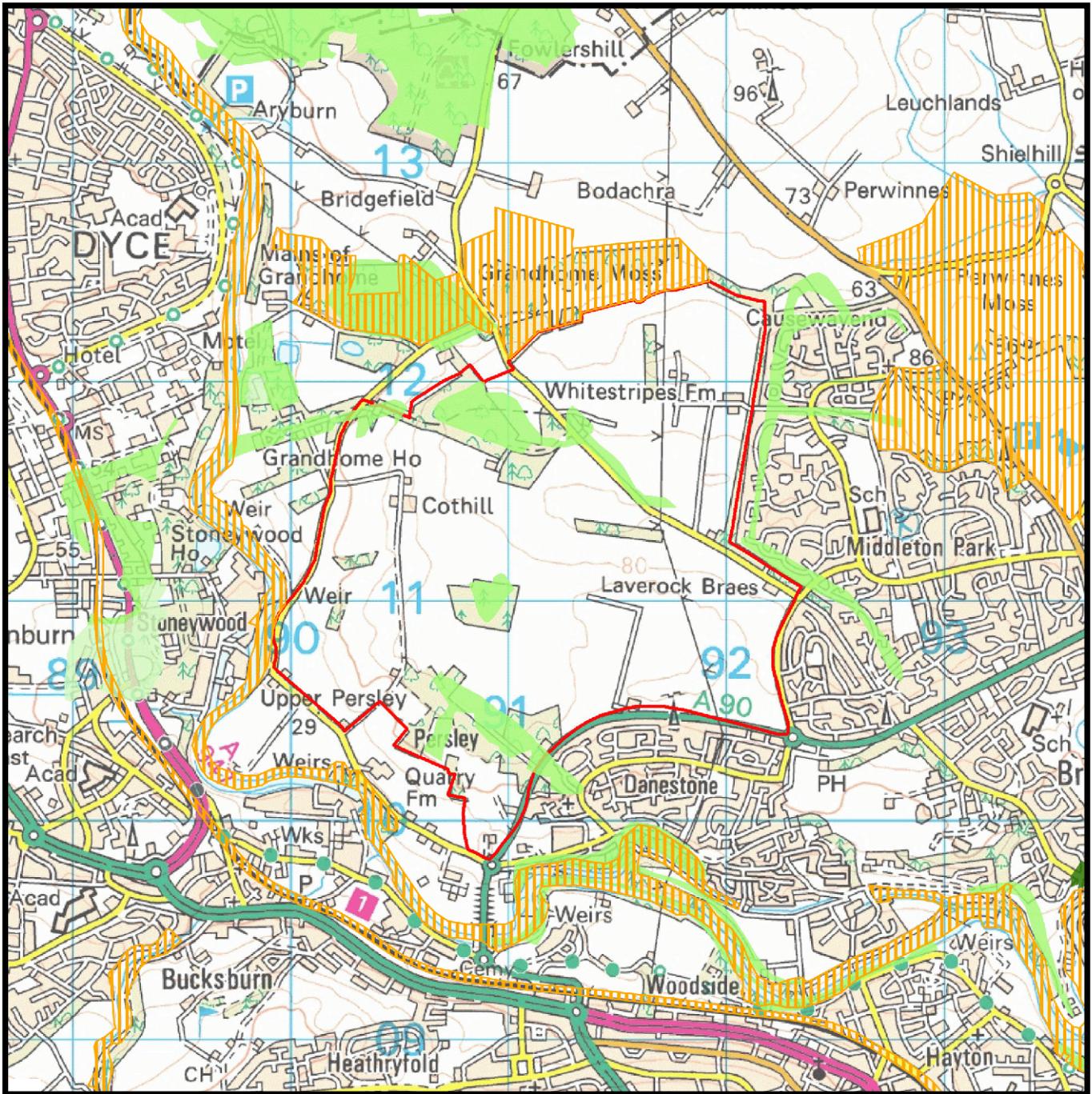


- | | | | |
|---|-------------------------------|---|-------------|
|  | Ecology appraisal survey area |  | SSSI |
|  | 2km from site |  | NNR |
|  | 5km from site |  | SPA |
|  | 10km from site |  | SPA |
| | |  | Ramsar site |
| | |  | LNR |

FIGURE 9.1

Statutorily Designated Sites





 Ecology appraisal survey area

 Local Nature Conservation Sites

Ancient Woodland

-  Ancient (of semi-natural origin)
-  Long-Established (of plantation origin)
-  Other (on Roy map)

FIGURE 9.2

Non-Statutorily Designated Sites



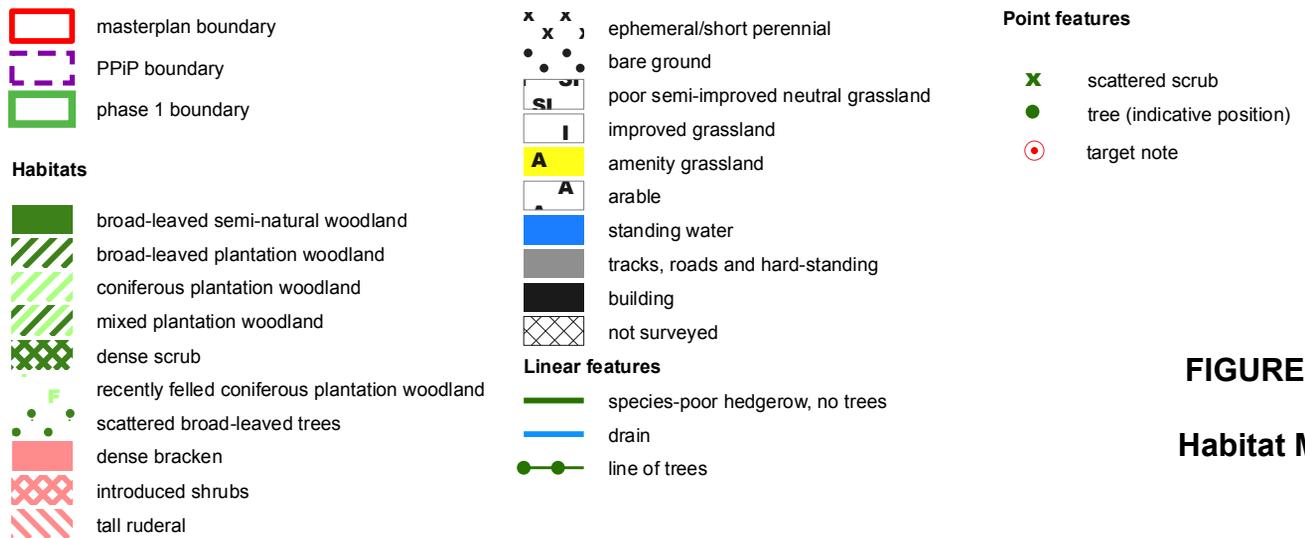
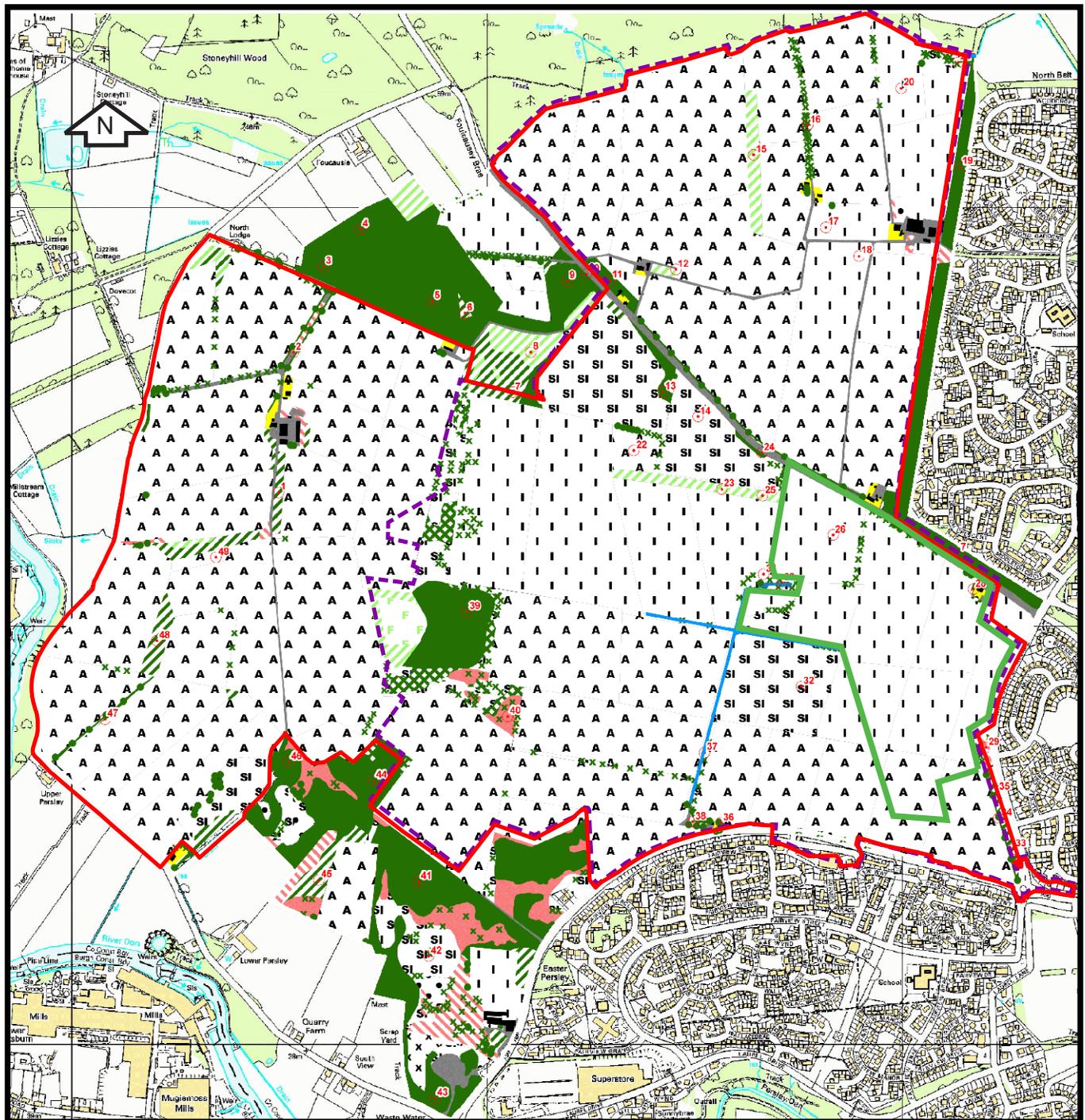


FIGURE 9.3
Habitat Map

10. Flood Risk and Drainage

Introduction

- 10.1 This chapter considers potential effects relating to flood risk and drainage. Whilst the drainage section mainly addresses surfacewater flows, an overview of the proposed foul drainage strategy is also provided, on the assumption that any associated environmental effects would be a matter for Scottish Water to consider once the flows from the development are discharged into their sewers. Effects relating to groundwater are addressed in Chapter 11.
- 10.2 The chapter should be read in conjunction with **Technical Annex 6**, which comprises the following reports:
- Water Quality Sampling in Disused Quarry, December 2012, Ref. 92017; Fairhurst. This report details the sampling, testing and assessment of the former manganese quarry located close to the boundary between the proposed Phase 1 and Phase 2 development areas.
 - Stormwater Drainage Assessment (DA), September 2013 Ref 13-0204/R-01: Pearce Design Consultants. This report details the stormwater drainage strategy for the site and describes the Sustainable Urban Drainage System (SuDS) principles to be applied to the proposed developments phases.
 - Flood Risk Assessment (FRA) Scoping Study, September 2013, Ref. 13-0204/R-02: Pearce Design Consultants. This report broadly outlines the high-level flooding risk for the masterplan PPIP Application site and details a strategy for further FRA works specific to future phased development.
 - Consultation and Scoping Opinion Responses – Flood Risk and Drainage, September 2013, Ref. 13-0204/R-03: Pearce Design Consultants. This report collates the key response documents which have partially informed the stormwater strategy
- 10.3 The assessment of flood risk and drainage was carried out in accordance with legislative guidance and the EIA Scoping Report. In summary, it comprised characterisation of the existing water environment, identification and prediction of potential effects as a result of the development, and recommendations for any secondary mitigation measures (i.e. those not already included in the masterplan or considered to be standard practice) required to offset any significant residual effects.
- 10.4 The assessment largely adopts a strategic approach, consistent with the level of detail being sought within the PPIP application. Detailed assessments, including specific engineering proposals, will be carried out as each phase of the development is brought forward.
- 10.5 However, the design of Phase 1 has been progressing, with a view to submitting a full application in 2014. The principles set out within this chapter have therefore been applied to Phase 1, and will be assessed in detail when that application is brought forward. This approach is intended to provide a level of assurance that the key principles are sufficiently robust to be applied throughout the PPIP scheme and remainder of the masterplan.

Scope

10.6 The assessment has sought to address the following key issues:

- The influence of the proposed development on the River Don and its floodplain, since the topography is such that large areas of the masterplan in the south and west drain towards this watercourse.
- The proposed change to the natural drainage regime of the site. Legislation and best practice guidance requires the implementation of SuDS, which have formed the basis of the Stormwater Drainage Assessment (DA).
- Stormwater and surface water quality. Consideration of treatment of run-off from trafficked areas from the completed development and consideration of the potential effects of construction and phasing of the proposed works on the stormwater run-off quality.

10.7 Consultation on flood risk and drainage matters was sought from the Scottish Environment Protection Agency (SEPA) and Aberdeen City Council (ACC). This was in the form of meetings and an exchange of correspondence which advised on standard policy issues and more specific guidance in respect of this development. A copy of the correspondence received from SEPA and ACC is included within the Technical Annex. The following is a summary of the key issues to arise:

- Advice on legislative and policy documentation in respect of flood risk assessment and surface water drainage including implementation of SuDS and also levels of treatment required for specific area types.
- Reference to other authority bodies such as Scottish Water (SW) in terms of SuDS features and adoption policy and strategy.
- Identification of key aspects of pollution prevention and environmental management both during construction and post-completion.
- Identification of key aspects of engineering activities in the water environment through implementation of the Water Framework Directive and including Scottish Planning Policy (SPP) constraints on culverting and minimisation of engineering activities adjacent to watercourses.
- Advice on disruption to wetland areas.

10.8 SEPA also provided more specific advice in respect of the design proposals in terms of broad agreement to the strategic approach to the undertaking of Flood Risk Assessments (FRAs) and also positive feedback in terms of utilisation of existing watercourses and hydrology as a means of controlling stormwater run-off. Further advice was provided in respect of implementation of SuDS, which has closely informed the Stormwater Drainage Assessment (DA).

Methodology

- 10.9 The consultation process has enabled an appropriate FRA strategy to be developed. The site is clearly not at risk from the River Don and includes only a small number of minor watercourses. The topography of the site indicates that most of the site would not be subject to flooding, and there appear to be no locations where flooding may constrain development.
- 10.10 Consequently, the assessment has taken the form of an FRA Scoping Study, which identifies high-level issues to be addressed and provides a framework within which a more detailed FRA will be undertaken in support of the design and detailed applications for each phase. Such a detailed FRA will be undertaken in respect of Phase 1, but is not anticipated to significantly influence the current scheme design and layout.
- 10.11 The post-PPiP phases of the masterplan will be located closer to the River Don, which may influence the development layout and the position of SuDS features such as long-term storage. In addition, these phases would be developed so far in the future that the effects of climate change and the policy regime could significantly alter. A detailed re-consideration of flood risk will therefore be required at the appropriate time.
- 10.12 The consultation process has also supported and informed the conceptual design approach and philosophy for stormwater management. This will be based on the implementation of SuDS design principles, whereby post-development stormwater is controlled and managed on the site in such a way that it replicates as closely as possible the pre-development situation. This enables the three principles of SuDS - Quantity, Quality and Amenity & Biodiversity - to be applied.
- 10.13 On the basis of the above, the rate and volume of surfacewater run-off for each phase will be controlled and managed so that the post-development situation would not exceed existing greenfield flows. The development proposals follow the existing topography and contours as closely as possible, whilst existing watercourses and stormwater outfalls will be used wherever practicable.
- 10.14 The assessment of baseline hydro-morphological conditions was based on observations from a site walkover and a desktop study. Data sources used to inform the assessment include historic mapping, aerial photography and SEPA's River Basin Management Plan (RBMP) Water Body Information Sheet.

Policy and Guidance

- 10.15 Relevant national policy and guidance may be summarised as follows:

European and National

- EU Water Framework Directive (WFD) 2000/60/EC
- Town and Country Planning (Scotland) Act 1997
- Planning etc (Scotland) Act 2006
- Building (Scotland) Regulations 2004
- Environment Act 1995
- Water Environment and Water Services (Scotland) (WEWS) Act 2003
- Water Environment (Controlled Activities) (Scotland) Regulations 2005 and 2011 (CAR)
- Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2013

- Sewerage (Scotland) Act 1968
- Flood Risk Management (Scotland) Act 2009
- Roads (Scotland) Act 1984
- Control of Pollution Act (COPA) 1974
- Scottish Planning Policy 2012
- PAN 61: Planning and Sustainable Urban Drainage Systems (2001)
- PAN 69: Planning and Buildings Standards Advice on Flooding (2004)
- PAN 79: Water and Drainage (2006)
- PAN 83: Masterplanning (2008)
- The Scottish Government - Designing Streets (2010)
- The Scottish Government - Designing Places (2010)
- General Guide to the Prevention of Pollution (PPG1)
- Works in, Near or Liable to affect Watercourses (PPG5)
- Working at Construction and Demolition Sites (PPG6)
- Control of water pollution from construction sites (CIRIA C532)
- Control of water pollution from linear construction sites (CIRIA C648)
- Civil Aviation Authority (CAA) CAP772 – Birdstrike Risk Management for Aerodromes (2008)

Technical Standards

- WRc (plc) Sewers for Scotland (2nd Edition) (2007)
- SCOTS/SuDS Working Party - SuDS for Roads (2009)
- Joint DEFRA/EA Flood and Coastal Erosion Risk Management R&D Programme - Preliminary rainfall run-off management for developments - R&D Technical Report W5-074/A/TR/1 Rev E, January 2012
- Institute of Hydrology Report 124 - Flood Estimation for Small Catchments (1994)
- The Flood Studies Report - NERC (1975)
- Flood Estimation Handbook, Centre for Ecology and Hydrology, Wallingford (1999)
- BRE Digest 365 (1991)
- CIRIA C697 The SuDS Manual (2007)
- CIRIA C635 Designing for exceedance in urban drainage – good practice (2006)
- CIRIA C609 Sustainable Drainage Systems
- CIRIA X108 Drainage of Development Sites – A Guide (2004)
- CIRIA C532 Control of Water Pollution from Construction Sites - Guidance for Constructors and Contractors (2001)
- CIRIA C521 Sustainable urban drainage systems. Design manual for Scotland and NI (2000)
- CIRIA C582 Source control using constructed pervious surfaces (2002)
- CIRIA C698 Site Handbook for the Construction of SuDS (2007)
- CIRIA C624 Development and Flood risk: guidance for the construction industry (2004)
- CIRIA C625 Model Agreements for sustainable water management systems.
- CIRIA C156 Infiltration drainage manual of good practice (1996)
- SEPA Working at Construction and Demolition Sites: PPG6
- SEPA Drainage Assessment – A Guide for Scotland (2005)
- SEPA Strategic Flood Risk Assessment - SEPA technical guidance to support Development Planning
- SEPA LUPS GU2 Planning Advice on Sustainable Drainage Systems (SuDS) (2010)

- SEPA WAT-PS-06-08 – Policy and Supporting Guidance on Provision of Waste Water Drainage in Settlements (2006)
- SEPA A Do's and Don'ts Guide for Planning and Designing Sustainable Urban Drainage Systems
- SEPA Groundwater Protection Policy for Scotland (2009)
- SEPA Ponds, Pools and Lochans – Guidance on Good Practice in the Management and Creation of Small Waterbodies in Scotland (2000)
- SEPA Watercourses in the Community (2000)
- SEPA Technical Flood Risk Guidance for Stakeholders v6, 2010
- The Highland Council – Construction Environmental Management Process for Large Scale Projects
- Interpave – Understanding Permeable Paving - Edition 5 (2013)

Local Policy

- Aberdeen City Council – Local Development Plan 2012 Policy NE6
- Aberdeen International Airport – Aerodrome Safeguarding Guidance –Proposed Developments on or around Aberdeen International Airport (January 2013)

Baseline Conditions

Topography

- 10.16 The majority of the site occupies the northern slopes of the Don valley, rising from an elevation of around 30m AOD at its south-western boundary, to a ridge which runs east/west across the centre of the site at elevations of up to 90m AOD. Levels decrease beyond Whitestripes Road, reaching around 65m AOD along the northern boundary. A valley is located to the south of Whitestripes Road to the east of the development site.

Surfacewater Drainage

- 10.17 There are a small number of existing minor watercourses located within the site. These comprise a series of orthogonal drainage channels which run east to west within the natural valley to the south of Whitestripes Road and connect to a channel which runs north to south from this point to the southern boundary of the site close to the A90 Parkway.
- 10.18 The Scottish Water sewer records indicate that the channel connects to a 1050mm diameter concrete culvert within the site, which then outfalls to the south under A90 Parkway, continuing through the Danestone area. It is assumed that the sewer ultimately outfalls directly into the River Don further to the south. It is understood that the drainage channels are natural watercourses which have been straightened and channelized, presumably to improve drainage efficiency and to align with field boundaries.
- 10.19 There is an existing water feature located immediately to the north of the orthogonal drainage channels, comprising a former manganese quarry that has naturally infilled with groundwater. It is believed that the former quarry is fed with groundwater from a natural spring located further to the north. There are also likely to be field drains in this area which may also supply groundwater to the former quarry. A channel outfall from the southern end of the former quarry connects directly to the orthogonal series of drainage channels.

- 10.20 The area immediately to the south of the former manganese quarry is the low point of the valley and is boggy. To the west of the development site there are two further minor open natural watercourses (burns) which follow the natural topography of the site, running east to west, flowing into the River Don further to the west and south-west. There are no existing crossing structures throughout the site carrying any farm tracks or local roads across the watercourses.
- 10.21 The majority of the site is currently agricultural land and is drained to the drainage channels in the east and the watercourses to the west, via a network of field drains. Localised areas of the site appear to drain poorly at present, suggesting that the field drainage network is either not maintained or not as extensive as it should be.
- 10.22 The Scottish Water sewer records indicate that stormwater sewers are located within Whitestripes Avenue to the east of the site, and appear to serve existing developments to the north and east of Whitestripes Avenue. There appear to be no existing stormwater sewers located within the A90 Parkway to the south. The local drainage regime is shown in **Fig 10.1**.

Foul Drainage

- 10.23 There is no public foul drainage infrastructure within the masterplan site; the various properties located within or adjacent to the site are assumed to drain to private septic tanks discharging to soakaways or watercourses. The nearest public sewers are within the existing Bridge of Don settlement to the east and in the Danestone settlement to the south of the A90.
- 10.24 The intention is to convey foul drainage from all phases of the development, via new sewers, to the Persley wastewater treatment works (WWTW), located to the south-west. The Persley WWTW pumps sewage to the Nigg WWTW to the south-east of Aberdeen. It is understood that the Persley WWTW has sufficient capacity to accept the discharge from part of the development, subject to the agreement of Scottish Water and the PFI Company.

Flood Risk

- 10.25 Based on a review of current flood risk documentation, there are no functional floodplains within the PPIp site. The existing dwellings and agricultural buildings within the site are unlikely to be at risk of flooding. Whitestripes Road is located on an east-west ridge at the high point of the site and therefore will not be subject to flooding.
- 10.26 The orthogonal drainage channels orientated east-west adjacent to the former manganese quarry may give rise to out-of-bank flows locally in flood conditions. The north-south section is deeper and more channelized, which would contain flows within the watercourse. Localised flooding at the low point in this area may occur prior to discharging into the north-south channel. The SEPA flood mapping is shown in **Fig 10.2**.

Hydromorphology

- 10.27 During the course of a site walkover, the main drainage channel was observed to have been subject to morphological modification and is typically incised and linear with a uniform cross-section. There was no evidence of active low-level erosion throughout the

study reaches or local 'hot-spots' where cattle and sheep access the watercourses to drink. Bed substrate is typically coarse with some pockets of finer sediment.

- 10.28 It is likely that there could be a high sediment content in the run-off from arable catchments, particularly in fallow periods, but the orientation of the watercourses does not naturally drain large agricultural areas. There is no evidence that the minor reaches are heavily vegetated, which would be indicative of a nutrient-enriched water environment which receives run-off from fertilised fields.
- 10.29 There is no baseline water body in terms of the Scotland RBMP. The water body information sheet for the burn records the watercourse to the east as being of bad status in terms of morphology due to channelisation, realignment and straightening.

Predicted Effects on Drainage

Design Strategy

- 10.30 The development proposals have been prepared based on a philosophy to respect existing topography and contours and to utilise existing stormwater hydrology and outfall locations. The drainage strategy is to ensure that the post-construction stormwater management replicates the pre-construction conditions as closely as possible. The proposed development layout incorporates hydrological features such as the former manganese quarry and the low-lying area to the south, which are incorporated into green spaces.
- 10.31 Development will be located an appropriate distance (6-20m) away from these features in accordance with Aberdeen LDP 2012. Similarly, existing watercourses and drainage channels will be retained and incorporated into the post-construction layouts with development set back at least 3m from the banks, in accordance with the LDP and to create safe margins with biodiversity.

Surfacewater Drainage

- 10.32 In accordance with Scottish Planning Policy and all associated legislation and technical guidance, it is proposed to implement SuDS throughout all phases of the development to ensure that a robust stormwater management strategy will be in place. The three key principles of SuDS - Quality, Quantity and Amenity & Biodiversity - will ensure that all aspects of design raised during the consultation process, such as flood risk, control of discharge, pollution control etc, will be adequately addressed.

PPiP

- 10.33 The PPiP scheme represents a fundamental change in the land-use and runoff characteristics of the local catchments. In the absence of mitigation, this change would be likely to have a significant adverse effect on the quality and quantity of peak flows, resulting in a locally increased risk of flooding and the silting and pollution of watercourses due to runoff from areas such as trafficked surfaces.
- 10.34 However, the surfacewater system will replicate the natural drainage of the catchment and mitigate many of the adverse effects of urban runoff by:
- managing and restricting runoff rates to reduce the risk of downstream flooding;

- encouraging natural groundwater recharge (where appropriate);
- reducing pollutant concentrations in the runoff and acting as protection to the receiving waters;
- contributing to the enhanced amenity and aesthetic value of developed areas; and
- providing habitats for wildlife in urban areas and opportunities for biodiversity enhancement.

10.35 The drainage system will be tested to assess performance during extreme rainfall events and overland flow routes will be considered to ensure that runoff is managed safely. Site levels will be set in order to prevent water from entering buildings or from restricting access for emergency vehicles.

Phase 1

10.36 The conceptual approach set out in the DA has been applied to the scheme design for Phase 1. A SuDS management train philosophy has been used, which commences with various options for 'at-source' control such as rainwater harvesting, soakaways and permeable paving, followed by further levels of attenuation/infiltration downstream such as detention and infiltration basins plus interconnecting swales. The management train also includes long-term storage which provides attenuation for major storm events up to 1 in 200 years, which is a mandatory requirement.

10.37 The SuDS management train approach more closely replicates the existing hydrology by controlling and attenuating the stormwater runoff such that outfall velocities and discharge rates are significantly reduced compared to a conventional piped drainage system. For Phase 1, the site area is 27ha and the development area is c20ha, of which c13ha is estimated to be impermeable. Private and public 'at-source' SuDS features are to be incorporated wherever possible, which will reduce the required capacity for the piped stormwater network and also the principal and secondary SuDS features.

10.38 The upper-bound limit for required storage and attenuation area for the main SuDS features will be c.9000sqm, which will be located throughout the Phase 1 area to suit the layout and topography. The main SuDS features will comprise detention and infiltration basins with conveyance swales. Infiltration is included where possible to suit the position within the SuDS management train and the required number of pollution control treatment levels. Infiltration rates used for scheme design have been based on the results of field testing. Long-term storage (LTS) is also incorporated into the SuDS management train positioned close to the outfall location. Outfall discharge into the receiving watercourse will be limited to the existing greenfield runoff generated by the catchment.

Phases 6 and 7

10.39 Phases 6 and 7 of the overall masterplan will adopt the same stormwater strategy utilising SuDS principles. The strategy will be to outfall into the existing burns draining towards the west and south-west of the site, whilst maintaining similar discharges to the greenfield condition by using SuDS features mainly located within green corridors.

10.40 Existing runoff from the site is likely to carry levels of nutrients and suspended solids, in comparison to which the proposed scheme would deliver improvements to water quality that would benefit local watercourses and biodiversity, and – ultimately – the River Don.

10.41 In order to comply with the safeguarding requirements of Aberdeen Airport, the SuDS design avoids creating long-standing bodies of water. At the detailed design stage, careful consideration will be required to limit the period of time that water is contained within SuDS features following 'normal' storm events as well as more extreme events.

Foul Drainage

10.42 A foul drainage strategy for the PPIP scheme has been developed in consultation with Scottish Water and is shown in **Fig 5.11**. New gravity foul sewers will be provided to serve the development, connecting to a pumping station, which will discharge to a new gravity sewer that will convey flows to the Persley WWTW. This sewer is likely to be laid within the A90/Parkway corridor. Later phases of the masterplan would require a second sewer connection, which is likely to be laid along Persley Lane.

10.43 Sewers and pumping stations will be designed and installed in accordance with Sewers for Scotland, Second Edition, November 2007. Individual houses and properties will each be connected to the foul sewers via a disconnection chamber. The foul drainage system, including the pumping station, would be adopted and maintained by Scottish Water subject to the Sewers for Scotland guidance.

10.44 The Persley WWTW currently has the capacity to serve the initial phases of the development, but would need to be upgraded at some stage. Such upgrades are a matter for Scottish Water, who would be responsible for assessing any associated environmental effects and for implementing whatever mitigation may be required under the provisions of their discharge licence.

10.45 As a result, neither Phase 1, the PPIP scheme nor the remainder of the masterplan would have any adverse effects on the existing foul drainage system, whilst it may be assumed that any future of the Persley WWTW would be permitted only if its environmental effects were considered to be acceptable.

Predicted Effects on Flood Risk

10.46 Development of the site and associated implementation of a SuDS management train will improve the existing baseline position by controlling stormwater within each phase of development. Control will be provided by infiltration, storage and attenuation prior to discharge to existing watercourses. As a result, flood risk would be reduced by incorporating attenuation measures within the drainage system. The detailed design process will include modelling of catchment areas and watercourse profiles so that existing and proposed flow characteristics are known and hence any flood effects will be mitigated through design.

10.47 Development will be set back from watercourses and stormwater features and will remain outside the envelope of the 1 in 200 flood. Detailed FRAs will be undertaken for each phase of development to ensure that flood risk from development will not affect property and infrastructure or their associated maintenance routes.

10.48 The development layouts will require some infrastructure such as bridges and culverts to be located in the vicinity of the watercourses. These will be designed to maintain or improve existing flow conditions. Typically SEPA's General Binding Rules will be applied ensuring that any watercourse crossings are simple in nature and simple to regulate.

There are no existing capacity-restricted crossings which would be required to be upsized.

- 10.49 The residual effects on flood risk are therefore predicted to be neutral for each of the three development scenarios: PPIP, Phase 1 and overall masterplan. New residents of the development would not be exposed to any flood risk. Levels of risk both on- and off-site would not increase, and may well be reduced, since the site currently does not contain any specific attenuation features.

Predicted Effects during Construction

- 10.50 Construction activity carries the potential risk of direct contamination of receiving watercourses in terms of hydrocarbons, chemicals or particulate matter. There is also the potential risk of contamination of soils and groundwater, including aquifers, from hydrocarbons or chemicals.
- 10.51 Potential sources of hydrocarbon contamination include plant and vehicles, mainly due to poor maintenance and inappropriate refuelling procedures. Inadequate procedures and poor supervision working close to watercourses and water bodies increase risks of direct contamination. The nature of construction in terms of exposure of sub-soils and extensive earthworks activity provide situations where runoff generated by storm events can wash particulate matter directly into watercourses and water bodies.
- 10.52 Surfacewater runoff during the construction phase will potentially be heavily laden with silt. In order to prevent this runoff from polluting receiving waters a surfacewater management strategy and schedule of mitigation will be prepared for each phase. This strategy will incorporate the following mitigation measures:
- localised interception of surface water run-off by temporary ditches or channels around the area of works;
 - settlement ponds to provide surface water settlement and filtration;
 - protection of permanent drainage system from silts and pollution;
 - careful siting and bunding of plant fuelling and storage areas; and
 - avoiding potentially polluting activities during periods of heavy rain.
- 10.53 A Construction Environmental Management Plan (CEMP) will be prepared by the contractor/s for approval prior to the commencement of each construction phase. The CEMPs will provide details of how surface water runoff will be dealt with during construction and will adhere to the principles set out in the surfacewater management strategy and schedule of mitigation.
- 10.54 The sub-phased nature of construction within each phase of development will also require detailed consideration. The initial infrastructure works for Phase 1 will include construction of principal roads and drainage, and these roads will be used for construction access during the subsequent development sub-phases. A rigorous regime of protection and cleaning as part of the CEMP will be put in place to ensure that pollution and sediment does not enter the stormwater system during these works.

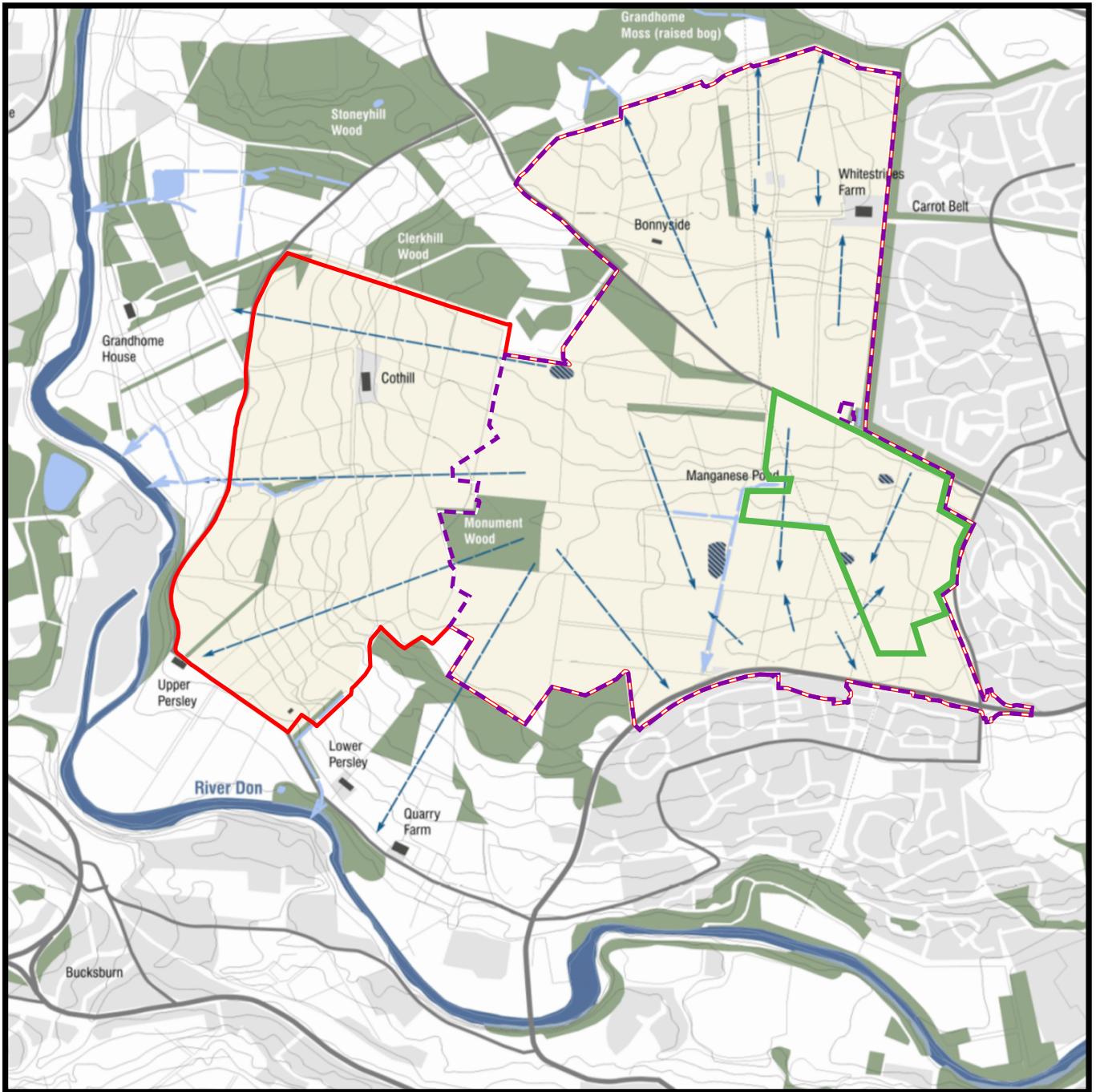
- 10.55 In the absence of mitigation, significant adverse effects on surfacewater quality could occur during the construction of the PPIP scheme, Phase 1 and the overall masterplan. On the assumption that the proposed mitigation is fully adopted and is effective, the residual effects are not anticipated to be significant.

Predicted Effects on Hydromorphology

- 10.56 Development of the site will change how the minor watercourses receive groundwater and pluvial flow. However, the stormwater management strategy to be adopted for each development phase is based on retaining existing catchments and replicating greenfield discharge volumes. In addition, the hydrology of green spaces, including features contained within those areas, will be designed such that the existing characteristics will be replicated. On this basis, the effects of development on hydro-morphology would not be adverse and should be slightly beneficial.
- 10.57 There are no proposals to actively restore modified elements of the water environment within the site, although some remodelling of the bank profiles may be appropriate. However, the existing watercourse channels are managed features with regular clearance undertaken to maintain their conveyance characteristics. If this level of management is reduced, a natural process of restoration can start to occur. In this regard, the development is anticipated to have a positive impact on watercourse morphology, leading to increased habitat diversity and ecological value.
- 10.58 Although the two minor watercourses located to the west of the site within the final phases of the masterplan are characterised by relatively steep longitudinal gradients, restorative behaviour may involve some lateral migration of the channel. In adopting the principle of setting development back from the banks of the watercourses and outwith the biodiversity zone, sufficient space for this natural process should be available.
- 10.59 Sediment sources within the watercourse catchments will diminish as the development replaces existing farmland. This may reduce the potential rate of change in the watercourses. However, it is possible that morphological recovery could lead in the long-term to reduced channel depths through sediment deposition, returning the watercourses to a more natural profile. The anticipated reduction in channel depth would also reduce the conveyance capacity and so increase the risk of flooding. In the event this was to occur, it would constitute a very minor effect. Whilst the scale of restoration is impossible to anticipate, no properties would be close enough to any of the minor watercourses to be considered vulnerable.
- 10.60 Untreated construction runoff can have implications for channel morphology, although the relatively short-term nature and high-energy receiving environment mean that impacts would not be significant. The CEMPs will outline appropriate measures to isolate potentially silty run-off, which may include silt traps, bunds, filtration or proprietary systems.
- 10.61 The water body at the former manganese quarry is being retained and incorporated as a landscape feature. Existing drainage entering, running through and eventually discharging to the drainage channel will be maintained. Incorporation of the principles and measures described above would ensure that the Phase 1 development would have no net effect on the morphology of this catchment.

Residual and Cumulative Effects

- 10.62 In terms of the water environment, any impacts associated with the development can largely be mitigated through design or compliance with guidance and best practice during construction. No significant residual impacts have therefore been identified.
- 10.63 It is anticipated that the watercourses within the site may undergo a natural process of morphological restoration and this will result in a long-term positive residual impact in terms of habitat diversity and ecological value. There is no significant increase in flood risk, due to the extremely minor nature of the three watercourses.
- 10.64 No potential for cumulative effects in relation to other developments has been identified.

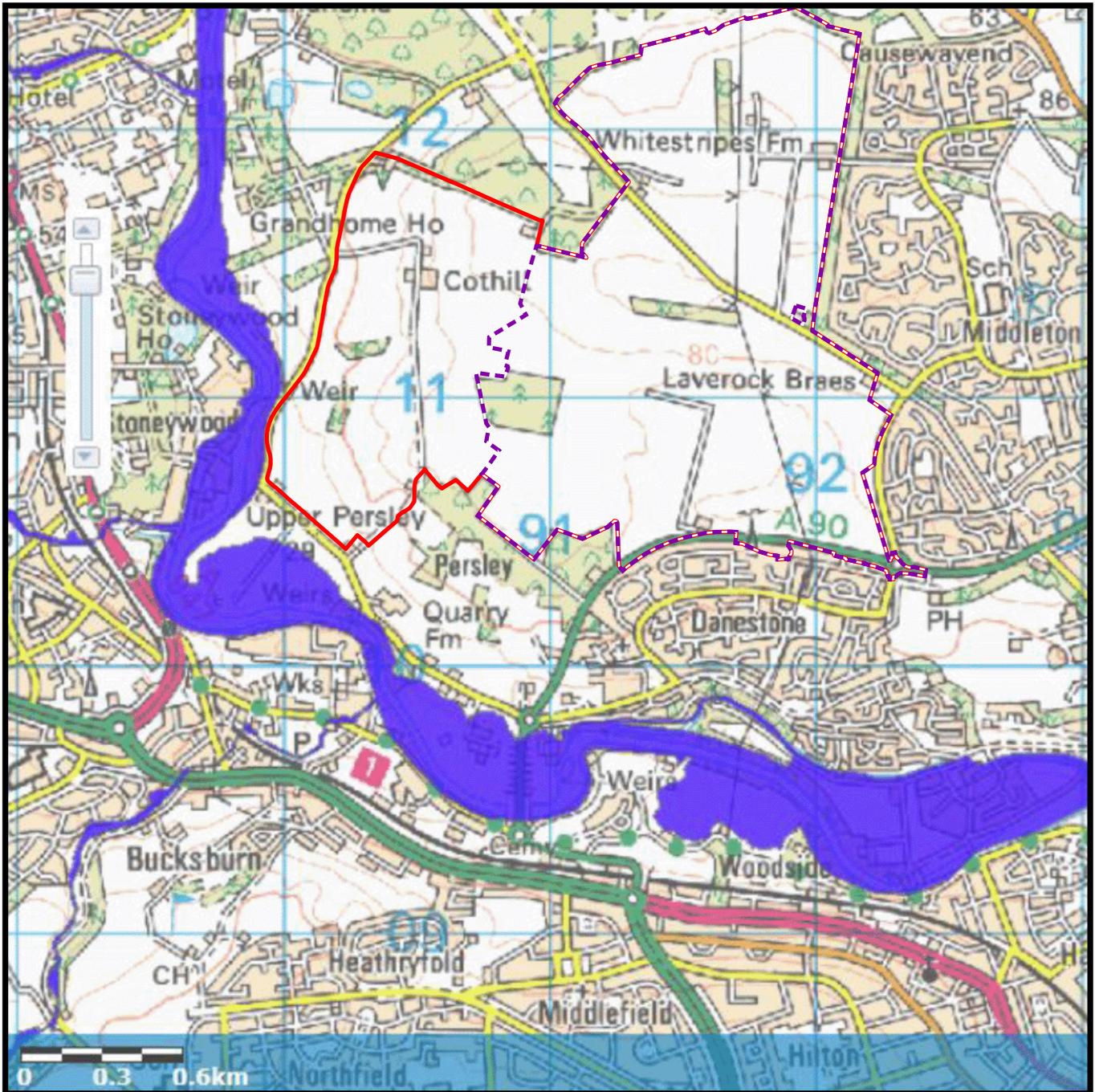


-  Direction of natural drainage
-  Localised damp ground
-  Streams/ditches
-  Lochan or mill pond
-  Masterplan Boundary
-  PPIp Boundary
-  Phase 1 Boundary

FIGURE 10.1

Local Drainage Regime





- Overall Masterplan Boundary
- PPIP Boundary
- Areas at risk of flooding from rivers

FIGURE 10.2

SEPA Flood Map



11. Geo-Environment

Introduction

- 11.1 This chapter assesses the impact of the proposed development on soils, geology and contamination, including the potential for existing and historical ground contamination to be encountered, and for contamination to occur during and after the development's construction stage. Where potentially significant environmental effects are identified, mitigation measures are presented to avoid, reduce or offset these impacts. Residual effects have been evaluated, taking account of the committed mitigation measures.
- 11.2 The chapter should be read in conjunction with the desk-based study and site investigation (SI) report presented in **Technical Annex 7**.

Scope and Methodology

- 11.3 Site investigation work was carried out in 2012 to verify the potential ground gas and contamination risks associated with two locations within the site: Hall's Quarry and an area of made ground south of Whitestripes Road (Upper Bonnyside). The findings from this site investigation have been reviewed and incorporated into this chapter.
- 11.4 In addition, the following work has been undertaken to complete the assessment:
- historic map regression to identify previous uses;
 - review of regulatory data for the site and surrounding area, provided by Landmark Information Group (see Technical Annex 7) and by Aberdeen City Council, to establish potentially contaminative land uses such as landfills and industrial installations;
 - consultation with the Aberdeen City Council Contaminated Land Officer for information on known or potential contamination sources at the site;
 - review of British Geological Survey (BGS) published information to determine ground/groundwater conditions; and
 - review of relevant information from other environmental studies undertaken for this EIA.
- 11.5 An initial ground contamination assessment has been completed based on a conceptual risk model identifying potential risks to groundwater, site workers, future users, services/structures, and surrounding receptors. Further investigations to inform the detailed design, and other committed pre-construction mitigation measures as appropriate, have been specified as appropriate.

Policy and Guidance

Legislation

- 11.6 The Nature Conservation (Scotland) Act 2004 (Ref. 11.1) allows SNH to designate Sites of Special Scientific Interest (SSSIs), including for geological importance. SSSIs are

protected by law and it is an offence for any person to intentionally or recklessly damage the protected natural features of them.

- 11.7 Part IIA of the Environmental Protection Act 1990 (Ref. 11.2) and the Contaminated Land (Scotland) Regulations 2005 (Ref. 11.3) define contaminated land as land which appears to the local authority to be in a condition that significant harm is being caused, or there is the significant possibility of significant harm being caused, or pollution of the water environment is being or is likely to be caused. The legislation places a responsibility on the Local Authority to determine whether land in its area is contaminated.
- 11.8 The Environmental Liability (Scotland) Regulations 2009 (Ref. 11.4), put a legal requirement on polluters to prevent and repair damage to the environment (protected species, habitats, water, land), caused by activities as detailed in Schedule 1 of the Regulations. Activities which may be relevant to the Grandhome development include: waste management; and use, release and on-site transport of dangerous substances (e.g. accidental leakage of fuels/oils during construction).
- 11.9 The Groundwater Regulations 1998 (Ref. 11.5) provide the Scottish Environment Protection Agency (SEPA) with statutory powers to prevent discharge of certain dangerous substances to groundwater and to control related pollution. The Water Environment (Oil Storage) (Scotland) Regulations (Ref. 11.6) provide standards for the design, capacity and installation of containers for storing oils above ground.

National Planning Policy

- 11.10 Scottish Planning Policy (SPP) (Ref: 11.7) is the over-arching Scottish Government policy on land use and planning, the relevant sections of which are as follows:
- Paragraph 37 states that decision making in the planning system should take into account the implications of development for water, air and soil quality.
 - Paragraph 133 states that where peat and other carbon rich soils are present, applicants should assess the likely effects associated with any development work (relating to greenhouse gas emissions).
 - Paragraph 137 states that development affecting a SSSI (which may be notified for the special interest of its geology or geomorphological features) should only be permitted where the development will not adversely affect the SSSI's integrity or where such effects are clearly outweighed by social, environmental or economic benefits of national importance.
- 11.11 Planning Advice Note (PAN) 51 Planning, Environmental Protection and Regulation (Ref. 11.8), summarises the statutory responsibilities of the environmental protection bodies, and informs those bodies about the planning system.
- 11.12 PAN 33 Development of Contaminated Land (Ref. 11.9), provides information on land contamination as part of the planning process, and in particular the implications of the contaminated land regime for the planning system, the development of contaminated land, the approach to contaminated land in development plans, the determination of planning applications when the site may be contaminated, and where further advice can be found.

Local Planning Policy

11.13 The Aberdeen Local Development Plan 2012 (Ref. 11.10) notes at Paragraph 2.13 that an assessment of contamination of brownfield sites will be required prior to the granting of planning permission. This would not apply to most of the Grandhome site however discrete areas of the site could be considered brownfield due to historical development/land use, and these have been particularly targeted for investigation as detailed later in this chapter.

Guidance

11.14 The key guidance documents relevant to the assessment are as follows:

- SEPA Pollution Prevention Guidelines (PPG) 1: General Guide to the Prevention of Pollution (Ref. 11.11);
- PPG2: Above Ground Storage Tanks (Ref. 11.12);
- PPG6: Working at Construction and Demolition Sites (Ref. 11.13);
- BS10175:2011 – Code of Practice for the Investigation of Potentially Contaminated Sites (Ref. 11.14);
- BS5930:1999 – Code of Practice for Site Investigation (Ref. 11.15);
- Guidance on preliminary site inspection of contaminated land CLR2 Applied Environmental Research Centre Volume 1 1994 (Ref. 11.16);
- Sampling Strategies for Contaminated Land CLR 4 Centre for Research into the Built Environment DoE 1994 (Ref. 11.17); and
- Other relevant guidelines issued by the former Department of the Environment, Transport and the Regions (DETR), the Royal Institution of Chartered Surveyors (RICS) and the Building Research Establishment (BRE).

Baseline Conditions

11.15 The key aspects of the geo-environmental baseline are illustrated on **Fig 11.1**, and are described below in relation to the PPiP scheme, Phase 1 and the remainder of the masterplan. Baseline conditions relating to the PPiP are also relevant for the overall masterplan and have not been restated. Where the baseline conditions noted within the PPiP area are located within Phase 1, this has been highlighted.

Designated Geological Sites

11.16 A review of published BGS and SNH information indicates that no part of the site is designated for its geological interests.

Made Ground

11.17 Early in the masterplanning process, the developer, in consultation with Aberdeen City Council, identified two areas of artificial deposits (made ground) on site: Hall's Quarry and Upper Bonnyside. These two areas were investigated by WSP in 2012 as described below and in Technical Annex 7. Further potential areas of made ground have also been detailed below.

PPiP

11.18 Upper Bonnyside is an area of made ground located in the central part of the site (central grid reference approximately 391410, 811535). An additional localised area of potential made ground has been identified at a former quarry area (the area at and around the pond in the east-central part of the site), which may have been subject to some infilling. However, this would have occurred prior to 1900 and no known information is available regarding the nature of any infill materials.

Phases 6 and 7

11.19 Hall's Quarry, located in the south-west part of the site (central grid reference approximately 390350, 810575) was operated as a landfill, reportedly for inert builders waste, in the late 1970s, according to regulatory data provided by Landmark Information Group (included in Technical Annex 7).

11.20 Additionally a small former sand pit on the western part of the site has the potential for being a further localised area of made ground. It is expected that this area may have been subject to some infilling, however previous to 1900 and with no known information regarding the nature of any infill materials.

Sensitivity

11.21 The sensitivity of receptors that may be affected by exposure to potentially contaminated made ground has been categorised as follows:

- Human health, specifically construction workers, end users, site neighbours: High;
- Building materials, including foundation concrete and water supply pipes: Medium, except where human health may be affected sensitivity (e.g. by impact on water supply pipes), in which case it is High; and
- Groundwater: See the discussion below.

Natural Superficial Geology

11.22 Published geological records indicate that natural superficial deposits comprise Banchory Till formation across most of the site area. This formation is described as gravelly and sandy diamicton (i.e. gravel and sand in a clay matrix) of typical thickness from 2 to 5m but up to 8m in some areas.

PPiP

11.23 Two discrete areas within the PPiP site are shown as having no superficial deposits:

- A small area in the central part of the site, at approximately 391030, 811055. Since no excavation is known to have occurred at this location, the absence of superficial deposits may be due to natural thinning of the till.
- A small area in the east-central part of the site, around a small body of water at approximately 391680, 811100. This area is indicated on very early historical maps to have been quarried (pre 1860s) therefore the absence of natural superficial deposits is likely to be due to removal during quarrying.

11.24 An area in the east central part of the site (central grid reference approximately 391615, 810975, size approximately 5 hectares) is underlain by lacustrine deposits, typically comprising soft silts, sands and clays. This area falls within the Phase 1 site.

11.25 A small area towards the north-east of the site (central grid reference approximately 391965, 811855, size approximately 0.8 hectares) is underlain by alluvium, typically comprising clays, silts, sands and gravels, potentially soft or loose in nature.

11.26 The area along the north-eastern boundary of the site is underlain by Lochton Sand and Gravel Formation, comprising glacial sand, gravel and boulders. The far north-eastern corner of the site, extending approximately 80m from the boundary, is recorded on BGS mapping as an area of peat. This extends off-site to the north, east and north-west. Since habitat survey work (see Chapter 9) did not identify peat or bog/marsh vegetation at this location, it is unlikely that peat extends into the site.

Phases 6 and 7

11.27 The area corresponding with Hall's Quarry, in the south-west part of the site, lies within the wider masterplan area. It is shown as having no superficial deposits, which were probably removed during the course of quarrying, with the resultant excavation then backfilled with materials of unknown origin.

Sensitivity

11.28 The superficial materials underlying the site are typical of materials widespread across Scotland and do not comprise an important mineral resource or feature of geological importance. The sensitivity of the superficial geology is therefore considered to be Low.

Solid Geology

11.29 The PPIp site is mainly underlain by the Aberdeen Formation, comprising psammite and semi-pelite (metamorphosed sedimentary rocks), with the south-western part underlain by the Aberdeen Pluton, namely granite. Both of these rock types also extend into the remainder of the masterplan area.

Sensitivity

11.30 The solid geology beneath the site is typical of bedrock which is widespread across the northeast of Scotland, and is not designated for its geological importance. The sensitivity of the solid geology beneath the site is therefore considered to be Low.

Groundwater

- 11.31 The groundwater body underlying the site is identified by SEPA (River Basin Management Plan Interactive Map, 2008) as the “*Lower Don bedrock and localised sand and gravel aquifers*”; water body number 150400. This groundwater body is of Good status, with High confidence in 2008. The quantity of groundwater has been classified as Good, with High confidence. The objectives for this water body are to maintain the chemistry and quantitative status as Good to 2027. No pressures on this groundwater body have been identified by SEPA. The site falls within a Drinking Water Protection Zone.
- 11.32 The granite, psammite and semi-pelite underlying the site is expected to be of low permeability with little or no groundwater near the surface. SEPA, in conjunction with the BGS, classifies the aquifer vulnerability as 4b on a scale in which 1 is least vulnerable and 5 is most vulnerable. This is based on an inter-granular low productivity drift aquifer overlying a fractured, very low productivity aquifer.
- 11.33 Three wells have been identified at the site (from historical maps), although their depth and status are unknown. The WSP site investigation identified no shallow groundwater at borehole locations in natural ground around the edge of Hall’s Quarry. However, Aberdeen City Council previously identified groundwater within the former quarry itself, at depths of below 4m below ground level (bgl). At Upper Bonnyside, the WSP investigation identified shallow perched groundwater.
- 11.34 Taking all of the above into account, the sensitivity of groundwater at the site is considered to be medium.

Historical Development

- 11.35 Historical mapping has been reviewed to identify potentially contaminative features at the site and in the immediate surrounding area. This is presented in Technical Annex 7, and the site’s historical development is summarised in Table 11.1.

Table 11.1: Historical Development of the Site and Surrounding Area

Date Range	Land Uses On Site	Surrounding Land Use
1866-1899	<p>Agricultural land, some areas of woodland, drains, isolated farm houses.</p> <p>A pond is shown at the current location of a small pond’ in the east-central site area. Large-scale mapping indicates <i>Old Quarries</i> at this location.</p> <p>A small sand pit is located in the western site area.</p> <p>A burial ground is located in the northeast part of the site, extent unclear.</p>	Agricultural land. Paper works and corn mills on the Don riverside to the west of the site.
1901-1902	As above, however neither sand pit nor burial ground are shown/labelled. Old quarries not marked at the pond location in the east-central part of the	As above, however corn mills marked as “old”. Quarries immediately south of the site. Additional paper works beyond

Date Range	Land Uses On Site	Surrounding Land Use
	site, but the pond remains.	quarries to the southwest.
1959	As above, however part of Persley Quarries now on site in the southwest corner (area currently known as Hall's Quarry), marked as disused and infilled with water.	As above, however quarries marked as disused.
1965-68	As above, plus a power line now crosses the site from southeast to northwest. Old corn mills no longer marked.	As above.
1981-87	As above. The quarry on site is still marked as disused but is no longer water-filled. The route of the power line has changed and the northern part of it now trends north-south. A tank is marked on-site in the north-central area (Upper Bonnyside).	As above, however quarries to the south largely unmarked. Residential development is evident immediately east of the site.
1990-95	As above.	Residential development to the east has expanded, and there is further residential development evident to the south/southeast of the site at Danestone.
2006	As above, however the former quarry area in the southwest is now labelled as Hall's Quarry and marked as a refuse tip.	As above, however there is further residential development evident to the east of the site, east of Whitestripes Avenue.
2012	As above.	As above.

Regulatory Data

- 11.36 A review of industrial land uses and permits, identified through regulatory data provided by Landmark Information Group (included in Technical Annex 7) and Aberdeen City Council, has been undertaken and is summarised in Table 11.2.

Table 11.2: Regulatory Data for the Grandhome Site and Surrounding Area

Reference	Description	Comment
Discharge Consent S/80/2	Domestic septic tank discharge in the southeast site area. Dated 1980, current status unknown.	Discharges to surface water therefore not relevant to assessment of geology and groundwater effects.
Registered landfill site, licence ref. 1991/08 (previously 1990/04)	Hall's Quarry, registered as a landfill site, located in the southwest site area. Operated by Caird Environmental Ltd. Waste produced/controlled by licence holder, described as inert builders waste. Licence dated 1978, status noted as lapsed/cancelled/surrendered.	Potential source of ground/ groundwater contamination. Subject of intrusive site investigation described later this chapter.
Various BGS Recorded Mineral Sites	Quarries/opencast operations noted to the south of the site and on site at Hall's Quarry. All for quarrying of igneous and metamorphic rock. All noted as ceased.	The on-site quarry, since infilled, is a source of potential contamination as noted above.
Man-Made Mining Cavity,	Noted at the location of the current pond in the east-central part of the site.	Potential source of ground/ groundwater contamination.

Reference	Description	Comment
no reference	Commodity indicated as manganese. No date information however historical maps date the quarry as pre 1860s.	However, given the scale and age of the reported quarry, the risk of water in the pond being contaminated is low. Manganese is a low-solubility metal (meaning it isn't likely to be present in high concentrations in a dissolved state in the pond water), and it is likely that any historical contamination would be buried in >150 years of sedimentation. There is potential for some localised associated contamination in soils in the area surrounding the pond, which will be subject to pre-construction investigation works.
Aberdeen City Council records	Evidence of possible infilling identified at the west end of the very old quarries shown at the current pond location in the east-central part of the site. There are no records relating to the nature of any fill materials.	Potential source of ground/groundwater contamination.
	The small sand pit in the western part of the site is recorded by the Council as an area of likely made ground.	Council considers unlikely to be a significant source of ground/groundwater contamination given age and small scale.
BGS Radon Report	Estimated probability of 1 to 3% of dwellings above radon action level.	Radon protection measures will be required for new buildings. Further detail is given in Technical Annex 7 .

Review of Site Investigation

11.37 The site investigation undertaken by WSP in 2012 (Technical Annex 7) targeted the two previously identified areas of made ground, at Upper Bonnyside and Hall's Quarry. Findings for the two areas are discussed briefly in turn below. Full details are provided in the Technical Annex.

Upper Bonnyside (PPiP)

11.38 The Upper Bonnyside area of recorded made ground extends to approximately 11.3 hectares and currently comprises rough grassland and woodland. A water tank is located on the southern boundary of this site area. The site investigation comprised trial pits within the area of identified made ground, with groundwater/ ground gas monitoring wells around the perimeter.

11.39 The trial pits identified topsoil/tarmacadam overlying made ground (sandy gravelly clay with demolition waste, cobbles and boulders) to depths of up to 3.4m bgl, underlain by natural clay. The perimeter monitoring wells did not encounter made ground. Shallow, perched groundwater was identified in the perimeter monitoring wells.

11.40 Chemical testing identified exceedences of some contaminants in soil samples from the trial pits, including lead and poly-cyclic aromatic hydrocarbons. Contamination was not

identified at shallow depth, suggesting that potential human health risks would amount to a limited potential for exposure. However the potential for unidentified similar contaminants at shallow depth cannot be entirely ruled out due to the heterogeneity of the made ground.

- 11.41 Some contaminant exceedences in groundwater samples were also recorded. Taking account of the contaminant concentrations, the low permeability of the underlying aquifer and the distance to surface watercourses, this source is considered to represent a low risk to the water environment. Ground gas monitoring at Upper Bonnyside identified elevated methane and carbon dioxide concentrations.

Hall's Quarry (Phases 6 and 7)

- 11.42 Hall's Quarry extends to approximately 1.4 hectares and currently comprises rough grassland and woodland, with an area of Japanese Knotweed identified in the south-western part. Aberdeen City Council undertook a site investigation at Hall's Quarry in 2009 and results were reviewed as part of WSP's 2012 site investigation. The Council investigation identified waste materials to a depth of at least 4.7m bgl in the centre of the quarry. Groundwater was recorded at depths greater than 4m, with a conjectured southerly flow towards the River Don. The Council has undertaken on-going groundwater monitoring since 2009.
- 11.43 The WSP site investigation focused on the fields adjacent to the former quarry, to the north and north-west. This is because the former quarry itself is proposed to remain undeveloped as open space, whilst the adjacent area to the north and north-west is proposed for new housing. The investigation aimed to identify the nature of the ground materials, the presence of contamination and the ground gas characteristics.
- 11.44 The investigation identified topsoil overlying sandy clay, with no evidence of made ground. Chemical testing identified no contamination above relevant standards. No groundwater was encountered during the WSP investigation. However, the previous Aberdeen City Council investigation within the former quarry itself identified groundwater below 4m bgl. Groundwater monitoring by the Council identified exceedences of a number of contaminants including metals and hydrocarbons. Taking account of the identified contaminant concentrations, the groundwater depth, low permeability of the underlying aquifer, and distance to surface watercourses, this source is considered to represent a low risk to the water environment.
- 11.45 Ground gas monitoring undertaken as part of the 2012 WSP site investigation identified low risks associated with ground gas (carbon dioxide and methane) affecting proposed new properties. No special gas protection measures were identified as being required.

Summary of Contamination Sources

PPiP

- Upper Bonnyside made ground: Some contamination identified at depths below what would be of concern for human exposure, though a potential for unidentified similar contamination at shallow depths cannot be ruled out. Elevated ground gas concentrations recorded.

- Possible partly infilled quarry/pond in the east-central site area: Low risk of localised residual contamination associated with historical quarrying and possible infilling with unknown materials.
- Natural radon gas associated with the bedrock geology.

Phases 6 and 7

- Hall's Quarry (infilled former quarry): No significant contamination or ground gas concerns identified by site investigation works to date.
- Infilled small sand pit: Low risk of residual contamination associated with historical sand pit and infilling with unknown materials.

Predicted Effects

11.46 Potential geo-environmental effects will occur during the construction phase (as ground disturbance takes place) and as the completed development is occupied by sensitive receptors. Effects have been considered under the following headings:

- Soil compaction during construction;
- Human exposure to contaminated soils;
- Exposure of ground- and surface-waters to contaminated soils;
- Loss of soil arisings;
- Pollution of soils and superficial deposits during construction;
- Ground gas impacts on properties or services;
- Radon gas impacts on properties; and
- Contamination impact on structures and services.

PPiP

Soil Compaction during Construction

11.47 There is potential for compaction of soils and superficial deposits during the construction works, resulting in loss of soil structure and associated alterations to surface run-off, drainage potential and perched water table geometry. The sensitivity of soils and superficial deposits within the site is considered to be low. The magnitude of change associated with the construction works, prior to mitigation, is low. Therefore, there is likely to be a Negligible to Minor negative, direct, permanent, long-term effect prior to the implementation of mitigation measures.

Human Exposure to Contaminated Soils

11.48 There is potential for mobilisation of residual contamination associated with earthworks/re-profiling and excavation for services and underground structures, in areas where contamination has been identified or where contamination may exist and be yet unidentified. Contaminated soils and/or groundwater could be exposed and/or encountered by construction operatives, and contamination could migrate off-site as dust. Post-construction, site end users could be exposed to residual contaminated soils via direct dermal contact, ingestion and inhalation (e.g. digging in garden areas, growing of vegetables).

- 11.49 The sensitivity of potential receptors, namely construction workers, the public and site end users, is high. The magnitude of change prior to mitigation measures is low with the exception of Upper Bonnyside, where it is medium. Therefore, there is potential for a Moderate to Major negative, direct, permanent, long-term effect associated with exposure of residually contaminated soils at Upper Bonnyside, prior to implementation of mitigation measures, with a Minor to Moderate potential across the rest of the site.

Exposure of Ground- and Surface-Water to Contaminated Soils

- 11.50 There is potential for mobilisation of residual contamination during construction works, resulting in impact to groundwater and migration to surface water bodies. The sensitivity of groundwater at the site is medium. The sensitivity of watercourses in the wider area is high. Based on the WSP and Aberdeen City Council site investigation findings the magnitude of change prior to mitigation measures is low. Therefore there is potential for a Minor negative, direct, permanent, long-term effect associated with exposure of residually contaminated soils to the water environment, prior to implementation of mitigation measures.

Loss of Soil Arisings

- 11.51 There is potential for loss of soil arisings from excavations and site profiling through off-site disposal. The sensitivity of soils and superficial materials within the site boundary is low and the magnitude of change prior to mitigation is low. Therefore there is likely to be a direct, permanent, long-term effect on soils and superficial deposits of Negligible to Minor negative significance prior to the implementation of mitigation measures.

Pollution of Soils or Superficial Deposits during Construction

- 11.52 It is anticipated that various oils will need to be stored and used on-site during the construction works, possibly including petrol, diesel, mineral oil, heating oil, lubricating oil, waste oil and plant oil. There is potential for pollution of superficial deposits from spillage or leakage of fuels and oils during the construction works. The primary routes by which contamination could occur include:

- spillages during fuel/chemical delivery or use;
- spillages during refuelling operations if carried out on-site;
- inadequate fuel/chemical storage facilities; and
- spillages during attempted theft or vandalism of stored fuels/chemicals.

- 11.53 The sensitivity of superficial deposits within the site is low. The magnitude of change, prior to mitigation, is high. Therefore, there is potential for a direct, temporary, short to medium-term effect on soils/superficial deposits of Moderate negative significance prior to the implementation of mitigation measures.

Ground Gas Impacts on Properties or Services

- 11.54 Ground gas monitoring undertaken by WSP in 2012 has indicated a high risk to future properties at Upper Bonnyside. The potential for ground gas risks at other areas of the site (not yet subject to intrusive investigation) is considered to be low.
- 11.55 The sensitivity of site end users and maintenance workers is high and the magnitude of change, prior to the implementation of mitigation measures, is high at Upper Bonnyside

and low elsewhere on-site. There is therefore the potential for a direct, long-term, permanent effect of Major negative significance at Upper Bonnyside and Negligible to Minor negative significance elsewhere on-site.

Radon Gas Impact on Properties

- 11.56 The site has been identified as being within an area where there is a risk of radon gas ingress to properties. The sensitivity of site end users is high and the magnitude of change, prior to the implementation of mitigation measures, is low to medium. There is therefore potential for a direct, long-term, permanent effect of Moderate negative significance.

Contamination Impact on Structures and Services

- 11.57 There is potential for residual contaminant concentrations at Upper Bonnyside (and possibly unidentified at other areas yet to be subject to intrusive investigation) which could impact on structures including foundation concrete and water supply pipes. The sensitivity of future structures and services is medium. However, the sensitivity of human health, which could be indirectly affected by impacts to water supply pipes, is high. The magnitude of change, prior to the implementation of mitigation measures, is medium. There is therefore potential for direct and indirect, long-term, permanent effects of Moderate to Major negative significance.

Phase 1

Compaction of Soils during Construction

- 11.58 The effects are the same as stated for the PPIp, namely that there is likely to be a Negligible to Minor negative, direct, permanent, long-term effect prior to the implementation of mitigation measures.

Human Exposure to Contaminated Soils

- 11.59 The sensitivity of potential receptors, namely construction workers, the public and site end users, is high. The magnitude of change prior to mitigation measures is low. Therefore, there is a potential for a Minor to Moderate effect.

Exposure Ground- and Surface Water to Contaminated Soils

- 11.60 The effects are the same as stated for the PPIp, namely that there is likely to be a Minor negative, direct, permanent, long-term effect prior to implementation of mitigation measures.

Loss of Soil Arisings

- 11.61 The effects are the same as stated for the PPIp, namely that there is likely to be a Negligible to Minor negative significance prior to the implementation of mitigation measures.

Pollution of Soils or Superficial Deposits during Construction

- 11.62 The effects are the same as stated for the PPIP, namely that there is likely to be a direct, temporary, short to medium-term effect on soils/superficial deposits of Moderate negative significance prior to the implementation of mitigation measures.

Ground Gas Impact on Properties or Services

- 11.63 The potential for ground gas risks within the Phase 1 development area (not yet subject to intrusive investigation) is considered to be low. The sensitivity of site end users and maintenance workers is high and the magnitude of change, prior to the implementation of mitigation measures, is low. There is therefore potential for a direct, long-term, permanent effect of Negligible to Minor negative significance.

Radon Gas Impact on Properties

- 11.64 The effects are the same as stated for the PPIP, namely that there is likely to be a direct, long-term, permanent effect of Moderate negative significance.

Contamination Impact on Structures and Services

- 11.65 The effects are the same as stated for the PPIP, namely that there is likely to be a direct and indirect, long-term, permanent effects of Moderate to Major negative significance.

Phases 6 and 7

Compaction of Soils during Construction

- 11.66 The sensitivity of soils and superficial deposits within the site is low, with the exception of the peat deposits in the far northeast corner, which are of medium sensitivity. However, no construction is planned within this area. The magnitude of change associated with the construction works, prior to mitigation, is low where construction is proposed, but negligible in the area of peat. Therefore, there is likely to be a Negligible to Minor negative, direct, permanent, long-term effect prior to the implementation of mitigation measures.

Human Exposure to Contaminated Soils

- 11.67 The effects are the same as stated for the PPIP, namely that there is likely to be a Moderate to Major negative, direct, permanent, long-term effect associated with exposure of residually contaminated soils at Upper Bonnyside, prior to implementation of mitigation measures, with a Minor to Moderate effect across the rest of the site.

Exposure of Ground- and Surface Water to Contaminated Soils

- 11.68 The effects are the same as stated for the PPIP, namely that there is likely to be a Minor negative, direct, permanent, long-term effect prior to implementation of mitigation measures.

Loss of Soil Arisings

- 11.69 The effects are the same as stated for the PPIp, namely that there is likely to be a Negligible to Minor negative significance prior to the implementation of mitigation measures.

Pollution of Soils or Superficial Deposits during Construction

- 11.70 The effects are the same as stated for the PPIp, namely that there is likely to be a direct, temporary, short to medium-term effect on soils/superficial deposits of Moderate negative significance prior to the implementation of mitigation measures.

Ground Gas Impact on Properties or Services

- 11.71 Ground gas monitoring undertaken by WSP in 2012 has indicated a low risk from ground gas affecting properties to be developed adjacent to Hall's Quarry. However, a high risk has been identified to properties to be developed at Upper Bonnyside. The potential for ground gas risks at other areas of the site (not yet subject to intrusive investigation) is considered to be low.
- 11.72 The sensitivity of site end-users and maintenance workers is high and the magnitude of change, prior to the implementation of mitigation measures, is high at Upper Bonnyside and low elsewhere on-site. There is therefore potential for a direct, long-term, permanent effect of Major negative significance at Upper Bonnyside and Negligible to Minor negative significance elsewhere on-site.

Radon Gas Impact on Properties

- 11.73 The effects are the same as stated for the PPIp, namely that there is likely to be a direct, long-term, permanent effect of Moderate negative significance.

Contamination Impact on Structures and Services

- 11.74 The effects are the same as stated for the PPIp, namely that there is likely to be a direct and indirect, long-term, permanent effects of Moderate to Major negative significance.

Mitigation

Site Investigation

- 11.75 Higher resolution site investigation works will be undertaken at Upper Bonnyside to confirm the absence of significant contamination at shallow depth and/or identify requirements for remedial measures such removal of contaminated soils or emplacement of clean cover in gardens and sports pitches/open space areas.
- 11.76 Intrusive site investigation works will be undertaken across the wider site in order to confirm the nature of subsurface materials and inform the design of foundations and infrastructure. The area of the former quarry at and around the pond location in the east-central part of the site will be targeted for investigation to identify any residual contamination and the requirement for any remedial measures to protect the new development and end users.

Gas Protection

- 11.77 Specialised gas protection measures will be incorporated into new properties developed at Upper Bonnyside, in accordance with the recommendations made in the WSP 2012 site investigation report (Technical Annex 7). Stage 1 radon protection measures will be incorporated into new properties across the site. The specification will depend on foundation types and design but would typically comprise radon-proof barriers (also providing damp-proofing) and under-floor ventilation.

Materials Resilience

- 11.78 Construction materials (including foundation concrete and water supply pipes) will be specified in accordance with contaminant concentrations and best practice. For Upper Bonnyside, this will include upgrading water supply pipes to polythene/aluminium/polythene barrier pipe as detailed in Technical Annex 7. For other areas the specification will depend on the results of further site investigation works to be undertaken prior to site development.

Noxious Weed

- 11.79 An agreed programme of treatment and/or removal of Japanese Knotweed at Hall's Quarry will be carried out prior to any disturbance to this area.

Construction Management

- 11.80 The contractor will produce a Construction Environmental Management Plan (CEMP) containing a construction method statement that will be agreed with the City Council and SEPA. This will include information on:

- best practices in soil handling and storage;
- testing and validation of soils in garden and landscaped areas to determine the requirement for any remediation such as removal of contaminated materials or emplacement of clean cover;
- dust management methodology relating to earthworks and stockpiling of materials; and
- fuel and oil handling and storage, management of maintenance activities on-site and emergency response in the case of a leak or spill;

- 11.81 All fuel and other chemicals will be stored in accordance with relevant best practice and the provisions of the Water Environment (Oil Storage) (Scotland) Regulations 2006, including:

- storage in line with manufacturers recommendations;
- storage in appropriate impermeable bunded areas with suitable security provisions and away from sensitive environmental receptors such as watercourses and surface water drains;
- away from extremes in temperature; and

- only until the end of shelf life.

- 11.82 Vehicles and plant will be regularly maintained and all maintenance will be undertaken on impermeable surfaces in order to minimise risks of leaks to soil. Any unexpected contaminated soils or groundwater encountered during construction will be dealt with according to environmental best practice, following suitable chemical analysis, and will be contained, treated or disposed of following best practice to a suitably licensed disposal facility.
- 11.83 Site operatives during construction works will be informed of the localised contamination identified on-site at Upper Bonnyside, and potential contamination that could be present elsewhere. Appropriate Personnel Protective Equipment (PPE) will be used during site works, to limit potential contact by site workers with contaminated materials, where present.
- 11.84 A cut and fill strategy will be developed to provide an overall mass balance and negate the need for removal of significant volumes of soil from the site. All excavated soils and superficial deposits removed as part of earthworks will be re-used on –site as the base for proposed future development and for landscape purposes, as far as reasonably practicable.

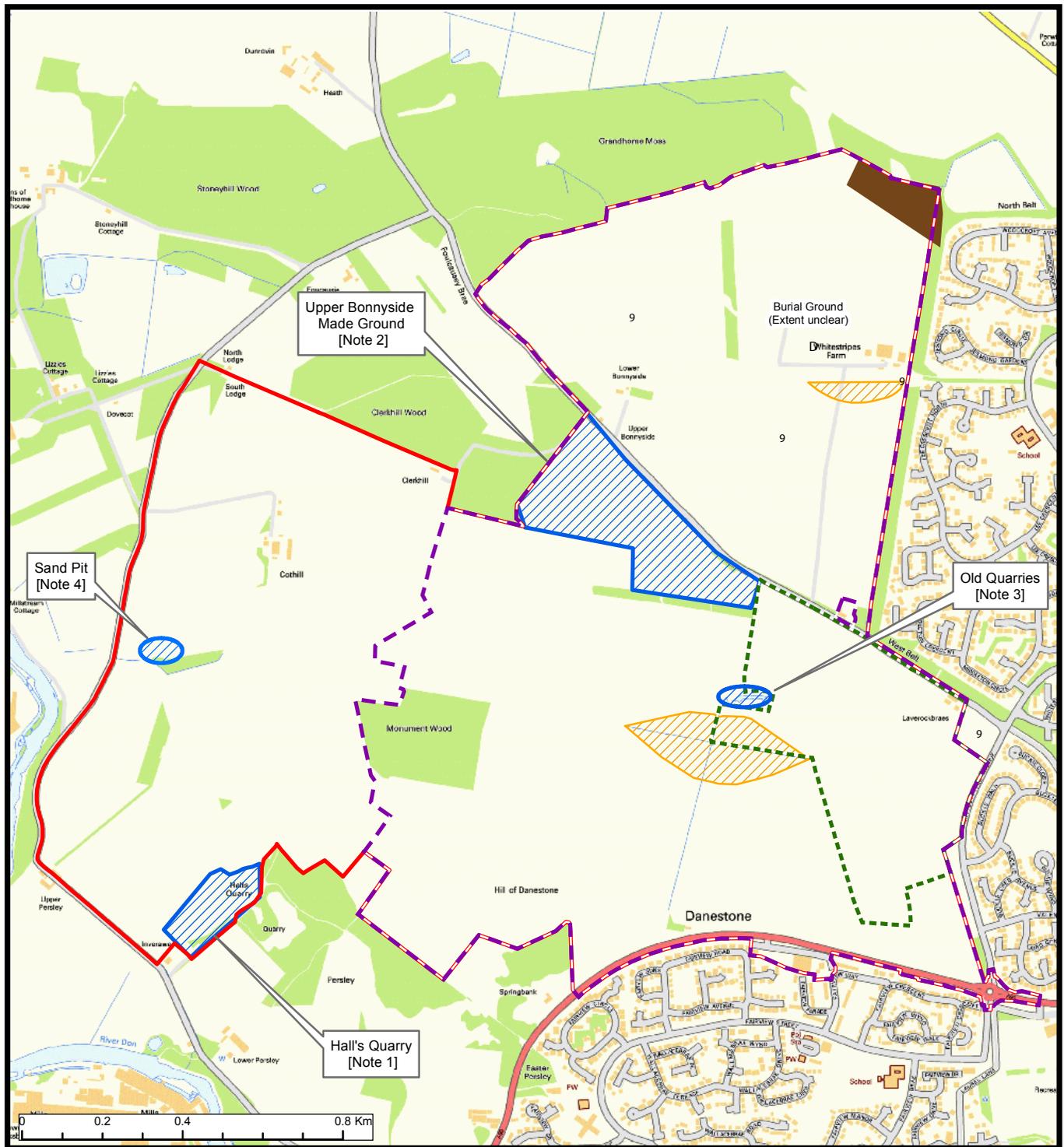
Residual and Cumulative Effects

- 11.85 The residual effects (for the PPIP, Phase 1 individually, and the overall masterplan) following the implementation of mitigation measures may be summarised as follows:
- Compaction of soils during construction: Negligible.
 - Human exposure to contaminated soils to humans: Negligible.
 - Exposure of groundwater and surface water to contaminated soils: Negligible to Minor negative.
 - Loss of soil arisings: Negligible.
 - Pollution of soils or superficial deposits during construction: Negligible to Minor negative.
 - Ground gas impact on properties or services: Negligible.
 - Radon impact on properties: Negligible.
 - Contamination impact on structures and services: Negligible.
- 11.86 The potential effects are predominantly associated with on-site activities and receptors, rather than being influenced by off-site development or other factors. Therefore, no cumulative effects on geo-environmental receptors are predicted.

References

- 11.1 The Nature Conservation (Scotland) Act 2004. Scottish Parliament, 2004.

- 11.2 Part IIA of the Environmental Protection Act 1990. HMSO, 1990.
- 11.3 The Contaminated Land (Scotland) Regulations 2005. Scottish Statutory Instrument 2005 No. 658, The Scottish Ministers, 2005.
- 11.4 The Environmental Liability (Scotland) Regulations 2009. Scottish Statutory Instrument 2009 No. 266, The Scottish Ministers, 2009.
- 11.5 The Groundwater Regulations 1998. Scottish Statutory Instrument 1998 No. 2746, The Scottish Ministers, 1998.
- 11.6 The Water Environment (Oil Storage) (Scotland) Regulations 2006. Scottish Statutory Instrument 2006 No. 133, The Scottish Ministers, 2006.
- 11.7 Scottish Planning Policy. The Scottish Government, 2010.
- 11.8 Planning Advice Note (PAN) 51 Planning, Environmental Protection and Regulation. The Scottish Executive, 2006.
- 11.9 PAN 33 Development of Contaminated Land. The Scottish Executive, 2000.
- 11.10 The Aberdeen Local Development Plan 2012. Aberdeen City Council, 2012.
- 11.11 SEPA Pollution Prevention Guidelines (PPG) 1: General Guide to the Prevention of Pollution. SEPA, 2001.
- 11.12 SEPA PPG 2: Above Ground Storage Tanks. SEPA, 2011.
- 11.13 PPG6: Working at Construction and Demolition Sites. Environment Agency, 2010.
- 11.14 BS10175:2001 – Code of Practice for the Investigation of Potentially Contaminated Sites. British Standards, 2011.
- 11.15 BS5930:1999 – Code of Practice for Site Investigation. British Standards, 1999.
- 11.16 Guidance on preliminary site inspection of contaminated land CLR2 Volume 1. Applied Environmental Research Centre, 1994.
Sampling Strategies for Contaminated Land CLR 4. Centre for Research into the Built Environment.



- Overall Masterplan Boundary
- Phase 1
- PPiP Boundary
- Made Ground (known & potential)
- Possible soft Clays & Silts (Approximate areas)
- Peat (Approximate area)
- 9 Well

FIGURE 11.1

Geo-Environmental Context



12. Landscape and Views

Introduction

- 12.1 This chapter assesses the potential effects on landscape and visual amenity, and should be read in conjunction with the Landscape and Visual Impact Assessment (LVIA) presented in **Technical Annex 8**.

Scope and Methodology

- 12.2 The assessment has followed best practice as described in the “Guidelines for Landscape and Visual Assessment” (2002)⁸. The main steps in the assessment process may be summarised as follows:

- Description of the site and surroundings: Collation and review of baseline information covering key features of the physical environment, planning allocation, natural and cultural heritage of the site and surroundings.
- Description of the landscape and features: The character, condition and value of the landscape were determined through a combination of desk and field study. Relevant designations were identified from a review of planning policies and other designations relating to the area.
- Review of existing visibility and visual amenity: Visibility, visual amenity and potential visual receptors were identified, e.g. residential properties, public footpaths, transport routes, key viewpoints. The approximate extent of the visibility of the proposed development was determined by a combination of fieldwork and mapping.
- Landscape and visual effects: The potential sources of impact of the proposed development, the sensitivity of the landscape and visual resources, and the magnitude of change to the existing landscape and visual environment were identified.
- Evaluation of significance: The likely effects were assessed with reference to landscape character and visual amenity, using different thresholds of significance of impact (major, moderate, minor or none) determined through an evaluation of the scale or magnitude of effect, and the environmental sensitivity of the location or receptor.

- 12.3 An initial schedule of assessment viewpoints was presented in the Scoping Report submitted to Aberdeen City Council. The Council then requested two additional viewpoints, which were included in the assessment⁹.

- 12.4 The significance of effects has been assessed using the following terms:

- Major - a fundamental change to the environment.

⁸ The new third edition of the GLVIA was published in April 2013. The Landscape Institute (LI) have advised that an assessment started using GLVIA 2 should be completed using that edition.

⁹ ACC 5-4-13 Whitestripes Road & Minor Road linking Persley to Foulcausey

- Moderate - a material but non-fundamental change to the environment.
- Minor - a detectable but non-material change to the environment.
- None- no detectable change to the environment.

Policy Context

European

- 12.5 The UK Government signed and ratified the European Landscape Convention (ELC) in 2006. The ELC is a Council of Europe treaty whose purpose is to promote landscape protection, management and sustainable planning. The ELC defines landscape as “an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors”¹⁰, and makes it clear that all landscapes require consideration and care.

National

- 12.6 National planning policy on landscape and natural heritage is set out in Scottish Planning Policy¹¹ (SPP) and is supported by Planning Advice Note (PAN) 60 Planning for Natural Heritage and PAN 44 Fitting New Development into the Landscape.
- 12.7 SPP notes that both countryside and urban landscapes are constantly changing and that the planning aim should be to “facilitate positive change whilst maintaining and enhancing distinctive character”. With reference to development it is noted “different landscapes will have a different capacity to accommodate new development, and the siting and design of development should be informed by local landscape character.”

Development Plans

- 12.8 The study area for the landscape and visual impact assessment is covered by the following development plans: Aberdeen City and Shire Structure Plan 2009, Aberdeen Local Development Plan Adopted 2012, and Aberdeenshire Local Development Plan Adopted 2012. The Structure Plan states, with regard to the environment, that the planning objective is to “make sure new development maintains and improves the region’s important built, natural and cultural assets.”
- 12.9 With regard to specific planning policies in the current adopted Local Plan, the site is designated for land release for future housing and employment development (Policy LR1) and the surrounding open space protected as Green Belt (Policy NE2). Policy LR2 outlines the requirement for large sites to deliver mixed use communities.
- 12.10 Local Plan policy protects two wide corridors aligned through the site to the north- south and east –west, and majority of the surrounding open space. This strategic Green Space Network (Policy NE1) of woodland and other habitats is protected to provide the setting

¹⁰ The European Landscape Convention opened for signature in Florence in October 2000

¹¹ SPP 2010

for future development, and opportunities for outdoor recreation, nature conservation and landscape enhancement.

- 12.11 The Local Plan makes provision for the general city wide protection of the landscape and views in Policy D6, which states that:

“Development will not be acceptable unless it avoids:

- 1. significantly adversely affecting landscape character and elements which contribute to, or provide, a distinct “sense of place” which point to being either in or around Aberdeen or a particular part of it;*
- 2. obstructing important views of the City’s townscape, landmarks and features when seen from busy and important recreation, wildlife or woodland resources or to the physical links between them;*
- 3. disturbance, loss or damage to important recreation, wildlife or woodland resources or to the physical links between them;*
- 4. sprawling onto important or necessary green spaces or buffers between places or communities with individual identities, and those, which can provide opportunities for countryside activities.*

Development should avoid significant adverse impacts upon existing landscape elements, including linear or boundary features or other components, which contribute to local amenity, and provide opportunities for conserving, restoring or enhancing them.

Further guidance is available in.....Supplementary Guidance: Landscape Strategy Part 2- Landscape Guidelines.”

- 12.12 Further policies protect the wider environment including natural and cultural heritage. Supplementary guidance has been prepared to provide further detail on a number of issues including landscape, trees and woodland, and open space.
- 12.13 With specific regard to the provision of public space associated with new development, the requirements are outlined in Policy NE1 and detailed in supplementary guidance. This information has been carefully reviewed in the preparation of the Landscape Framework for the proposed development.
- 12.14 The wider area to the north and west of the proposed development site is covered by the Aberdeenshire Local Development Plan (2012). This protects the open farmland as Green Belt and coastline to the east as Coastal Zone. The future Aberdeen Western Peripheral Route (AWPR) will be located approximately 2.5km to the north of the site and is safeguarded in the Aberdeen and Aberdeenshire Development Plans.
- 12.15 Other relevant landscape and visual planning policies in the Aberdeenshire Local Plan protect the landscape, natural and historic environment. With regard to Landscape Conservation (Policy 12), supplementary guidance is provided in the Aberdeenshire Local Development Plan regarding landscape character and valued views (SG Landscape 1 and 2). A review was undertaken of the “valued views” as identified in Appendix 1¹² of the Supplementary Guidance when the viewpoints were selected for the landscape and visual assessment.

¹² Appendix 1 of the Aberdeenshire Local Development Plan provides a list of valued views as identified by community councils and from the local knowledge of elected members.

Baseline Conditions

Landscape Character Assessment

- 12.16 SNH has undertaken a “Landscape Character Assessment of Aberdeen” (LCA) (ACC/ SNH, 1996) which classifies the southern part of the proposed site as within the “Major River Valley” landscape character type and specifically the “Lower Don Valley” landscape character area. This landscape type is described as “a large valley with a narrow floodplain through which the River Don winds”. It is noted “woodland occurs extensively throughout the area, on the steep valley sides downstream, and as policy woodland around Grandhome at the western end of the area” and that “there are extensive man-made elements in the area”.
- 12.17 The “Wooded Farmland” landscape character type encompasses the northern part of the site and specifically the “Braes of Don” landscape character area. This area is described as “well wooded” and having “a very gently rolling, almost flat topography”. The main land use is noted to be agriculture and woodland.
- 12.18 To the north and west of the proposed development site the “South and Central Aberdeenshire: Landscape Character Assessment (LCA)” (ERM, 1998) classifies the area as within the “Agricultural Heartlands” landscape character type and specifically the “Central Wooded Estates” landscape character area. This landscape is described as having dense woodland as a consistent feature, “be it small coniferous plantations, thick clumps and shelterbelts of beech, large mixed broadleaf policies associated with estates, or meandering riverside glades along the Don and the Dee”.
- 12.19 In the detailed description of the Lower Don Valley, the LCA notes that “Much of this area is highly visible from a range of viewpoints that include large areas of residential development; major city routes; and the Aberdeen – Inverness railway line”. In summary, the LCA states the “mixture of open space to developed areas is characteristic, as is the extent and variety of woodland; these attributes would be sensitive to change” and notes that the many distinctive shelterbelts “will become sensitive in the future to the over maturity, and possible loss”. Since publication of the LCA, part of the Lower Don Valley has been developed to the east of Whitestripes Avenue.
- 12.20 With reference to sensitivity of the Braes of Don area to landscape change the LCA states, “The area has a degree of visual separationfrom the city, and has a predominantly rural character. The existing woodland pattern is distinctive, and is important in reducing the visual impacts of nearby development in adjacent landscape character areas. Part of the woodland forms a distinctive landmark from the city.”
- 12.21 The landscape guidelines for the Lower Don Valley and Braes of Don LCAs include: the retention and management of trees and woodland; retention of open areas and the characteristic skyline trees; extension of the shelterbelt pattern and new tree planting, and maintenance of stone dykes “particularly the distinctive coursed dykes associated with shelterbelts (that usually comprise beech trees)”. The relationship of the site to the LCA is shown in **Fig 12.1**.

Existing Landscape Character

- 12.22 The following sections describe the characteristics of the overall masterplan site. The landform of the site slopes north, west and south from a high point of 90m AOD on

Whitestripes Road. This ridge of high ground extends north eastwards into the adjacent residential area of Middleton Park. To the north the ground gently descends and rises linking to the surrounding undulating lowlands to the north and north-west. To the east, beyond Middleton Park the rolling lowland descends to the coast. To the south and west of the development site, the land forms the sides of the River Don valley and descends to approximately 30m AOD.

- 12.23 South of the River Don, a long low spur of undulating ground separates the Rivers Don and Dee. This rising undulating ground west of the city centre and the coast has been built up, encompassing side slopes of the valley and high points such as Cummings Park, Northfield and Mastrick at around 125m AOD. To the west the undulating land gently rises to a ridge of low hills aligned in a north - south direction, the high point of which is Brimmond Hill (265m AOD). South of the River Dee, the land rises to undulating lowlands.
- 12.24 The land cover is predominantly medium-sized pasture and arable fields bounded by post and wire fences, stone walls and ditches. Within the site there is a large block of mixed woodland named Monument Wood. There are also two long linear coniferous shelterbelts. There are some smaller areas of deciduous woodland and rows of mature trees most notably along Whitestripes Road, which form a distinctive skyline feature. Mature tree clumps are associated with the scattered dwellings and farmsteads. A distinctive roundel of trees is located to the north-west of Whitestripes Farm and triangular group to the south west of Monument Hill. There are a few areas of more rough grassland and gorse most notably around Monument Wood. There is a linear strip of water on the site located to the south of Whitestripes Road associated with a former manganese quarry.
- 12.25 The Ancient Woodland Inventory (AWI) prepared by SNH indicates that Monument Wood within the proposed development site is an area of historic woodland. SNH¹³ notes that woodland indicated on OS 1st edition maps is likely to be ancient, which would encompass the mature trees along Whitestripes Road and forming the boundary to the adjacent residential area of Middleton Park.
- 12.26 Adjacent to the site are the large areas of broadleaved and coniferous woodlands - Grandhome Moss, Clerkhill Woods and Persley Quarry Woods. To the east are mature broadleaved shelterbelts named the North, West and Carrot Belts, which once formed the policy woodland of Scotstown House. The West Belt extends along Whitestripes Road and eastwards along the skyline separating Middleton Park from the residential development to the south. A large mast is located at the eastern end of this woodland belt.
- 12.27 To the north, beyond the proposed development site, is gently rising undulating agricultural land and a radio mast at Perwinnes. To the east is the residential area of Middleton Park, the A90, and coast. To the south, the A90 bounds the site with the residential area of Danestone beyond. Beyond the River Don are the residential areas of Woodside, Heathryfold, Middlefield, Northfield and Cummings Park encompassing the south side of the river valley. To the west is the well wooded River Don valley, with large buildings and chimneys associated with industrial works, and beyond the residential areas of Dyce and Bucksburn. More distant is Aberdeen Airport and a ridge of undulating hills, with Brimmond Hill forming a high point.

¹³ <http://www.snh.gov.uk/docs/C283974.pdf>

- 12.28 The main landuse of the proposed development site is agriculture. There are a few farmsteads and residential properties scattered throughout the area. Passing across the eastern part of the site is an overhead transmission line. Overhead, helicopters and aeroplanes overfly the site to Aberdeen Airport to the west.
- 12.29 Whitestripes Road passes from west to east through the proposed development site. To the east and south, Whitestripes Avenue and A90 form the boundary to the development site and edge to the existing built up areas. To the south west is a minor road linking Persley to Whitestripes Road at Foulcausey, with the River Don, built up areas and busy A96 beyond.
- 12.30 A number of footpaths pass through the site. The main routes are along Whitestripes Road and through the western part of the site, where a public footpath links to the River Don footpath and leads through Lower Persley to Cothill, through Clerkhill Woods to Whitestripes Farm, and along the Carrot Belt to Middleton Park. A number of informal routes are also noted in the area, particularly along the northern boundary through Grandhome Moss and the woodland belt to the east.
- 12.31 The landscape character of the proposed development site is of a medium-scale, relatively enclosed, familiar, urban fringe agricultural landscape. Localised diversity in colour and texture is provided by the following landscape features: broadleaved and mixed woodland blocks, coniferous shelter belts, mature deciduous woodland belts and skyline trees; tree avenues; small roundels and clumps of trees; areas of rough grassland and gorse; stone walls and ditches; and the scattered residences and farms.
- 12.32 The urban fringe agricultural landscape is divided to the north and south by the ridge of higher ground and tree lined Whitestripes Road, which creates a distinct boundary in the landscape. To the south the urban fringe character is dominated by the River Don valley, and to the north, undulating agricultural lowlands.
- 12.33 The landscape of the proposed development site appears generally well tended and productive. Many distinctive landscape features are identifiable and have been protected and managed. Some features on site are in decline or being lost as evidenced by some lengths of eroding stone wall. The many mature trees which form a distinct feature of the site and in particular the skyline feature along Whitestripes Road, are now reaching maturity and will require careful future management and replacement.
- 12.34 In summary, the proposed development site, which encompasses a gentle ridge with localised, undulating and sloping valley topography, and variety of woodland areas and landscape features, has an interesting urban fringe character. This urban fringe landscape is most strongly connected to the surrounding urban area to the east, more enclosed and rural to the west, and more open and remote to the north.
- 12.35 The proposed development site is identified in the Aberdeen LDP for land release (Policy LR1) and Landscape Policy D6 makes specific provision for the protection of the landscape character and elements, which contribute to “sense of place”. Across the site two corridors are identified as Green Space Network and protected by Policy NE1. The only designated areas within the Masterplan site relate to cultural heritage and cover the Listed Building of Grandhome Lodges to the west of the site. Overall, it is considered that the landscape features and character of the proposed development site are of medium sensitivity to change. The landscape features of the site are shown on **Fig 12.2**.

Visual Influence

- 12.36 The indicative area of visibility of the overall masterplan, together with viewpoint photograph locations, is shown on **Fig 12.3**. To the north, visibility of the site will extend approximately 4km, encompassing a minor road linking the village of Potterton to the B977. Distant views will be afforded from a more distant highpoint of Overhill approximately 6.5km to the north (2.5km west of Balmedie). Receptors include scattered residential properties, farmsteads, part of the B997, minor road leading to Newtonhill, and proposed route of the AWPR. The extent of visibility is limited to the north by the undulating topography and scattered blocks of woodland. Visibility of the proposed development site will include the site to the north of Whitestripes Road and pylons, which cross the area.
- 12.37 To the east, immediate views of the northern part of the proposed development site are restricted to near the boundary by the belt of mature woodland which forms the edge of Middleton Park, the perimeter properties of this estate and fencing. Further south, visibility to the east is limited by existing housing along Whitestripes Avenue and a woodland strip along the road.
- 12.38 More distant views extend across Aberdeen and are gained from points along the River Don valley to the coast and harbour approximately 6km to the south east. Receptors include residential properties, parts of the Great Northern Road (A96), the Esplanade and Torry Battery. Existing visibility of the proposed development encompasses the site to the south of Whitestripes Road and pylons, which cross the area. From this angle of view, the pylons and belt of mature trees along Whitestripes Road, which extends between Danestone and Middleton Park, is a noticeable and distinctive silhouette on the skyline.
- 12.39 To the south, immediate views are afforded from the A90, which forms the edge of Danestone residential area and are restricted to the west by Persley Quarry Woods. Further south, views are afforded from approximately 2km distance from the rising ground of the River Don valley and encompass the residential areas of Bucksburn, Heathryfold, Middlefield, Northfield, Cummings Park, parts of the A96 and A90, and Auchmill golf course. From this angle of view, the belt of mature trees, which extends westwards along Whitestripes Road, is a noticeable and distinctive silhouette on the skyline with existing housing development on the hillside in the foreground (Buckie Road residential area).
- 12.40 Further distant views are afforded across Aberdeen from the rising ground south of the River Dee valley and higher ground approximately 10km from the proposed development site. This includes the residential areas of Kincorth and Tullos, scattered residential properties, part of the A90 and A956, and Loirston Country Park. Visibility of the proposed development site will include the site to the south of Whitestripes Road and the pylons, which cross the area.
- 12.41 To the west, immediate views are restricted to near the boundary of the proposed development site by the existing blocks of woodland of Parkhill, Clerkhill, Stoneyhill and woodland surrounding Grandhome House and along the River Don valley. This includes scattered residential properties and farmsteads located along the minor roads from Lower Persley to Whitestripes Road.
- 12.42 Further west, views of the proposed development site are afforded across the River Don valley and include the residential areas of Dyce and Stoneywood and parts of the A947.

Further distant views are available from the rising higher ground approximately 5km to the west. This includes scattered farmsteads and residential properties, part of the A96, Aberdeen Airport, Kirkhill Forest, Tyrebagger and Brimmond Hill. To the north west, the extent of visibility extends to Cothall, and encompasses parts of the B977 and scattered residential properties.

- 12.43 Existing night lighting sources on the site are associated with the scattered residential properties and farmsteads. The most brightly lit areas are associated with the surrounding built up areas located to the east, south and west of the site. All these areas have an intervening buffer of woodland with the exception of the proposed development boundary to the A90 and Danestone residential area. Tall structures and buildings in the surrounding area are identifiable at night by red top lights and include Perwinnes Mast to the north, Granitehill Tower to the south at Cummings Park, mast on the A90 to the east, and the high rise flats of Aberdeen which are located mainly to the south and east of the proposed development site. Two areas very brightly lit at night are Aberdeen Airport to the west, and the harbour at Torry Bay, with the many boats docked offshore.
- 12.44 In summary, visibility is either relatively restricted and encompasses separate parts of the site, or distant. The extent of visibility encompasses receptors of high to low sensitivity. The site is located close to a high density of residential receptors to the east, south and west. For the majority of these receptors, views to the proposed development will be screened or broken up, at least in part, by intervening development and woodland. Distant views of the site are afforded from the coast and ridge of higher ground to the south and west, which encompasses the existing cityscape.

Predicted Effects

Landscape Features

- 12.45 The development will necessitate the permanent loss of arable and pasture fields, and localised regrading and removal of some existing landscape features such as stone walls and trees. From the outset, the design approach has aimed to retain key natural, heritage and landscape features so that loss is minimised, and to reflect the existing landscape pattern in the development layout in order to ensure continuity, reinforcement and fit. This approach has ensured that a high proportion of landscape features have been retained and safeguarded.
- 12.46 Overall, it is considered that the magnitude of change on landscape elements would be medium during construction, reflecting primarily the loss of agricultural land. On completion, it is considered that the magnitude of change would be medium adverse, which would over time change to medium beneficial with the establishment of the Landscape Framework.

Landscape Character

- 12.47 The proposed development is located within a medium-scale, urban fringe agricultural landscape. The local landscape character is well managed and has a coherency reflecting its long-term ownership. This landscape has evolved in response to agricultural improvements in the 18th century, industrial development along the River Don, construction of the railway and overhead transmission lines, and more recently the expansion of Aberdeen to the east, south and west of the site. Further change is proposed with the AWPR, which will be routed to the north.

12.48 Overall, it is considered that the permanent removal of agricultural land to create the proposed urban extension would amount to high magnitude of change on landscape character during construction. The magnitude of change would be greatest at the outset, decreasing to medium on completion and would continue to decrease further over time.

Visual Amenity

12.49 The baseline study identified that, within the visual envelope, a number of sensitive and less sensitive receptors (residential properties, public footpaths, cycle ways, listed buildings, railway line, A90, A96, B997 and other roads) will have views or transient views of the proposed development. Potential open and partial views of the proposed development are relatively contained to the local surrounding area. Views will be gained from scattered residential properties in agricultural land to the north, from the edge of the City of Aberdeen to the east, and from the wider built up areas encompassing the slopes of the River Don valley to the south.

12.50 Transient views will also be gained from the minor local roads bounding and passing through the site, cycle ways and footpaths, A90, A96 and B997. More distant partial and glimpse views will be afforded from the wider surrounding area encompassing the coast to the east and higher ground from the north, southeast, south and west. Elevated views encompass the cityscape of Aberdeen and seascape.

12.51 Overall, it is considered that the magnitude of change to views and visual amenity during construction would be high for the majority of receptors located within the local surrounding area. It is considered that the magnitude of change would be high/medium on completion. The magnitude of change would be greatest at the outset when the degree of contrast would be greatest, decreasing overtime as the development integrates with its surroundings.

Mitigation

12.52 The masterplan has been carefully designed in a coherent and unified manner to safeguard, maintain and enhance the distinctive qualities of the existing cityscape and landscape character. A key aim has been to integrate the proposed development into the existing landscape, providing for amenity, public access, enhancement of biodiversity and habitats.

12.53 The strategic landscape mitigation measures are indicated in the Landscape Concept Green Network, Landscape Structure, Landscape Framework and Elements drawings, as shown in **Fig 5.12**. In summary, the treatment of the external spaces aims to:

- integrate the development within its setting;
- create varied and attractive spaces and places within the built-up area;
- support biodiversity throughout the site; and
- provide a full range of recreational opportunities.

Residual Effects

12.54 The significance of the predicted effects is summarised in Tables 12.1 and 12.2 below.

Table 12.1: Summary of Landscape Effects

Landscape Receptor	Effect			Significance		
	Sensitivity	Magnitude of Change		Level of Construction Effect	Level of Permanent Effect	Rationale
		Construction	Permanent			
Landscape Features	Medium	Medium	Medium/ Medium	Moderate	Moderate/ Moderate	<p>Construction: Loss of agricultural land, although key landscape features retained. Limited removal woodland/ stone walls.</p> <p>Permanent: Establishment of Landscape Framework will reinforce existing features and provide new landscape features creating a net benefit. Moderate adverse effect on landscape features will decrease over time to Moderate beneficial.</p>
Landscape Character	Medium	High	Medium	Major	Moderate	<p>Construction: Alteration of the local appearance and character of the site during construction.</p> <p>Permanent: Establishment of a new urban extension with a distinct sense of place and associated Landscape Framework, which will reinforce the local landscape and cityscape character. Localised Moderate adverse effect on landscape character will decrease over time.</p>

Table 12.2: Summary of Visual Effects

Visual Receptor	Effect			Significance		
	Sensitivity	Magnitude of Change		Level of Construction Effect	Level of Permanent Effect	Rationale
		Construction	Permanent			
Open and Partial View Receptors/ Viewpoints 1-14 & Additional Viewpoints 15-16	High-Low	High	High/ Medium	Major	Major/ Moderate	<p>Construction: Large scale temporary alteration of the localised available views of the site and character during construction.</p> <p>Permanent: Localised change in character of view and visual amenity. Establishment of the new urban extension and associated Landscape Framework will reduce</p>

						visual effect over time. Major/ Moderate adverse localised effect will decrease over time.
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Note: Positive effects are underlined

Effects of the PPIP

- 12.55 The overall permanent landscape and visual effect of the PPIP will be moderate adverse. This effect will be localised and will decrease significantly over time as the development and associated landscape becomes established.

Effects of Phase 1

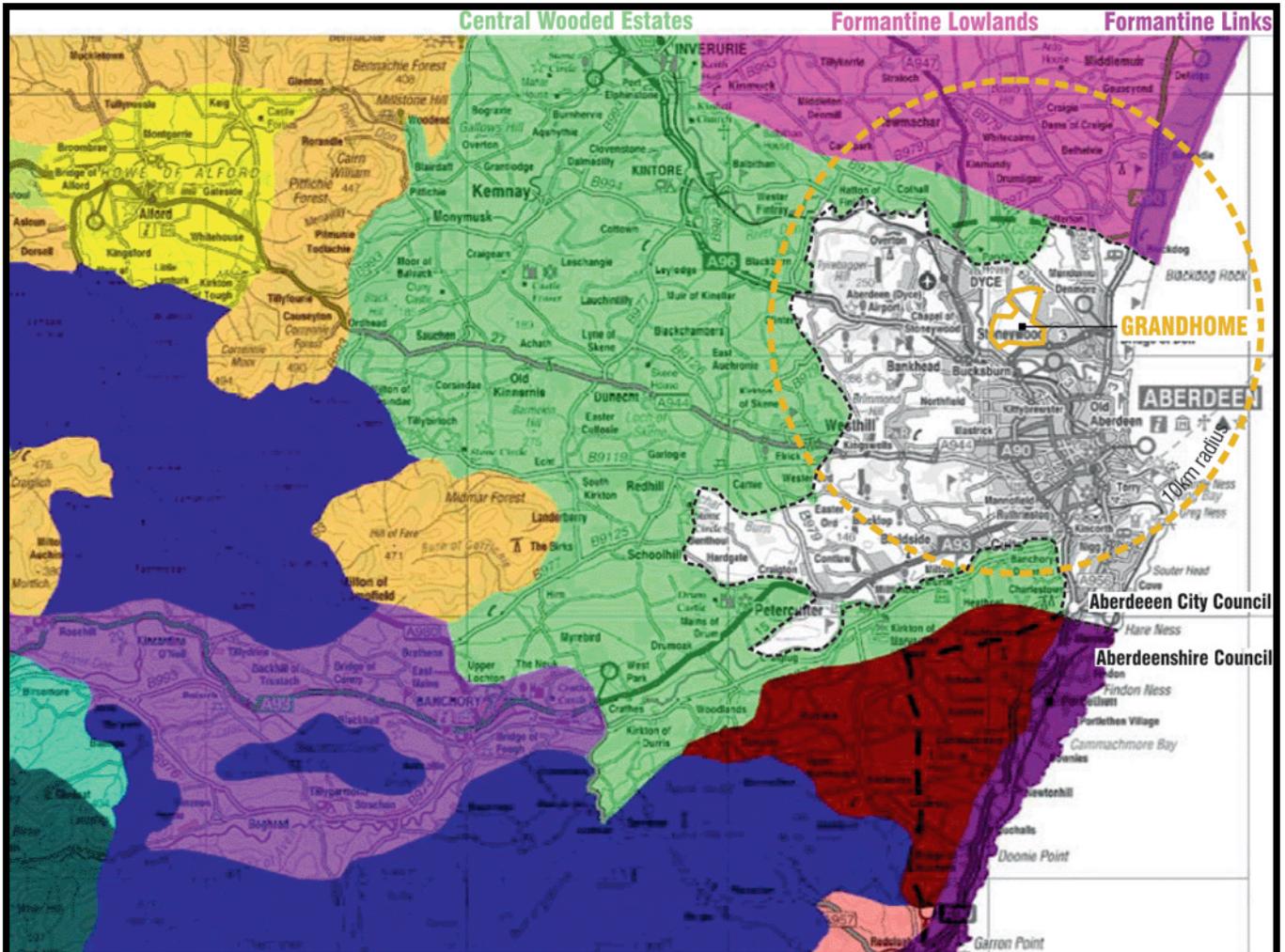
- 12.56 The overall permanent landscape and visual effect of the Phase 1 will be moderate adverse. This effect will be localised and will decrease significantly over time as the development and associated landscape becomes established.

Effects of Overall Masterplan

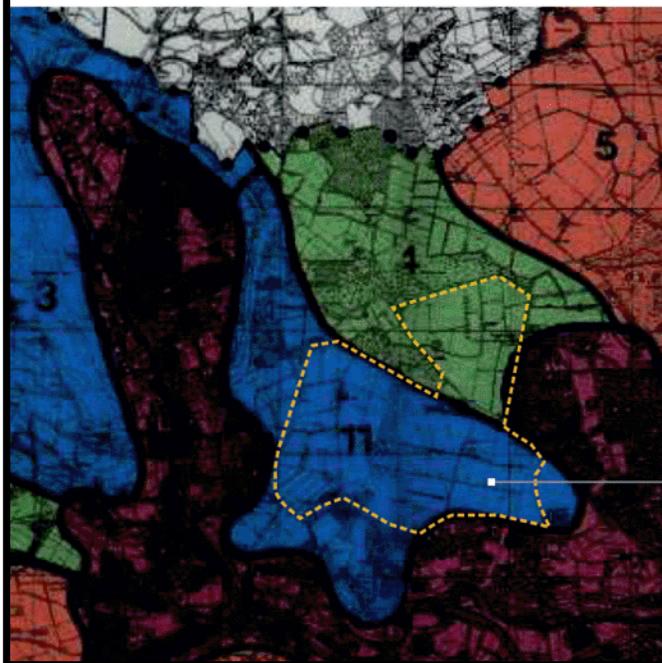
- 12.57 The landscape and visual effects of the overall masterplan are assessed as major adverse during construction. This effect will be temporary and localised. On completion, the permanent landscape and visual effects will be moderate adverse. This effect will be localised and will decrease significantly over time as the new urban extension and associated landscape becomes established.

Cumulative Effects

- 12.58 The masterplan site is separated from other consented development sites by the River Don and its associated landscape corridor. Whilst some receptors will be likely to experience views of more than one development, the cumulative effects are not predicted to be any greater than those identified for the development on its own.



Source: Aberdeenshire Local Development Plan [2012]
 SG 1 Landscape Character Appendix 1



- Valley - Area 11 Lower Don Valley
- Wooded farmland - Area 4 Braes of Don
- Open farmland
- Urban area

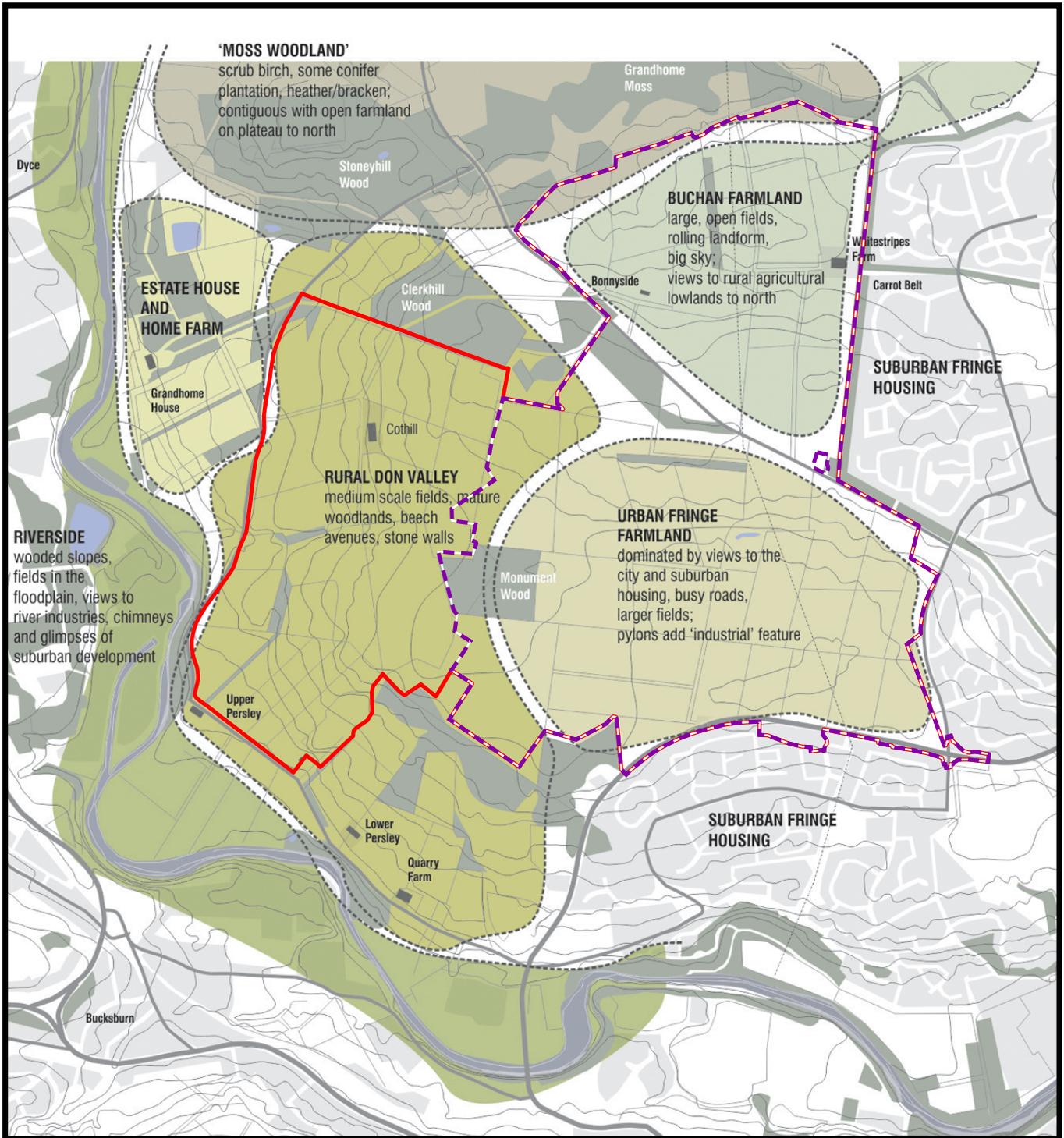
GRANDHOME

Source: Aberdeen City
 Landscape Character Assessment
 [1996]

FIGURE 12.1



SNH Landscape Character Assessment

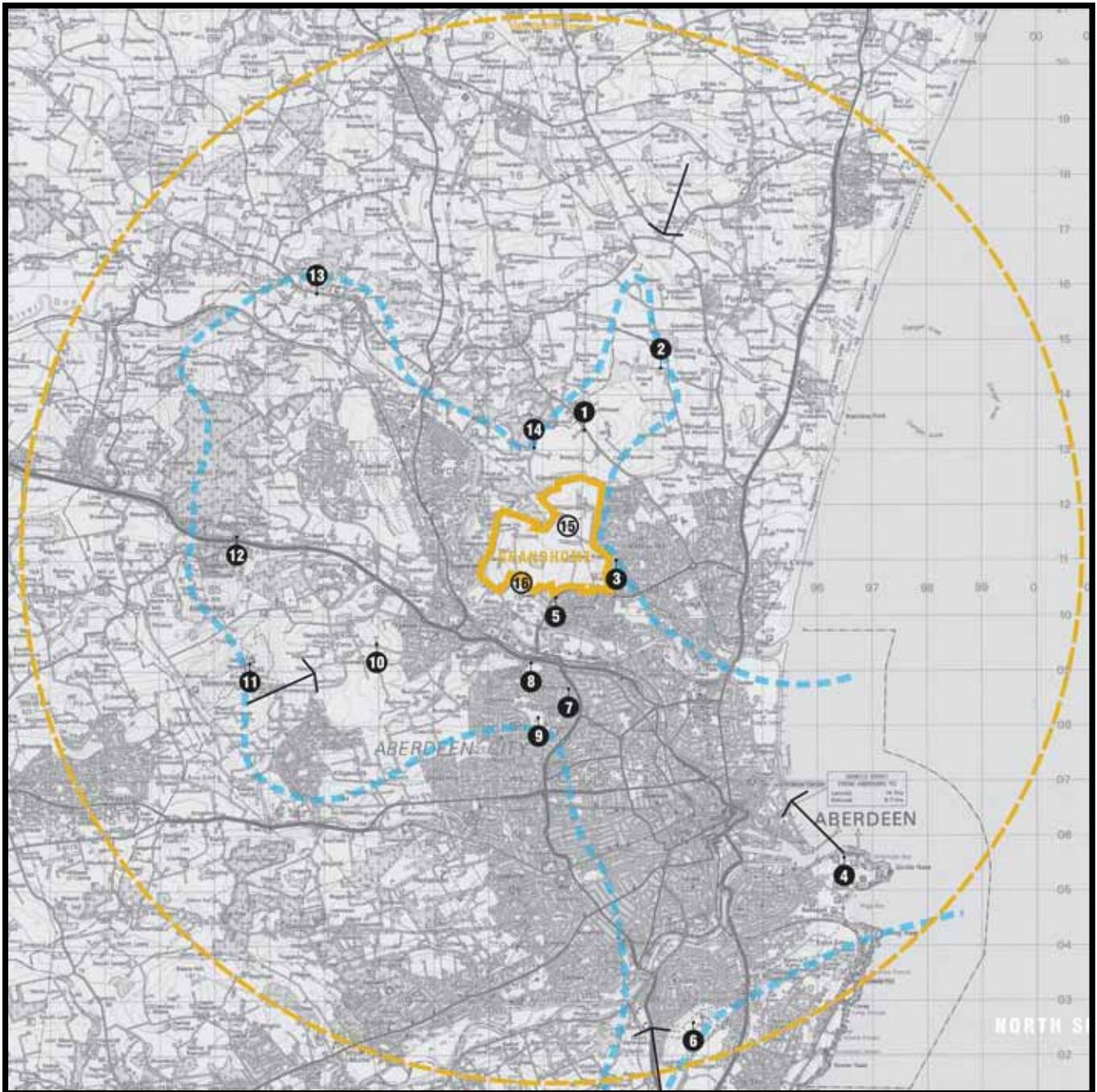


- Overall Masterplan Boundary
- PPiP Boundary

FIGURE 12.2

Landscape Character of the Site





-  Proposed development site (master plan)
-  10km radius - study area
-  Indicative zone of visibility

-  Proposed viewpoint photograph locations
- 1 B997, Toad Hollow
- 2 Corby Loch
- 3 Whitestripes Avenue
- 4 Torry Battery
- 5 A90, Parkway
- 6 Loirston Country Park
- 7 A90, North Anderson Drive
- 8 A96, Auchmill Road
- 9 Granitehill Tower, Cummings Park
- 10 Kepplehill
- 11 Brimmond Hill
- 12 A96, Kirkhill Forest
- 13 B977, Cothall
- 14 Parkhill Wood

- Additional viewpoints requested by ACC in Scoping Opinion 05.04.13:*
- 15 Whitestripes Road
- 16 Persley - Foulcausey minor road
-  Distant views
-  Additional viewpoints

FIGURE 12.3

Visual Influence





- Phase 1
- PPIP Boundary

FIGURE 12.4

Landscape Framework Plan



13. Noise and Vibration

Introduction

- 13.1 This chapter assesses the potential effects relating to noise and vibration. It should be read in conjunction with the noise and vibration assessment presented in **Technical Annex 9**. The Technical Annex includes a glossary of noise and vibration terminology.

Scope and Methodology

- 13.2 The assessment has aimed to:

- describe and quantify the existing noise levels at and around the site;
- quantify and assess the effects of the construction works;
- quantify and assess the effects of existing noise and vibration sources on proposed sensitive elements of the development to determine the suitability of the site for the proposed uses;
- quantify and assess changes in off-site road traffic noise levels as a result of development-generated traffic;
- assess the potential impact from any building services plant, where noise emission levels exist, and set noise limits where this information does not exist;
- set out mitigation measures where adverse impacts are predicted; and
- quantify residual impacts where mitigation does not resolve identified impacts.

- 13.3 The Housing and Environment Department of Aberdeen City Council was consulted in relation to the scope and methodology. It was agreed that the assessment would follow the guidance in Planning Advice Note 1/2011 Planning and Noise, with reference to:

- British Standard 5228: 2009 with respect to construction noise and vibration;
- the Design Manual for Roads and Bridges with respect to changes in off-site road traffic noise;
- British Standard 4142: 1997 with respect to any building services plant proposed as part of the development;
- British Standard 8233: 1999 and the World Health Organisation's *Guidelines for Community Noise* with respect to guidance on suitable noise levels for residential developments; and
- Building Bulletin 93 with respect to the suitability of the Site for schools.

- 13.4 In addition, the City Council stated that:

- indoor target noise levels should be 40 to 45dB during the daytime and 30 to 35dB at night; and
- noise associated with building services plant should be limited to a level 5dB below the background noise level.

Policy and Guidance

13.5 Key planning policies and guidance are detailed in the Technical Annex and are summarised below.

National Planning Policy and Legislation

13.6 Planning Advice Note (PAN) 1/2011 *Planning and Noise* provides advice on the role of the Scottish planning system to prevent and limit the adverse effects of noise. It provides high level guidance on issues such as development planning, development management, noise impact assessment and mitigation.

13.7 A Technical Advice Note (TAN) has been produced to accompany PAN 1/2011, titled *Assessment of Noise* (published in 2011), which sets out detail on appropriate noise impact assessment methods and the legislation, technical standards and codes of practice relevant to specific noise issues.

13.8 The key assessment guidance adopted from the PAN 1/2011 Technical Advice Note is shown in Table 13.1. This shows the impact categorisations for varying noise levels affecting noise-sensitive developments, as is the case for the majority of the Proposed Development. The guidance is based on achieving a target noise level, and the amount by which the target noise levels is achieved. The target noise level is to be defined using appropriate guidance.

Table 13.1: Example of Associating Exceedance Noise Levels with Magnitudes of Impacts for a New Residential Area

(Existing – Target) Noise Level, x L _{Aeq,T} dB	Magnitude of Impact
x ≥ 10	Major adverse
5 ≤ x < 10	Moderate adverse
3 ≤ x < 5	Minor adverse
0 ≤ x < 3	Negligible adverse
x < 0	No change

13.9 For this assessment, the target values are taken to be:

- a daytime target level of 55dB, based on the guidance in the WHO *Guidelines for Community Noise* and BS8233; and
- a night-time target level of 45dB, based on the internal noise level guidance in the WHO *Guidelines for Community Noise* and BS8233, with an allowance of 10dB for an open window.

13.10 The resultant criteria are shown in Table 13.2.

Table 13.2: Adopted Criteria for Determining the Magnitudes of Impacts for the Proposed Development

Daytime Criteria, $L_{Aeq,16hrs}$	Night-time Criteria, $L_{Aeq,8hrs}$	Magnitude of Impact
≥65	≥55	Major adverse
60 to 64.9	50 to 54.9	Moderate adverse
58 to 59.9	48 to 49.9	Minor adverse
55 to 57.9	45 to 47.9	Negligible adverse
<54.9	<44.9	No change

13.11 Aberdeen City Council indicated that noise levels within the properties should be 40 to 45dB during the daytime and 30 to 35dB at night. To be consistent with the guidance in BS8233, the target internal noise levels adopted for this assessment are 40dB during the daytime and 35dB during the night-time. More detailed description of the WHO Guidelines for Community Noise and BS8233 can be found in the Technical Annex. Table 13.3 sets out the TAN framework for determining the level of significance relating the magnitude of impact with the sensitivity of the receptor.

Table 13.3: Significance of Effects

Magnitude of Impact	Level of Significance Relative to Sensitivity of Receptor		
	Low	Medium	High
Major	Slight/Moderate	Moderate/Large	Large/Very Large
Moderate	Slight	Moderate	Moderate/Large
Minor	Neutral/Slight	Slight	Slight/Moderate
Negligible	Neutral/Slight	Neutral/Slight	Slight
No change	Neutral	Neutral	Neutral

13.12 All of the receptor locations considered in this assessment are deemed to have a sensitivity of 'high', as they are predominantly residential. The level of significance and its relevance to the decision-making process is summarised in the TAN as:

- **Very Large:** These effects represent key factors in the decision-making process. They are generally, but not exclusively, associated with impacts where mitigation is not practical or would be ineffective.
- **Large:** These effects are likely to be important considerations but where mitigation may be effectively employed such that resultant adverse effects are likely to have a Moderate or Slight significance.
- **Moderate:** These effects, if adverse, while important, are not likely to be key decision making issues.
- **Slight:** These effects may be raised but are unlikely to be of importance in the decision making process.
- **Neutral:** No effect, not significant, noise need not be considered as a determining factor in the decision making process.

Local Planning Policy

- 13.13 The key Local Plan policy relating to noise is Policy H8 Housing and Aberdeen Airport, which states that:

“Applications for residential development under or in the vicinity of aircraft flight paths, where the noise levels are in excess of 57dB L_{Aeq} (using the summer 16- hour dB L_{Aeq} measurement) will be refused, due to the inability to create an appropriate level of residential amenity, and to safeguard the future operation of Aberdeen Airport.”

- 13.14 The supporting text notes at paragraph 3.50:

“3.50 The airport is a noisy neighbour. To avoid conflict with neighbouring uses residential development within close proximity to it is not acceptable. Planning Advice Note PAN 1/2011 and the accompanying Technical Advice Note on the assessment of noise set out Scottish Government guidance on planning and noise, while the Environmental Noise (Scotland) Regulations 2006 provide the basis for minimising noise disturbance at Aberdeen Airport through the Aberdeen Airport Noise Action Plan.”

- 13.15 The site sits outside the forecast 57dB contour for the period up to 2040, as set out in the Aberdeen International Airport Master Plan, January 2013. The contours for 2006, 2020 and 2040 are contained in Appendix A2 of the technical Annex.

BS5228

- 13.16 The calculation and assessment method set out in British Standard 5228: 2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites, has been used for the assessment of construction noise and vibration. Details of the construction noise assessment are set out in the Technical Annex. The assessment criteria have been determined using the approach set out in Table 13.4.

Table 13.4: Threshold of Significance Effects at Dwellings

Assessment Category and Threshold Value period (L_{Aeq})	Threshold Value, dB		
	Category A ⁽¹⁾	Category B ⁽²⁾	Category C ⁽³⁾
Night-time (23:00 to 07:00)	45	50	55
Evenings and weekends ⁽⁴⁾	55	60	65
Daytime (07:00-19:00)	65	70	75

Notes:
⁽¹⁾ Category A: threshold values to use when ambient noise levels (rounded to the nearest 5 dB) are less than these values.
⁽²⁾ Category B: threshold values to use when ambient noise levels (rounded to the nearest 5 dB) are the same as Category A values.
⁽³⁾ Category C: threshold values to use when ambient noise levels (rounded to the nearest 5 dB) are higher than Category A values.
⁽⁴⁾ 19:00-23:00 weekdays, 13:00-23:00 Saturdays and 07:00-23:00 Sundays

- 13.17 The criteria set out in Table 13.4 have been used to assess the noise levels likely to be generated during construction. The significance of any impacts caused by construction noise has been determined using the following approach:

- Exceeding the relevant criteria in Table 13.4 by more than 10dB will constitute a major adverse impact, irrespective of the duration;
- Exceeding the relevant criteria in Table 13.4 by less than 10dB for a period of more than one month will constitute a moderate adverse impact;
- Exceeding the relevant criteria in Table 13.4 by less than 10dB for a period of less than one month will constitute a minor adverse impact; and
- Compliance with the relevant criteria set out in Table 13.4 will constitute a neutral or negligible impact.

13.18 Where existing ambient noise levels already exceed the assessment criteria, a minor adverse impact will be considered to occur where the ambient noise levels increase by up to 3dB, a moderate adverse impact will be considered to occur where the ambient noise levels increase by more than 3dB and a major adverse impact will be considered to occur where the ambient noise levels increase by 10dB.

13.19 The significance of any impacts caused by construction vibration will be determined as set out below. Note that the duration of vibration impacts is of less significance since all of the construction works generating vibration will be of relatively short duration. The significance of the impact is therefore categorised according to the vibration magnitude only:

- Any works causing a vibration level >10 mm/s (PPV) will constitute a major adverse impact;
- Any works causing a vibration level between 1 mm/s and 10 mm/s will constitute a moderate adverse impact;
- Any works causing a vibration level between 0.3 mm/s and 1 mm/s will constitute a minor adverse impact; and
- Any works causing a vibration level <0.3 mm/s will constitute a neutral or negligible impact.

13.20 The threshold for a minor adverse impact has been set at 0.3 mm/s as the guidance in BS5228 indicates that this is appropriate for residential situations. The full detail can be found in the Technical Annex.

Design Manual for Roads and Bridges

13.21 Impacts associated with off-site operational traffic have been assessed broadly in accordance with the guidance set out in The Design Manual for Roads and Bridges (DMRB, 2011), which provides detailed guidance on noise and vibration assessment for road schemes in the UK. The DMRB gives guidance and interpretation on the magnitude of noise impact from road traffic sources and includes exemplar semantic scales for classifying the magnitude of short term and long term impacts, as shown in Tables 13.5 and 13.6.

Table 13.5: DMRB Short-Term Impact Scale

Change in Noise Level dB(A)	Magnitude of Impact
0	No change
0.1 - 0.9	Negligible
1.0 – 2.9	Minor or low
3.0 – 4.9	Moderate or medium
5+	Major or high

Table 13.6: DMRB Long-Term Impact Scale

Change in Noise Level dB(A)	Magnitude of Impact
0	No change
0.1 - 2.9	Negligible
3.0 – 4.9	Minor or low
5.0 – 9.9	Moderate or medium
10+	Major or high

- 13.22 The criteria above reflect key benchmarks that relate to human perception of sound. A change of 1dB is classed in DMRB as the smallest change that is considered perceptible in the short term, a 3dB change is considered to be the smallest change in noise that is perceptible in the long term, and a 10dB change is approximately a halving or doubling of loudness.
- 13.23 The criteria set out in Table 3.6 have been used to assess the potential impact of off-site road traffic noise as a result of the scheme in principle, i.e. the potential long-term impact of development. The criteria in Table 3.5 have been used to assess the short-term impacts associated with the completion of each development scenario.

BS4142

- 13.24 British Standard 4142: 1997 Method for rating industrial noise affecting mixed residential and industrial areas, has been used to identify noise limits for any building services plant that may be provided as part of the development (e.g. air conditioning units). Aberdeen City Council stipulated that the rating noise levels associated with any items of plant should not exceed a limit set 5dB below the existing background noise level.

Building Bulletin 93

- 13.25 The Department for Education and Skills' Building Bulletin (BB) 93 *Acoustic Design of Schools – A Design Guide* sets out the most recent Governmental advice for the design of schools. The document covers the external and internal environments and describes the measures that need to be undertaken to ensure a suitable environment for learning.
- 13.26 The acceptability of noise for a proposed school is quantified in Section 2.2 titled Recommendations for external noise levels outside school buildings:

“For new schools, 60dB $L_{Aeq,30min}$ should be regarded as an upper limit for external noise at the boundary of external premises used for formal and informal outdoor teaching, and recreational areas.

Under some circumstances it is possible to meet the specified indoor ambient noise levels on sites where external noise levels are as high as 70dB $L_{Aeq,30min}$ but this will require considerable building envelope sound insulation, screening or barriers.”

13.27 This criterion of 60dB has been adopted to determine the suitability of the proposed school locations in this case.

Calculation Methods

13.28 The calculations undertaken as part of this assessment have used:

- The Calculation of Road Traffic Noise (CRTN);
- The DEFRA Method for Converting the UK Road Traffic Noise Index $L_{A10,18h}$ to the EU Noise Indices for Road Noise Mapping, colloquially known as the TRL End Correction;
- CADNA noise modelling software for road traffic noise calculations; and
- Integrated Noise Model (INM) for aircraft noise modelling, implementing the US Society of Automotive Engineers’ (SAE) report SAE-AIR-1845 methodology.

13.29 The full details are contained in the Technical Annex.

Baseline Conditions

13.30 Noise surveys were carried out at and around the site between Thursday 31st May 2012 and Friday 1st June 2012, and between Tuesday 26th February 2013 and Friday 1st March 2013, to establish the existing noise climate. The survey methodology and results are set out in full in the Technical Annex.

13.31 The noise surveys focused on both establishing source noise data for the dominant noise sources at the site, to enable the noise levels across the whole site to be calculated using proprietary noise modelling software, and establishing the existing baseline noise levels at receptors close to the site. The measurement equipment, measurement locations and detailed survey results are described in the Technical Annex.

13.32 The noise surveys established that the dominant source affecting the site was road traffic noise, principally from the A90, although other roads also contributed to the noise climate. Noise from aircraft using Aberdeen Airport was audible. Although the main flight paths do not pass directly over the site, there were intermittent helicopter flights over the site during the daytime. The noise survey results are summarised in Tables 13.7 and 13.8.

Table 13.7: Summary of Measured Noise Levels, May/June 2012, free-field dB

Position	Period	Duration	$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{ASmax}	L_{AFmax}
1	Day	45 mins	72.5	56.7	76.8	82 to 83.9	85.9 to 87.3
	Night	15 mins	66.6	29.8	71.0	82.7	86.7
4	Day	45 mins	58.2	42.5	55.4	71.4 to 77.3	73.5 to 79.4

Position	Period	Duration	L _{Aeq,T}	L _{A90}	L _{A10}	L _{ASmax}	L _{AFmax}
	Night	15 mins	44.4	42.8	45.6	50.5	53.2
8	Day	45 mins	54.5	35.9	52.0	49.9 to 79.2	53.2 to 82.1
	Night	15 mins	37.1	33.1	38.4	51.2	52.4
9	Day	45 mins	53.6	37.1	55.4	68 to 71.7	70.6 to 74.4
	Night	15 mins	27.1	24.1	28.5	45.9	52.6
10	Day	45 mins	51.8	34.3	47.5	42.4 to 73.6	46.4 to 78
	Night	15 mins	27.2	22.1	29.8	41.3	45.7
11	Day	16 hours	56.1	36.8	50.5	45.6 to 83.1	52.3 to 86.6
	Night	8 hours	41.4	29.2	37.1	37 to 71.5	39.6 to 73.9

Table 13.8: Summary of Measured Noise Levels, February/March 2013, free-field level dB

Position	Period	Duration	L _{Aeq,T}	L _{A90}	L _{A10}	L _{ASmax}	L _{AFmax}
1	Day	3 hours	73.5	57.4	77.2	84.6 to 91.1	87.9 to 95.0
	Night	8 hours	63.2	42.9	61.5	72.3 to 82.5	74.3 to 86.3
2	Night	7 hours 45 mins	54.1	32.5	38.7	36.6 to 84.2	39.7 to 87.8
3	Day	3 hours	70.6	53.9	75.1	78.6 to 82.7	81.3 to 84.8
4	Night	8 hours	59.1	49.1	52.5	50.6 to 88.8	51.7 to 91.8
5	Day	2.5 hours	68.0	47.1	70.6	79.9 to 88.3	83.3 to 92.3
	Night	8 hours	58.3	47.2	50.8	47.3 to 84.7	47.9 to 88.3
6	Day	3 hours	77.1	53.8	81.8	87.2 to 103.8	90.5 to 107.7
7	Day	3 hours	77.3	64.0	81.0	84.7 to 88.9	86.9 to 92.7

Predicted Effects

Site Suitability

- 13.33 The suitability of the site for the proposed residential development has been assessed against the requirements of the PAN 1/2011 Technical Advice Note, specifically, by comparing the noise levels across the site against the criteria set out in Table 13.2. For the proposed schools, the guidance set out in BB93 has been referenced.
- 13.34 Noise levels across the site have been modelled using a combination of CADNA for road traffic noise sources, and INM for aircraft noise. The outputs from each model have then been combined to form composite noise contour plots. Two scenarios have been considered:
- existing noise levels at the site, to assess both the principle of the development and the PPIp in particular; and
 - the noise levels likely to exist in 2023, on the assumption that the PPIp scheme has been built.

- 13.35 The assumptions made in modelling the noise across the site are set out in Appendix A6 of the Technical Annex. **Figs 13.1** and **13.2** show the existing and future daytime and night-time noise contours at the site.
- 13.36 The majority of the site is currently predicted to be below 55dB during the daytime and below 45dB during the night-time (dark blue areas). When considered against the guidance in the PAN 1/2011 Technical Guidance Note, as shown in Table 5.2, these areas would be deemed to have “no change”, or to have a neutral impact. A similar situation is predicted for 2023, which includes an allowance for the traffic generated by the PPIP scheme. The majority of the site is therefore considered to be suitable for a predominantly residential development.
- 13.37 Parts of the site, principally those close to the A90 and Whitestripes Avenue, are predicted to be above 55dB during the daytime and 45dB during the night-time. The bandings shown on Figs 13.1-4 represent areas of negligible impact (light blue), minor adverse impacts (green), moderate adverse impacts (yellow) and major adverse impacts (red). The significance of these impacts would range from slight/moderate for the properties within the green areas (minor impact), to large or very large for the properties in the red areas (major impact). The extent to which the various bandings extend into the site is shown in Table 13.9.

Table 13.9: Extent of Impact Categories within Site

Potential Impact	Near Whitestripes Ave	Near A90 (near Fairview Way)	Near Laurel Drive at Upper Persley
Existing Situation			
Major Adverse (red)	46m	54m	13m
Moderate Adverse (yellow)	88m	102m	43m
Minor Adverse (green)	122m	152m	77m
Negligible (light blue)	202m	276m	470m
On Completion of the PPIP Scheme (post-2023)			
Major Adverse (red)	52m	58m	6m
Moderate Adverse (yellow)	109m	118m	19m
Minor Adverse (green)	155m	182m	38m
Negligible (light blue)	252m	300m	455m

- 13.38 The parts of the site that are predicted to be above 55dB during the daytime and 45dB during the night-time, are considered suitable for residential development, although the evolving masterplan will need to ensure that any opportunities to reduce noise exposure are exploited.
- 13.39 The proposed schools are located away from the site boundaries, and as such the noise levels are likely to be 55dB or lower. The guidance in BB93 is that 60dB should be regarded as the upper limit at the boundary of areas used for teaching, so these locations are considered to be appropriate. It is likely that, once the development is constructed, the acoustic screening provided by the surrounding buildings, together with noise generated within the development, will alter the noise climate at the

proposed school locations, so they should be considered in more detail when the appropriate phase is brought forward for detailed planning.

13.40 Since the site is generally considered to be suitable for the proposed development, the need for mitigation measures is limited. However, the perimeter of the site, principally those parts close to the A90 and Whitestripes Avenue, will require careful design to ensure that opportunities to reduce noise exposure are exploited. Such opportunities may include:

- locating the properties to ensure that acoustic screening is maximised, e.g. locating gardens to the rear so that the houses provide acoustic screening;
- orienting properties so that the number of habitable rooms facing surrounding noise sources are minimised; and
- use of landscaped buffer zones.

13.41 The sound reduction performance of the external building fabric will need to ensure that the noise levels within the properties meet the values stipulated by Aberdeen City Council and those specified in BS8233. In order to test this, noise levels have been calculated at a number of locations across the development to provide an indication of the sound reduction performances required of the external building fabric. Calculations have been undertaken for two scenarios:

- the existing situation, which comprises the baseline for the PPIP scheme; and
- the situation once the PPIP scheme is completed, which will form the baseline for the remainder of the masterplan.

13.42 Ten locations have been assessed, as shown on Figure A8.1 in the Technical Annex. The calculated sound reduction performance requirements are considered to be indicative, since the detailed site layout will affect the noise levels at specific properties. However, the calculations set out below are considered appropriate for current assessment purposes. The noise levels have all been calculated at a height of 4m above ground level, to represent the first floors of the properties.

13.43 The sound reduction performance requirements are shown in Table 13.10. The calculated noise levels have all been rounded up to the nearest whole number to ensure that the calculated sound reduction performances are robust. These requirements will apply to the whole external building fabric of the proposed properties. However, since windows are typically the weakest link in the external building fabric, in terms of acoustic performance, the calculated values will particularly apply to the windows.

Table 13.10: Indicative Sound Reduction Performance Requirements

Receptor	Period	Predicted Noise Level	Target	Indicative Sound Reduction Performance Requirement
Phase 1 - South	Day $L_{Aeq,16hrs}$	60	40	20
	Night $L_{Aeq,8hrs}$	50	35	15
Phase 1 - East	Day $L_{Aeq,16hrs}$	65	40	25

Receptor	Period	Predicted Noise Level	Target	Indicative Sound Reduction Performance Requirement
	Night L _{Aeq,8hrs}	57	35	22
Phase 1 - North	Day L _{Aeq,16hrs}	62	40	22
	Night L _{Aeq,8hrs}	54	35	19
Phase 2-5 - South 1	Day L _{Aeq,16hrs}	69	40	29
	Night L _{Aeq,8hrs}	59	35	24
Phase 2-5 - South 2	Day L _{Aeq,16hrs}	55	40	15
	Night L _{Aeq,8hrs}	46	35	11
Phase 2-5 - West	Day L _{Aeq,16hrs}	50	40	10
	Night L _{Aeq,8hrs}	41	35	6
Phase 2-5 - East	Day L _{Aeq,16hrs}	51	40	11
	Night L _{Aeq,8hrs}	42	35	7
Phase 2-5 - North	Day L _{Aeq,16hrs}	54	40	14
	Night L _{Aeq,8hrs}	45	35	10
Phase 6-7 - South	Day L _{Aeq,16hrs}	55	40	15
	Night L _{Aeq,8hrs}	47	35	12
Phase 6-7 - West	Day L _{Aeq,16hrs}	56	40	16
	Night L _{Aeq,8hrs}	48	35	13

13.44 It can be seen from Table 13.10 that to achieve the internal criteria, sound reduction performances of up to 29dB are required. In most instances, a sound reduction performance of 25dB will be sufficient. Windows do not reduce noise equally across the entire frequency spectrum, so the frequency content of the sound will influence the overall sound reduction performance of a given window and by extension, the resulting noise levels within the receiving room.

13.45 Many glazing manufacturers test their products under laboratory conditions using a typical road traffic noise frequency spectrum source. The resultant measured noise attenuation, in dB, gives a very useful guide to in-situ sound reduction performance of the window for situations where road traffic noise dominates, known as the R_{TRA}. The sound reduction requirements set out in Table 13.10 should be interpreted as R_{TRA} values. By way of example, standard 4/16/4 double glazing units will typically achieve a sound reduction of 25dB R_{TRA}. The notation refers to a double glazing unit with two panes of 4mm glass, separated by a 16mm air-gap. Pilkington's 10/12/4 double glazing unit should typically achieve a sound reduction of 29dB R_{TRA}.

13.46 The above analysis is provided to demonstrate that a design solution is feasible at the site for the purposes of a planning application, but not for the purposes of detailed design or glazing procurement.

Construction Noise

13.47 Detailed information is not available at this stage on the proposed construction methods, nor on the construction phasing. Notwithstanding this, the works are anticipated to involve the following elements:

- site preparation works, involving excavators, dump trucks, loaders and lorries;

- foundation works, involving augered piling, concreting plant, trucks and lorries;
- building erection works, involving lorries, tracked cranes, manual tasks such as hammering, nail guns and erection of scaffolding, generators and compressors;
- road surfacing, including asphalt paving equipment and lorries; and
- landscaping works, involving dump trucks, lorries, compaction plant, excavators and tarmac plant.

13.48 The items of plant used in the calculations for each phase of works are set out in Appendix A7 of the Technical Annex. It should be noted that the listed construction plant do not represent the total plant likely to be utilised across the whole development site, but are representative of the typical plant that may undertake the construction works within each area.

13.49 The calculations have been undertaken for two situations; an 'average' case where the construction plant are assumed to be at the approximate centre of the site, and a 'worst-case' where the construction plant are assumed to be at the part of the site closest to the receptor under consideration. This gives a range of values representing the average and worst-case noise levels likely to be generated during the works. The receptors considered for each assessment phase, and the assessment criteria that are considered appropriate for each, are identified in the Technical Annex.

13.50 The potential effects of the predicted construction noise levels on the measured ambient noise levels have been calculated and are shown in Table 13.11. Only the noise levels for the noisiest phases of works have been considered.

Table 13.11: Assessment of Construction Noise Levels, dB

Receptor	Existing Ambient Noise Level, $L_{Aeq,T}^{(1)}$	Future Average to Worst-case Ambient Noise Level, $L_{Aeq,T}$	Assessment Criteria
Phase 1			
Danestone	70.6	70.6 to 70.7	75
Fairview Way	70.6	70.6 to 71.3	75
Laverockbraes	53.6	57.8 to 85.3	65
Middleton Crescent	53.6	56.5 to 69.9	65
Whitestripes Avenue	70.6	70.7 to 76.6	75
Whitestripes Road	53.6	56.7 to 79.5	65
Phases 2 to 5			
Bonnyside	51.8	53.9 to 85.3	65
Clerkhill	54.5	55.1 to 64.4	65
Cothill	54.5	55.0 to 57.0	65
Danestone	70.6	70.6 to 83.2	75
Fairview Way	70.6	70.6 to 83.2	75
Foucausie	54.5	54.9 to 58.0	65

Receptor	Existing Ambient Noise Level, $L_{Aeq,T}^{(1)}$	Future Average to Worst-case Ambient Noise Level, $L_{Aeq,T}$	Assessment Criteria
Lee Crescent North	56.1	56.6 to 73.3	65
Lower Persley	58.2	58.3 to 59.3	65
Middleton Crescent	53.6	54.6 to 72.9	65
Phase 1 south	58.2	58.4 to 83.0	65
Phase 1 west	53.6	54.9 to 83.0	65
Whitestripes Cottages	51.8	53.0 to 85.3	65
Whitestripes Avenue	70.6	70.6 to 73.3	75
Whitestripes Farm	56.1	56.5 to 85.3	65
Whitestripes Road	53.6	54.9 to 83.0	65
Woodcroft Avenue	56.1	56.4 to 71.1	65
Phases 6 and 7			
Clerkhill	54.5	55.6 to 83.0	65
Cothill	54.5	58.2 to 83.0	65
Dovecot	54.5	55.4 to 59.2	65
Foucausie	54.5	55.0 to 57.7	65
Lower Persley	58.2	58.4 to 60.9	65
North Lodge	54.5	55.5 to 83.0	65
Phase 2-5 North West	54.5	54.9 to 56.9	65
Phase 2-5 South West	58.2	58.7 to 68.3	65
Phase 2-5 West	54.5	55.8 to 70.6	65
Upper Persley	58.2	58.5 to 83.0	65
Note: ⁽¹⁾ Taken to be measured noise level at closest measurement location			

- 13.51 It can be seen from Table 13.11 that the future ‘average’ ambient noise levels are predicted to be within the assessment criteria at all of the locations considered. This would constitute a neutral or negligible noise impact.
- 13.52 Future ‘worst-case’ ambient noise levels have been predicted to exceed the assessment criteria at four of the six locations assessed for Phase 1, 11 of the 16 assessed for the PPIP scheme, and 6 of the 10 assessed for the remainder of the masterplan. The greatest exceedances are predicted to be 20.3dB at Laverockbraes during the Phase 1 works, and at Whitestripes Cottages and Whitestripes Farm during the remainder of the PPIP works.
- 13.53 The periods when the criteria are likely to be exceeded are anticipated to be short, and it should also be noted that the worst-case assessment, where the breaches of the criteria are predicted, assumes that all items of plant are operating at the closest point on-site to the receptor, which in practice is unlikely to happen.
- 13.54 Twelve of the assessed locations are predicted to exceed the assessment criteria by more than 10dB, and would therefore be classed as major adverse impacts. The significance of these would be classed as large or very large.

13.55 To ensure that the potential construction impacts are minimised, a range of mitigation measures would be implemented as part of the CEMP. Typical measures are likely to include the following:

- phasing the construction to minimise the period where noisy works are undertaken close to the site boundaries;
- ensuring that the works adhere to agreed working hours;
- controlling off-site parking of construction traffic on the public highway;
- implementing a traffic management system at site entrances;
- minimising disturbance from reversing beepers through measures such as site layout, provision of screening, or use of broadband sound emitting reversing alarms;
- using 'silenced' plant and equipment wherever possible;
- switching off vehicle engines when vehicles are standing for a significant period of time;
- operating plant at low speeds where possible and incorporating automatic low speed idling;
- selecting electrically driven equipment where possible in preference to internal combustion powered, hydraulic power in preference to pneumatic, and wheeled instead of tracked plant;
- maintaining all plant properly (greased, blown silencers replaced, saws kept sharpened, teeth set and blades flat, worn bearings replaced, etc);
- giving consideration to temporary screening or enclosures for static noisy plant to reduce noise emissions, and certifying plant to meet any relevant EC Directive standards; and
- making all contractors familiar with the guidance in BS5228 (Parts 1 and 2) which would form a pre-requisite of their appointment.

13.56 Adopting a neighbourly approach to the construction works will be essential to maintain good relations with the occupants of neighbouring properties. In particular, local residents should be given advance warning of any noisy or intensive operations.

Construction Vibration

13.57 Whilst there are no British Standards that provide an accurate method of predicting levels of vibration from construction activities, BS5228: Part 2 contains a number of equations that may be used to estimate vibration levels where specific types of activity are undertaken, such as the use of a vibratory roller.

13.58 It is generally accepted that, for the majority of people, vibration levels in excess of 0.14 mm/s peak particle velocity are just perceptible. On the assumption that it will be

possible to use augered piling during the construction of building foundations, the items of plant that are likely to produce the most vibration are those used for excavation, the movement of heavy vehicles and the piling works themselves.

- 13.59 Experience in monitoring such activities suggests that vibration is not generally perceptible at distances of 50 metres or more. The receptors closest to the site are within 20m of the boundaries, so perceptible levels of vibration are anticipated when the works are in the vicinity. Consequently, minor adverse impacts are possible, which would be deemed to be of slight/moderate significance.
- 13.60 It should be noted that significantly greater levels of vibration are required to cause damage to buildings than those perceptible to humans. As a result, and taking account of the type of plant likely to be used and the distances involved, damage to existing dwellings due to vibration is unlikely to occur.
- 13.61 There are no effective mitigation measures to reduce vibration from the construction works, other than to limit the period of exposure by reducing the working period, or to use alternative methods or plant. A watching brief will be adopted, with vibration monitoring carried out at relevant properties if necessary. Where high levels of vibration are observed or measured, the works would be modified or undertaken for a shorter duration to minimise any adverse effects.

Noise from Development Traffic

- 13.62 The assessment of traffic noise has considered the years 2018 (when Phase 1 is assumed to be complete), 2023 (when the PPIp scheme is assumed to be complete), and 2032 (when the remainder of the masterplan is assumed to be complete). Traffic noise predictions have been carried out at a notional receptor location 10m from the edge of the carriageway and 1.5m above ground level. A notional receptor has been used because it is the change in traffic noise level that is of interest, not the absolute noise levels at any given receptor. The predicted changes in noise level will occur at noise-sensitive receptors along each section of road considered. The traffic flows are set out in the Technical Annex.

PPIp

- 13.63 The changes in traffic noise associated with completion of the PPIp in 2023 are shown in Table 13.12.

Table 13.12: Predicted Changes in Road Traffic Noise for the PPIp

Road	2018 – No Development	2023 - With Development
Muggiemoss Road (East of Persley Bridge)	71.0	71.1 (+0.1)
Persley Bridge	71.3	71.9 (+0.6)
Laurel Drive (East of Persley Bridge)	65.4	66.5 (+1.1)
Laurel Drive (West of Persley Bridge)	65.5	63.4 (-2.1)
A90 Parkway - (North of Persley Bridge)	72.0	72.8 (+0.8)
Fairview St (South of Buckie Farm junction)	68.3	67.0 (-1.3)
A90 Parkway (East of Buckie Farm Junction)	74.2	71.4 (-2.8)
Whitestripes Ave (North of Buckie Farm junct)	66.8	68.4 (+1.6)

Road	2018 – No Development	2023 - With Development
Whitestripes Road (N)	65.0	68.2 (+3.2)
Whitestripes Ave (North of Whitestripes Rd)	65.2	65.6 (+0.4)
Balgownie Road (South of Parkway)	65.8	63.9 (-1.9)
Scotstown Rd (North of Parkway)	69.4	68.5 (-0.9)
A90 Parkway (East of Scotstown Road)	72.4	69.1 (-3.3)
Scotstown Road (South of Parkway)	68.4	66.4 (-2.0)
Woodside Road	64.7	64.2 (-0.5)
A90 Parkway (West of Ellon Road - A90)	71.5	68.1 (-3.4)
A90 Ellon Road (North of Parkway)	77.4	77.5 (+0.1)
AEP access - (East of Ellon Road)	66.5	66.5 (0)
A956 Ellon Rd (South of Parkway)	72.0	71.8 (-0.2)

Note: Figures denote the calculated noise level and the change from the 2018 baseline value in brackets.

- 13.64 Considering the changes in noise level shown in Table 13.12 against the long-term impact scale set out in Table 13.6, it can be seen that a minor increase of 3.2dB is predicted along Whitestripes Road, with all of the other increases being negligible. Minor decreases in noise are predicted along the A90 Parkway (West of Ellon Road – A90) and A90 Parkway (East of Scotstown Road). The significance of the minor changes in off-site road traffic noise would be slight or moderate.

Phase 1

- 13.65 The predicted short-term changes in traffic noise as a result of the completion of Phase 1 in 2018 are shown in Table 13.13.

Table 13.13: Predicted Changes in Road Traffic Noise for Phase 1

Road	2018 – No Development	2018 – With Development
Muggiemoss Road (East of Persley Bridge)	71.0	71.1 (+0.1)
Persley Bridge	71.3	71.4 (+0.1)
Laurel Drive (East of Persley Bridge)	65.4	65.4 (0)
Laurel Drive (West of Persley Bridge)	65.5	65.5 (0)
A90 Parkway - (North of Persley Bridge)	72.0	72.1 (+0.1)
Fairview St (South of Buckie Farm junction)	68.3	68.5 (+0.2)
A90 Parkway (East of Buckie Farm Junction)	74.2	74.3 (+0.1)
Whitestripes Ave (North of Buckie Farm junct)	66.8	67.6 (+0.8)
Whitestripes Road (N)	65.0	65.7 (+0.7)
Whitestripes Ave (North of Whitestripes Rd)	65.2	65.2 (0)
Balgownie Road (South of Parkway)	65.8	66.0 (+0.2)
Scotstown Rd (North of Parkway)	69.4	69.4 (0)
A90 Parkway (East of Scotstown Road)	72.4	72.5 (+0.1)
Scotstown Road (South of Parkway)	68.4	68.5 (+0.1)
Woodside Road	64.7	64.7 (0)

Road	2018 – No Development	2018 – With Development
A90 Parkway (West of Ellon Road - A90)	71.5	71.6 (+0.1)
A90 Ellon Road (North of Parkway)	77.4	77.4 (0)
AEP access - (East of Ellon Road)	66.5	66.6 (+0.1)
A956 Ellon Rd (South of Parkway)	72.0	72.1 (+0.1)

Note: Figures denote the calculated noise level and the change from the 2018 baseline value in brackets.

13.66 Considering the changes in noise level shown in Table 13.13 against the short-term impact scale set out in Table 13.5, it can be seen that they are all less than 1dB and would therefore be considered as negligible impacts. The significance of these impacts would be slight.

Remaining Phases of PPIP

13.67 The predicted incremental, short-term changes in traffic noise associated with completion of the remaining phases of the PPIP scheme in 2023 are shown in Table 13.14.

Table 13.14: Predicted Changes in Road Traffic Noise for the Remainder of the PPIP Scheme

Road	2018 – With Development	2023 – With Development
Muggiemoss Road (East of Persley Bridge)	71.1	71.1 (0)
Persley Bridge	71.4	71.9 (+0.5)
Laurel Drive (East of Persley Bridge)	65.4	66.5 (+1.1)
Laurel Drive (West of Persley Bridge)	65.5	63.4 (-2.1)
A90 Parkway - (North of Persley Bridge)	72.1	72.8 (+0.7)
Fairview St (South of Buckie Farm junction)	68.5	67.0 (-1.5)
A90 Parkway (East of Buckie Farm Junction)	74.3	71.4 (-2.9)
Whitestripes Ave (North of Buckie Farm junction)	67.6	68.4 (+0.8)
Whitestripes Road (N)	65.7	68.2 (+2.5)
Whitestripes Ave (North of Whitestripes Rd)	65.2	65.6 (+0.4)
Balgownie Road (South of Parkway)	66.0	63.9 (-2.1)
Scotstown Rd (North of Parkway)	69.4	68.5 (-0.9)
A90 Parkway (East of Scotstown Road)	72.5	69.1 (-3.4)
Scotstown Road (South of Parkway)	68.5	66.4 (-2.1)
Woodside Road	64.7	64.2 (-0.5)
A90 Parkway (West of Ellon Road - A90)	71.6	68.1 (-3.5)
A90 Ellon Road (North of Parkway)	77.4	77.5 (+0.1)
AEP access - (East of Ellon Road)	66.6	66.5 (-0.1)
A956 Ellon Rd (South of Parkway)	72.1	71.8 (-0.3)

Note: Figures denote the calculated noise level and the change from the 2018 with development value in brackets.

13.68 Considering the changes in noise level shown in Table 13.14 against the short-term impact scale set out in Table 13.5, it can be seen that minor increases of 1.1dB and 2.5dB are predicted along Laurel Drive (East of Persley Bridge) and Whitestripes Road respectively, with all of the other increases predicted to be less than 1dB and therefore considered as negligible impacts.

13.69 There are minor to moderate decreases in noise predicted along Laurel Drive (West of Persley Bridge), Fairview St (South of Buckie Farm junction), A90 Parkway (East of Buckie Farm Junction), Balgownie Road (South of Parkway), A90 Parkway (East of Scotstown Road), Scotstown Road (South of Parkway) and A90 Parkway (West of Ellon Road - A90), although some of these decreases are unrelated to the development. The significance of minor changes in off-site road traffic noise would be slight or moderate.

Phases 6 and 7

13.70 The predicted incremental, short-term changes in traffic noise associated with completion of the remaining phases of the masterplan in 2032 are shown in Table 13.15.

Table 13.15: Predicted Changes in Road Traffic Noise for the Remainder of the Masterplan

Road	2023 – With Development	2032 – With Development
Muggiemoss Road (East of Persley Bridge)	71.1	71.2 (+0.1)
Persley Bridge	71.9	72.0 (+0.1)
Laurel Drive (East of Persley Bridge)	66.5	66.4 (-0.1)
Laurel Drive (West of Persley Bridge)	63.4	64.5 (+1.1)
A90 Parkway - (North of Persley Bridge)	72.8	72.9 (+0.1)
Fairview St (South of Buckie Farm junction)	67.0	67.4 (+0.4)
A90 Parkway (East of Buckie Farm Junction)	71.4	71.5 (+0.1)
Whitestripes Ave (North of Buckie Farm junct)	68.4	68.4 (0)
Whitestripes Road (N)	68.2	69.3 (+1.1)
Whitestripes Ave (North of Whitestripes Rd)	65.6	65.5 (-0.1)
Balgownie Road (South of Parkway)	63.9	63.8 (-0.1)
Scotstown Rd (North of Parkway)	68.5	68.8 (+0.3)
A90 Parkway (East of Scotstown Road)	69.1	69.4 (+0.3)
Scotstown Road (South of Parkway)	66.4	66.5 (+0.1)
Woodside Road	64.2	64.5 (+0.3)
A90 Parkway (West of Ellon Road - A90)	68.1	68.5 (+0.4)
A90 Ellon Road (North of Parkway)	77.5	77.8 (+0.3)
AEP access - (East of Ellon Road)	66.5	66.7 (+0.2)
A956 Ellon Rd (South of Parkway)	71.8	71.9 (+0.1)

Road	2023 – With Development	2032 – With Development
Note: Figures denote the calculated noise level and the change from the 2023 with development value in brackets.		

13.71 Considering the changes in noise level shown in Table 13.15 against the short-term impact scale set out in Table 13.5, it can be seen that minor increases of 1.1dB are predicted along Laurel Drive (West of Persley Bridge) and Whitestripes Road. All of the other changes are predicted to be less than 1dB and therefore considered as negligible impacts. Mitigation is considered neither practicable nor necessary to reduce the identified minor adverse impacts.

Allowance for Background Changes

13.72 To provide some additional context to the anticipated changes in road traffic noise, particularly some of the decreases shown in Table 13.14, changes in background road traffic noise levels have been assessed, as shown in Table 13.16.

Table 13.16: Predicted Changes in Baseline Road Traffic Noise

Road	2018 – No Development	2023 – No Development	2032 – No Development
Muggiemoss Road (E of Persley Bridge)	71.0	71.0 (0)	71.1 (+0.1)
Persley Bridge	71.3	71.7 (+0.4)	71.8 (+0.5)
Laurel Drive (E of Persley Bridge)	65.4	66.4 (+1.0)	66.3 (+0.9)
Laurel Drive (W of Persley Bridge)	65.5	62.8 (-2.7)	62.9 (-2.6)
A90 Parkway - (N of Persley Bridge)	72.0	72.4 (+0.4)	72.6 (+0.6)
Fairview St (S of Buckie Farm junction)	68.3	66.4 (-1.9)	66.5 (-1.8)
A90 Parkway (E of Buckie Farm Junction)	74.2	71.7 (-2.5)	71.9 (-2.3)
Whitestripes Ave (N of Buckie Farm junct)	66.8	67.4 (+0.6)	67.3 (+0.5)
Whitestripes Road (N)	65.0	66.4 (+1.4)	66.9 (+1.9)
Whitestripes Ave (N of Whitestripes Rd)	65.2	66.1 (+0.9)	66.1 (+0.9)
Balgownie Road (S of Parkway)	65.8	63.8 (-2.0)	63.8 (-2.0)
Scotstown Rd (N of Parkway)	69.4	67.6 (-1.8)	67.7 (-1.7)
A90 Parkway (E of Scotstown Road)	72.4	69.4 (-3.0)	69.7 (-2.7)
Scotstown Road (S of Parkway)	68.4	65.7 (-2.7)	66.0 (-2.4)
Woodside Road	64.7	64.4 (-0.3)	64.4 (-0.3)
A90 Parkway (W of Ellon Road - A90)	71.5	68.1 (-3.4)	68.6 (-2.9)
A90 Ellon Road (N of Parkway)	77.4	77.5 (+0.1)	77.8 (+0.4)

Road	2018 – No Development	2023 – No Development	2032 – No Development
AEP access - (E of Ellon Road)	66.5	66.5 (0)	66.7 (+0.2)
A956 Ellon Rd (S of Parkway)	72.0	71.7 (-0.3)	71.8 (-0.2)

Note: Figures denote the calculated noise level and the change from the 2018 baseline value in brackets.

13.73 It can be seen from Table 13.16 that, without the development, the increases in road traffic noise on the network are likely to be 1dB or less along all the roads considered, except Whitestripes Road (N), where increases of up to 2dB are predicted. A number of roads are predicted to benefit from a decrease in road traffic noise, notably Laurel Drive (West of Persley Bridge), Fairview St (South of Buckie Farm junction), A90 Parkway (East of Buckie Farm Junction), Balgownie Road (South of Parkway), Scotstown Rd (North of Parkway), A90 Parkway (East of Scotstown Road), Scotstown Road (South of Parkway), A90 Parkway (West of Ellon Road - A90). The decreases on these roads are predicted to range from 1.7 to 3.4dB. Since these are long-term effects, the highest decreases would be considered as minor benefits, with the remainder being negligible changes.

Fixed Plant Noise

13.74 The development is likely to include building services plant, although at this stage no details are available. Consideration has been given to the application of suitable noise limits, determined in consultation with Aberdeen City Council, who stated that noise from plant should be limited to a level 5dB below the existing background noise levels. It is assumed that the criteria relate to rating levels, which include any corrections for acoustic characteristics. The limits should also apply to the cumulative noise from all fixed plant items and should include any corrections for acoustic characteristics. The noise limits, based on the lowest background noise levels measured during each of the daytime and night-time periods, rounded down to the nearest whole number, are shown in Table 13.17.

Table 13.17: Recommended Noise Limits for Building Services Plant, free-field dB

Location	Period	Measured Existing L_{A90}	Proposed Noise Limit $L_{Ar}^{(1)}$
Receptors Close to Measurement Position 4	Day	42	37
	Night	42	37
Receptors Close to Measurement Position 5	Day	47	42
	Night	47	42
Receptors Close to Measurement Position 8	Day	35	30
	Night	33	28
Receptors Close to Measurement	Day	37	32
	Night	24	19

Location	Period	Measured Existing L _{A90}	Proposed Noise Limit L _{Ar} ⁽¹⁾
Position 9			
Receptors Close to Measurement Position 10	Day	34	29
	Night	22	17
Receptors Close to Measurement Position 11	Day	36	31
	Night	29	294
Note: ⁽¹⁾ The proposed noise limits are applicable at a point close to, but at least 4 metres in front of, the relevant façade			

13.75 The limits suggested above are rating levels and as such the detailed design will need to take into account the acoustic characteristics of the plant. The limits are deemed to apply to the total noise emission level from all plant, so that individual plant items may need to be designed to a lower limit to take into account the cumulative effects of noise. As and when plant locations and noise emissions are known, their noise emission levels will be assessed against the noise limits set out in Table 13.17 and mitigation specified if necessary. Compliance with the identified noise limits would result in a negligible impact, which would be classed as being of slight significance.

Residual and Cumulative Effects

Construction

- 13.76 There is potential for the adopted assessment criteria to be exceeded at the properties closest to the site, where the works are in the vicinity of sensitive receptors. Implementing the identified mitigation measures will reduce noise from the construction works, although it may not eradicate the adverse impacts entirely; minor to moderate adverse impacts are likely to remain, although they will be short term in nature.
- 13.77 Perceptible levels of vibration from the construction works may occur where piling or heavy ground works are undertaken near the receptors closest to the site. Where high levels of vibration are observed or measured, the works would be modified or undertaken for a shorter duration to minimise any adverse effects. Adopting this approach would reduce vibration impacts, although it may not eradicate them entirely; minor adverse impacts may remain.
- 13.78 Noise and vibration are unlikely to combine with other environmental aspects during the construction works to exacerbate any identified impacts. However, an integrated approach to the construction works would be adopted to ensure that the management of noise and vibration is consistent with the management of other environmental topics, such as air quality.

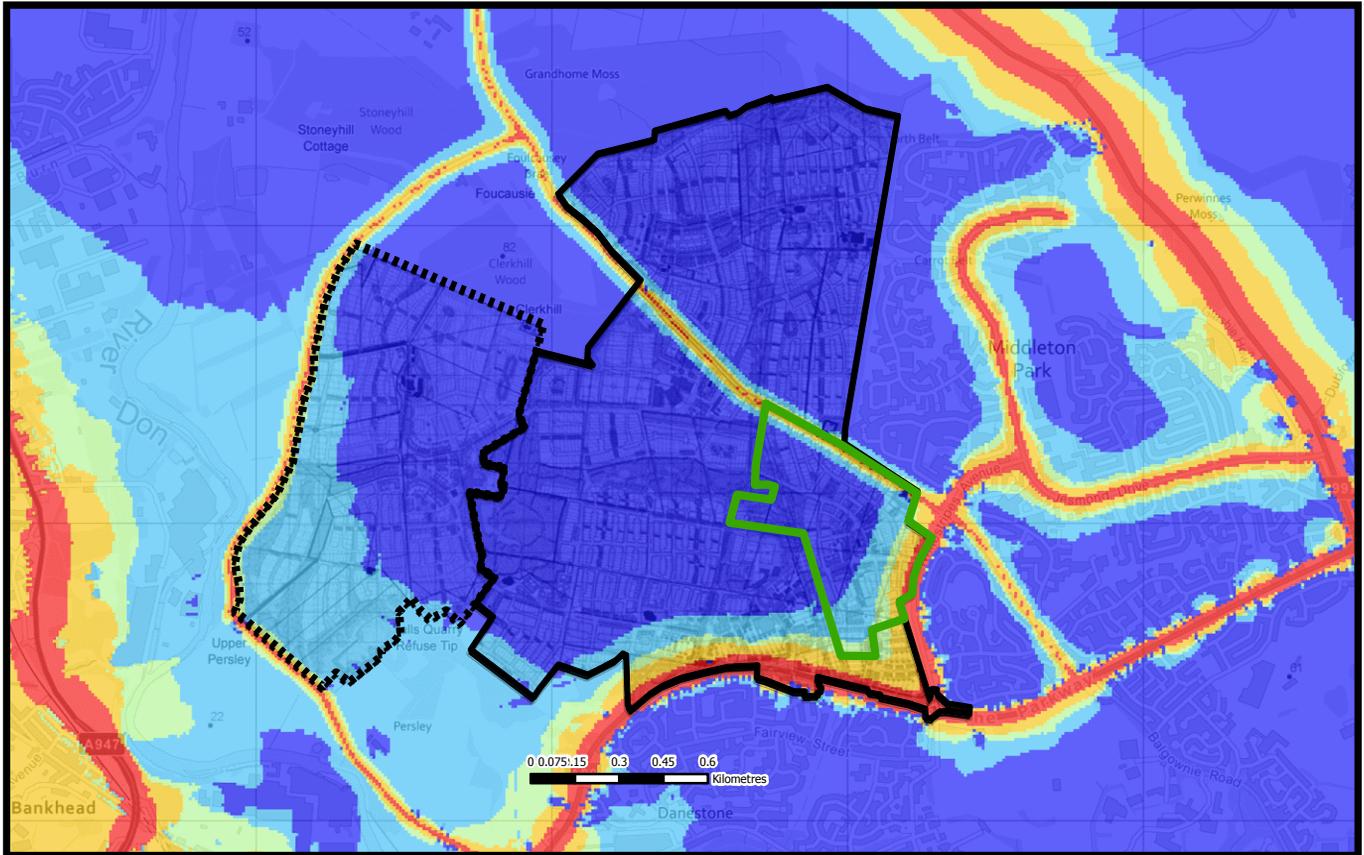
Operational Phase

- 13.79 The identified off-site road traffic noise minor adverse impacts are likely to remain. No other residual effects are considered likely. The effects of other developments have been taken into account in the traffic noise assessment, as the traffic data include traffic

generated by other schemes. Other than for road traffic, noise and vibration are unlikely to combine with other environmental to exacerbate any of the identified impacts.



Existing Daytime Noise Contours



2023 Daytime Noise Contours

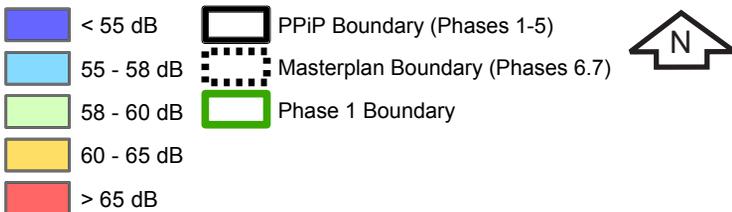
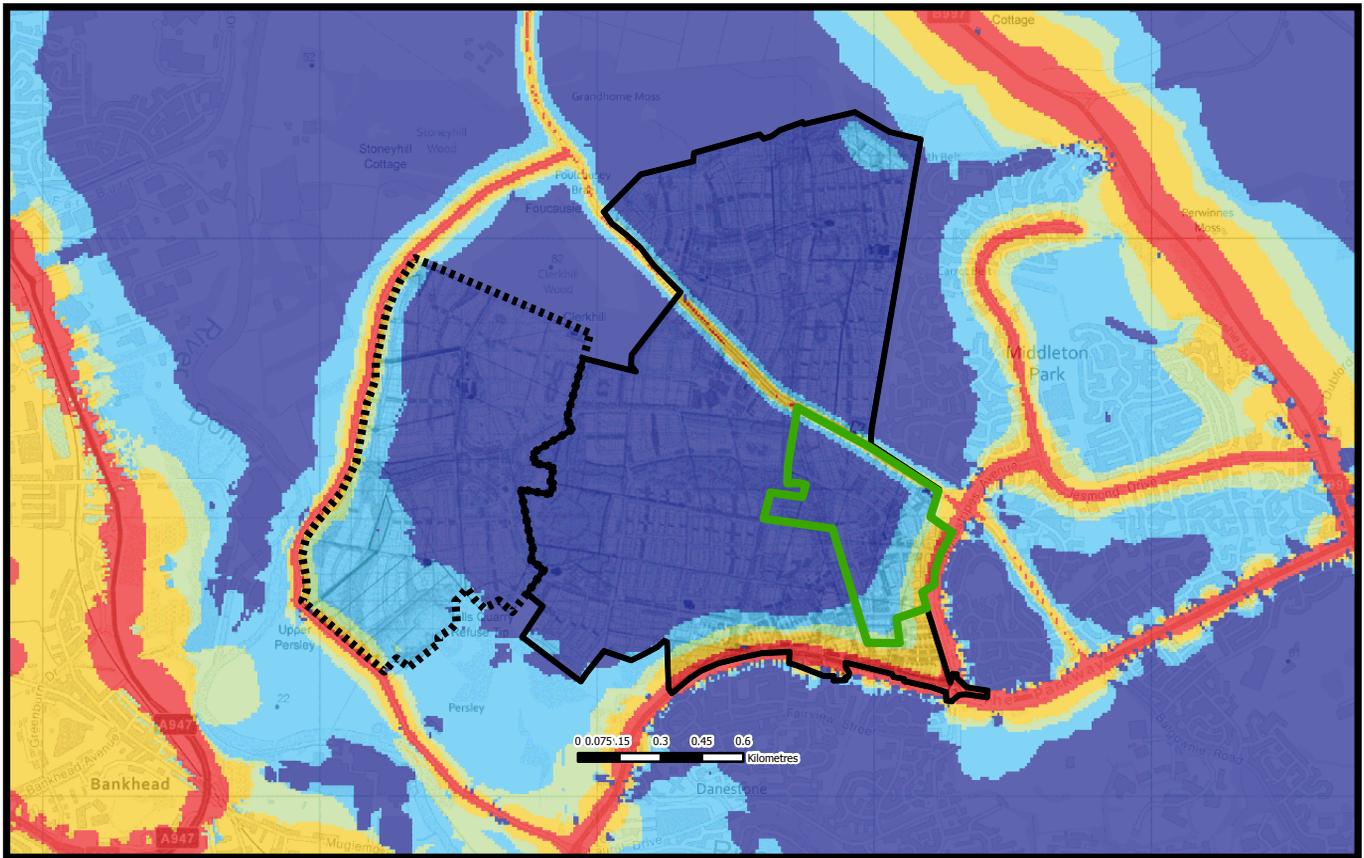


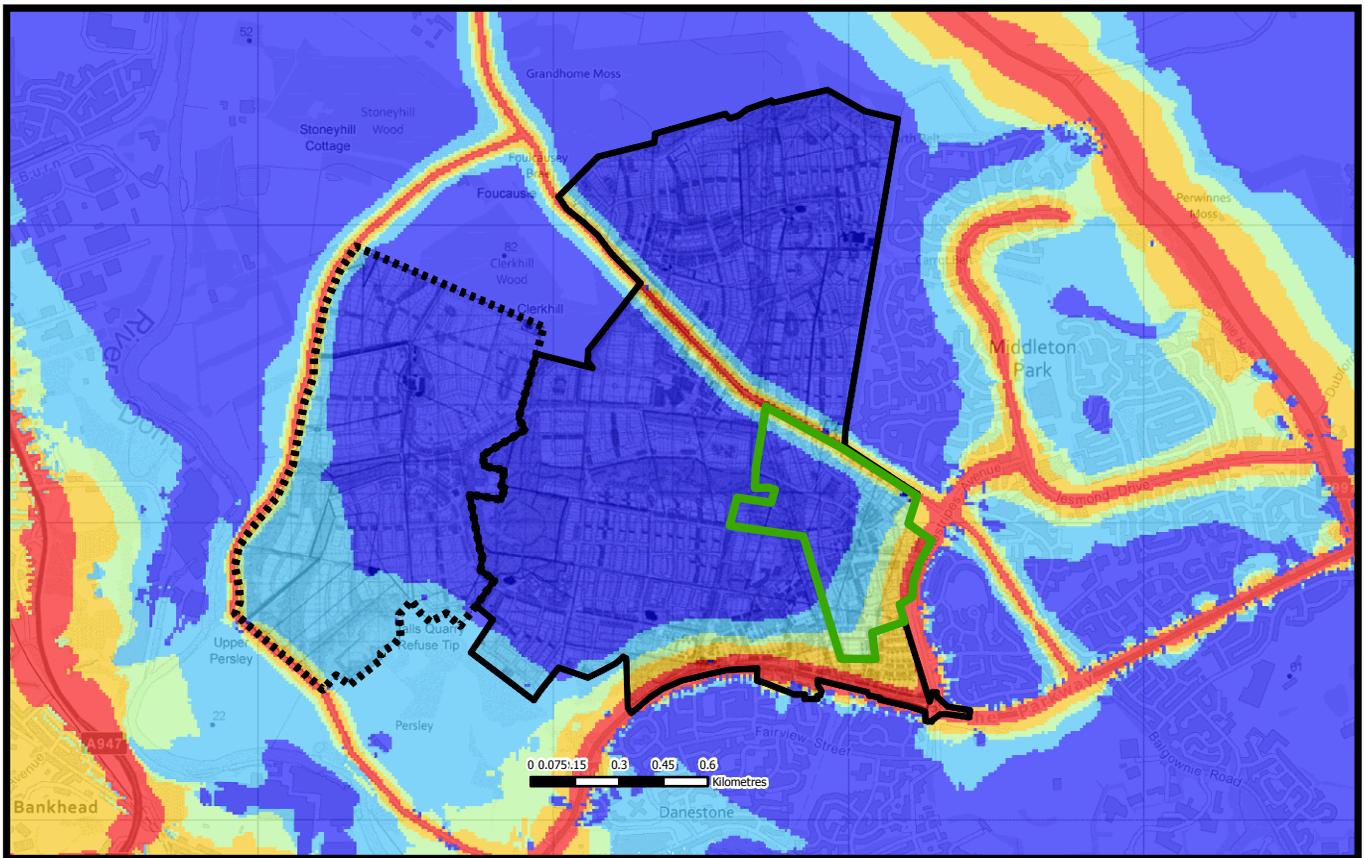
FIGURE 13.1

Daytime Noise Contours

Job No 2278 - Not to scale - October 2013
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Existing Night-time Noise Contours



2023 Night-time Noise Contours

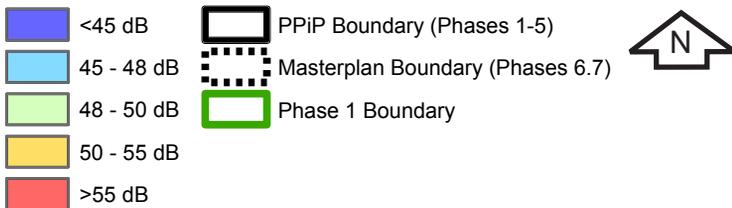


FIGURE 13.2

Night-time Noise Contours

Job No 2278 - Not to scale - October 2013
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14. Socio-Economics

Introduction

- 14.1 This chapter assesses the socio-economic effects of the proposed development, and should be read in conjunction with the full report presented in **Technical Annex 10**.

Scope

- 14.2 Socio-economic effects have been assessed both for the construction phase and for the completed development (operational effects). Construction effects relate mainly to the direct and indirect employment generated by the works and their associated supply chain. The following operational effects have been considered:

- Population - Effects relating to the increase in population and the characteristics of the new residents.
- Labour supply – Effects on local labour supply, principally the economically active, working age component.
- Employment – Effects associated with the employment provided by the proposed commercial premises and social/community facilities.
- Housing – Effects of the new housing provision on city-wide housing supply.
- Social and community infrastructure – Effects relating to demand for services such as education and healthcare.

- 14.3 The following resources/receptors have been considered for each assessment topic:

- Population - The size and characteristics of the population (working age, retired, children etc).
- Labour supply – The labour force of the local area (Bridge of Don/Danestone) and Aberdeen City.
- Employment – The local employment base (number of jobs).
- Housing supply – The quantity of housing in Aberdeen City and the future housing requirements identified in the Local Development Plan, the Aberdeen City/Aberdeenshire Structure Plan and the emerging SDP.
- Social and community infrastructure - The capacity of education and health facilities and services within the Bridge of Don/Danestone impact area.

- 14.4 Baseline conditions have been derived from a wide range of indicators, including the following datasets:

- ONS Census and Mid- Year population estimates, 2001 and 2011

- NRS Population Projections, 2010-2033
- GROS Average Household Size, 2010-2035
- GROS Average Household Projections, 2010-2035
- ONS Annual Population Survey (APS Occupational Classifications), 2012
- ONS Business Register and Employment Survey (BRES), 2008 onwards
- ONS Annual Business Inquiry (ABI Employment and Enterprises data), 1998-2008
- Interdepartmental Business Register (IDBR Business registration and deregistration), 2011
- ONS Annual Survey of Hours and Earnings (ASHE), 2012
- Scottish Housing Survey, 2009/10
- Aberdeen Housing Need and Demand Assessment, 2011
- Aberdeenshire County Council Employment Land Audit, 2011
- Scottish Index of Multiple Deprivation, 2012
- Aberdeen City Council School places data (2012/13)
- Grampian NHS GP data.

Methodology

- 14.5 Construction impacts have been assessed using indicative construction costs and a ratio of construction employment to output benchmarks. Regeneris Consulting's housing impact model, which draws on a range of employment, demographic, and household expenditure datasets has been used to estimate the scale of these housing related impacts. Employment effects have been assessed using a combination of the proposed floorspace by use-class, as well as national evidence on employment densities. The criteria used for assessing receptor sensitivity are set out in Table 14.1.

Table 14.1: Sensitivity Criteria

Sensitivity	Criteria	Example Criteria
Very High	Receptor is accorded a very high priority in local and regional development and regeneration policy.	Identification as a highest ranking thematic or spatial priority (as a result of economic potential and/or need). Evidence of severe socio-economic challenges, under-performance or vulnerability e.g. patterns of deprivation, employment and wealth generation, employment forecasts, exposure to socio-economic threats.

High	Receptor is accorded a high priority in local and regional economic development and regeneration policy.	Identification as a key thematic or spatial priority (as a result of economic potential and/or need). Evidence of major socio-economic challenges, under-performance or vulnerability e.g. patterns of deprivation, employment and wealth generation, employment forecasts, exposure to socio-economic threats.
Medium	Receptor is accorded a medium priority in local and regional economic development and regeneration policy.	No identification as a key thematic or spatial priority (as a result of economic potential and/or need) Evidence of significant socio-economic challenges, under-performance or vulnerability.
Low	Receptor is accorded a low priority in local and regional economic development and regeneration policy.	No identification as a key thematic or spatial priority (as a result of economic potential and/or need) Evidence of economic prosperity, buoyancy and resilience e.g. low levels of deprivation, relatively high employment and wealth generation rates, relatively strong employment forecasts.
Negligible	Receptor is accorded no particular priority in local and regional economic development and regeneration policy.	No identification as policy priority (as a result of economic potential and/or need). Evidence of good overall economic performance and long term prospects. No particular economic weaknesses or challenges.

14.6 The magnitude of impacts has been assessed by the change they represent when considered against baseline conditions. Whilst the assessment of magnitude primarily takes account of the absolute change (e.g. increase in employment compared to total employment in the impact areas), for some impacts the contribution to projected annual change has been considered (e.g. projected annual household change, projected population change). The magnitude criteria are set out in Table 14.2.

Table 14.2: Magnitude Criteria

Magnitude of Impact	Description
High	Proposals would cause a substantial change – judged positive or adverse - to baseline conditions in terms of absolute and/or percentage change.
Medium	Proposals would cause a moderate change – judged as positive or adverse - to existing conditions in terms of absolute and/or percentage change.
Low	Proposals would cause a slight change – judged as positive or adverse - to existing conditions in terms of absolute and/or percentage change.
Negligible	No discernible change in baseline conditions
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

14.7 The significance of effects has been derived by relating receptor sensitivity to impact magnitude, as shown in Table 14.3.

Table 14.3: Significance Criteria

Sensitivity of Receptor	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Minor	Minor
Low	Negligible	Negligible	Minor	Minor	Moderate
Medium	Negligible	Negligible	Minor	Moderate	Moderate
High	Negligible	Minor	Moderate	Moderate	Major
Very high	Negligible	Minor	Moderate	Major	Major

- 14.8 Using this scale, effects identified as major or moderate significance are regarded as being significant in Environmental Impact Assessment (EIA) terms (shaded cells). Effects of minor or lesser significance are not regarded as significant in EIA terms.
- 14.9 The potential for cumulative effects has been assessed in relation to three other developments in the surrounding area: Davidson’s Mill (575 residential units), Dubford (700 residential units) and Berryhill (30 acres of mixed uses).
- 14.10 Since the majority of the socio-economic impacts of the proposed development would be positive, the assessment identifies a limited need for mitigation. Where mitigation is relevant (e.g. social and community infrastructure) the provision of facilities as part of the Grandhome masterplan and the proposed approach to meeting demand for such facilities is explained.

Policy and Guidance

National Policy

- 14.11 Draft Scottish Planning Policy (2013) sets out the priorities for land-use planning to deliver sustainable economic growth. The key policy drivers are summarised below.
- 14.12 The Scottish Government’s Economic Strategy (2011) focuses on six strategic priorities including a supportive business environment, the transition to a low carbon economy, learning, skills and well-being, as well as effective Government and equity. The strategic priority attached to infrastructure development and place focuses on harnessing the strength and quality of Scotland’s towns, cities and rural areas, as well as promoting the digital economy. Following the elections in 2011, the Scottish Government renewed its emphasis on the drive to create and sustain new private sector employment as part of a rebalancing of the economy following reductions in public sector employment.
- 14.13 Working for Growth: A Refresh to the Employability Framework for Scotland (2012) - Reducing unemployment is identified as a national challenge requiring a cohesive response across all partners in Scotland. The Employability Framework encourages the

alignment of employability and skills services and seeks to emphasise and develop the premise that employability policy and investment across Scotland should have the same purpose of supporting economic recovery and ensuring that those who struggle the most in the labour market are not left further behind in the competition for good jobs.

- 14.14 National Low Carbon Economic Strategy (2010) - Objectives relating to the development of low carbon built environments and the provision of more low carbon transport options are central to the strategy. It reinforces the importance attached to economic growth which enables Scotland to meet its carbon emission targets. It would be expected to influence the type of development that takes place in the proposed settlement.
- 14.15 National Planning Framework 2 (2009) - This document guides Scotland's development to 2030 and takes forward the spatial aspects of the Government's Economic Strategy. The National Planning Framework 2 (NPF2) argues that changes in Scotland's demographic profile need to be reflected in the provisions for housing, transport and local community facilities. Sub-national population projections for Scotland indicate that Aberdeenshire's population will increase by 19% until 2030.
- 14.16 Throughout Scotland, the number of households required by 2030 is also projected to increase by 19% (to 2.7 million), an average of 17,600 additional households per year. However, the Government's aspirations imply a higher overall household growth than the current projections indicate. This means that not all the additional new houses needed can be built on previously developed land. Furthermore, there remains a pressing need for the planning system to help deliver growth in the supply of new homes to respond to long-term housing pressures and to ensure that enough houses of the right type are provided in the right place and at the right price.
- 14.17 Energetica - Under the banner of the Energetica Framework, Aberdeen City Council and Aberdeenshire Council, in association with other partners in Aberdeenshire are seeking to encourage development that makes a contribution to the quality of life, environmental performance and economic development targets. The Energetica area extends from North Aberdeen to Peterhead and encompasses the settlements of Dyce, Bridge of Don, and Danestone to the north of Aberdeen City. This framework will result in the transformation of the Energetica corridor into a high class lifestyle, leisure and global business location. The aspiration is to create a technology lifestyle community with innovative transport links showcasing the latest low carbon technologies while drawing on the dynamism and innovation of the energy and offshore industries.
- 14.18 Homes Fit for the 21st Century (2011) - This document suggests that budget cuts to the Scottish Government mean that the traditional methods used to finance new homes is no longer sustainable, and that innovative and different approaches to finance new homes are required.
- 14.19 Scottish Sustainable Communities Initiative (2008) - The Scottish Sustainable Communities Initiative (SSCI) encourages the creation of new low or zero carbon communities while providing a platform to stimulate a rise in environmental and design quality standards. It wants to do away with homogeneous, single-use housing areas that are not well related to the patterns of development around them, and which encourage energy and resource consumption as well as unhealthy and insular lifestyles. One of the initiative's key proposals is that proposals are developed in

partnership between both the public and private sectors and that all SSCI settlements provide high quality, affordable homes for all sectors of the community. The new sustainable communities should be housing-led projects, and the creation of new communities may be particularly appropriate in areas experiencing significant housing pressures.

- 14.20 National Transport Strategy (2006) - A move to more sustainable forms of transport and reductions in carbon emissions are key objectives of the National Transport Strategy. Accessible locations for employment which are close to housing and well served by public transport will be essential to the delivery of these objectives. How the proposed settlement is able to connect residents to jobs on the site and provide sustainable transport options when they travel to other places will determine the extent of the contribution it makes.

Local Policy

- 14.21 Key elements of local policy are summarised in Table 14.4.

Table 14.4: Overview of Relevant Local Policy

Policy / Strategy	Relevance to Proposed Settlement
Aberdeen City and Shire Strategic Development Plan (2013)	<ul style="list-style-type: none"> Grandhome recognised as a key location for growth in the plan, part of the Aberdeen city strategic growth area The plan recognises the need for a supply of employment land to support economic growth, setting a target of 60 Ha of marketable land to be available at any point in time Increase the population of the area to 500,000 by 2035 and a need for 35,000 additional homes. Both are a target for the plan. It recognises the challenge presented by an ageing population The document also points to the need for substantial investment in infrastructure if it is to create sustainable communities at it grows
Building on Success: The Economic Action Plan for Aberdeen City and Shire, 2013-18, <i>Aberdeen City and Shire Economic Future</i> (2013)	<ul style="list-style-type: none"> The action plan sets an ambitious economic growth rate of 2.5% per annum from 2013-18 Energy, life sciences, tourism and food and drink are identified as the key sectors for the area's economy Attracting, developing and retaining skilled people is identified as one the key strategic priorities for the area, with actions identified to invest in the skills base, attract new 'talent' and support employment growth in key sectors The action plan recognises the link between economic objectives for the area, the need to promote it as a place to live and the need for a planning system which supports development
Aberdeen Local Plan (2012) <i>Aberdeen City Council</i>	<ul style="list-style-type: none"> Aim is for Aberdeen to be a sustainable city at the heart of a vibrant and inclusive North East of Scotland. Redevelopment of previously used sites will make a huge contribution to the overall sustainability aims of the Local Development Plan. It is however, also recognised that the city needs to expand beyond its existing edges to maintain and enhance employment and housing opportunities as well as retaining the city's growing population while attracting other to invest and live there. Grandhome area is identified as having opportunities for a mixture of uses. The area has a housing allowance for 7,000 homes and 5 hectares of employment land by 2030. <ul style="list-style-type: none"> - 2,600 homes 2007-2016 - 2,100 homes 2017-2023

	<ul style="list-style-type: none"> - 2,300 homes 2024-2030
<p>Aberdeen Local Transport Strategy 2008 to 2012 (2008) <i>Aberdeen City Council</i></p>	<ul style="list-style-type: none"> • The Local Transport Strategy's vision is to develop a sustainable transport system that is fit for the 21st century, accessible to all, supports a vibrant economy whilst minimising environmental impacts. Settlement would be expected to meet the principles laid out in the strategy, particularly: <ul style="list-style-type: none"> - Transport networks contributing towards a thriving economy for Aberdeen City and its region - Minimising the environmental impacts of transport on the community and the wider area - Ensure that the transport system is integrated and accessible to all • This strategy aims to support Aberdeen's thriving economy by supporting the improvement of regional, national and international connections to the City whilst locking-in benefits locally. • In addition the Local Transport Strategy aspires to facilitate and support land use development that is adjacent to sustainable and major transport corridors and nodes.
<p>Building on Energy: The Economic Manifesto for Aberdeen City and Shire (2007) <i>Aberdeen City and Shire Economic Forum</i></p>	<ul style="list-style-type: none"> • This is Aberdeen City and Shire Economic Forum's comprehensive strategic document setting out its vision and priorities for the City and Aberdeenshire's economy. • Wide range of priorities and actions that are relevant to the proposed settlement, particularly those relating to the need to attract new business investment (including corporate headquarters) as well as attracting skilled people and maximising on their intellectual capital. • Objectives which are particularly relevant to the Grandhome proposal include: <ul style="list-style-type: none"> - The use of master planning with a positive and co-ordinated approach between all parties involved in the planning process including the private sector. - A more joined-up approach between economic development proposals and planning functions to ensure the vision is achieved - Infrastructure requirements identified – mainly road and public service provision.
<p>Aberdeen Housing Strategy, 2012-2017</p>	<ul style="list-style-type: none"> • Sets out the Council's vision for the delivery of housing in line with national and local needs, particularly in relation to providing affordable housing and sustaining economic growth.

Baseline Conditions

14.22 Whilst Aberdeen City has been the main study area, data for the local area of Danestone and Bridge of Don have been considered where appropriate. This is important in the context of localised impacts associated with job creation, housing, and social infrastructure. Benchmark data have also been considered for Aberdeenshire, the Aberdeen City Region (Aberdeen City and Shire combined), Scotland and Great Britain (where available).

14.23 While the local population in this area of Aberdeen has fallen over the last decade, the population for Aberdeen City and Aberdeenshire grew at 4% and 9% respectively. Overall, the City and Shire's population grew by more than 29,000 (+7%) people over the past ten years, at a rate that was almost twice that for Scotland (+4%) and in line with Great Britain's (+7%). This growth in population across the Aberdeen City Region reflects the city's buoyant economy and the way the city has acted as a magnet for investment and business expansion.

- 14.24 This growth in population was, however, accompanied by limited growth in the working age population, a fall in the proportion of children under the age of 16, but a significant increase in older adults. Average household size has also been falling given increases in single-person households for both young and older adults, as well as changing family composition (e.g. divorces, widows etc).
- 14.25 Population projections up to 2035 forecast that the number of older adults in the Aberdeen and Aberdeenshire City Region will increase at a faster rate than in either Scotland or the UK. This, along with ever falling household sizes, will drive the need for new residents of working age, and a more balanced housing mix in the Aberdeen City Housing Market Area. Household forecasts also underline the strong rate of growth anticipated for the Aberdeen and Aberdeenshire areas through to 2035. The Strategic Development Plan (2013) for Aberdeen City and Aberdeenshire identifies a requirement for 35,000 homes to 2035.
- 14.26 The regional economy is buoyant and was able to limit the negative impacts of the recession (only losing around 1,000 jobs during 2008-2011). The energy sector (especially oil and gas) is a key sector, and is well regarded internationally, employing a fifth of the regional workforce. The public sector is another major employer and employs one in four people in the Aberdeen City and Shire area. However, while the city region area's economy was relatively buoyant, evidence for Aberdeen City shows that around 10,000 jobs were lost between 2008-2011, as a result of the recession, while the local area of Danestone and Bridge of Don appears to have also been hit hard by the recession, losing around 1,400 jobs over this period.
- 14.27 House prices in Aberdeen are, on average, 50% higher than Scotland's. While reflecting the economy's strength, higher house prices may also be driving down affordability and thus restricting supply and, potentially influencing the ability of key and public sector workers to buy houses within the City's housing market area. Recent housing completion rates for Aberdeen City and Aberdeenshire indicate that while in Aberdeenshire the market was able to respond and out-perform housing need, the city was unable to keep pace with its projected need.
- 14.28 The 2011 Employment Land Audit identified over 550 Ha of established land supply in the Aberdeen City and Shire area. Of this, 89 Ha is considered as marketable supply in Aberdeen City, but only 27 Ha (31%) is immediately available for development. The limited supply of immediately available land for development is likely to have a constraining effect on the Aberdeen City and Shire region achieving its growth aspirations.
- 14.29 Aberdeen City holds a dominant position in the North East of Scotland for shopping; in 2009, it was 20th best city in UK for shopping facilities, and third-best in Scotland. Retail provision for the local impact area is currently available at Danestone, Middleton Park and Dyce. Provision is fairly limited in each area, and each functions as a district centre for its surrounding residential area. Each of the three districts is dominated by a large superstore (Tesco / ASDA) and a number of national chains.
- 14.30 Analysis of the existing GP and dentist provision within the Bridge of Don/Danestone area, and across Aberdeen has highlighted that the area is currently very well served with GP facilities and Dentists, and that there are no significant shortages of GPs or dentists in the local area and the city. The local area therefore has the ability to absorb additional patients prior to the need for additional provision to be brought forward.

14.31 Analysis by PSE Consulting has highlighted that there is substantial unfilled capacity in both primary and secondary schools in neighbourhoods around the Grandhome site at present. While there is scope to consider wider educational priorities (quality of provision, modern infrastructure), the baseline assessment identified that existing capacity within existing schools will play an important role in accommodating new pupils originating from early phases of development at Grandhome.

Predicted Effects during Construction

14.32 The construction phase will support a range of employment, notably:

- Jobs based on the site, ranging from elementary skilled jobs to site managers and specialist trades;
- Jobs based in the local area (i.e. primarily Aberdeen), but off site, including those related to design, planning and management of development; and
- Jobs located elsewhere linked to a similar range of functions.

14.33 Although no headline construction costs have been prepared at this stage, for the purposes of this assessment it has been possible to use benchmark construction cost data (£ per sqm benchmarks from SPONS¹⁴) to derive broad construction costs for the housing and employment components of the development. Best-fit construction cost categories were selected where required, while costs were adjusted, in line with SPONS guidance, to make allowances for preliminaries and external works associated with the housing and floorspace elements.

14.34 However, the total cost estimates and employment estimates presented here do not reflect the total scheme. Some further costs have not yet been identified. As well as the housing and employment floorspace, there will be significant further costs associated with the construction of roads, pathways, mains sewerage and services, and other services to support the new community. As a result, this assessment of construction costs and construction employment impacts is likely to be an under-estimate. The breakdown of construction impact is shown in Table 14.5.

Table 14.5: Construction Employment

Key Indicators	Phase 1	PPiP	Full Masterplan (2015-2050)
	(2015-2018)	(2015-2038)	
Construction cost estimates (residential)	£62m	£570m	£854m
Total person years of employment (supported by residential)	1,229	11,357	17,018
Average construction employment per annum (supported by residential)	410	495	486
Construction cost estimates (employment floorspace)	£2m	£126m	£136m

¹⁴ SPONS is the key construction industry source for construction benchmark costs.

Total person years of employment (employment floorspace)	32	2,111	2,277
Average construction employment per annum (supported by employment floorspace)	11	92	65
Total indicative construction cost estimates (exc. Wider site infrastructure and services)	£64m	£696m	£990m
Total construction Person Years of Employment	1,261	13,468	19,295
Total construction Employment (average jobs per annum)	421	587	551
Note: Construction periods: Phase 1 = 3 years (2015-2018), PPIp (Phase 1-5) = 23 years (2015-2038), Full Masterplan (Phases 1-7) = 35 years (2015-2050). Source: Regeneris Consulting			

- 14.35 Total indicative construction cost estimates (excluding wider site infrastructure and services) could potential be of the order of £696m. This level of construction expenditure could support 13,470 person years of employment over the course of the PPIp development period. , This is equivalent to supporting, on average, around 590 jobs per annum (the majority of which is in the house-building element of the proposed scheme). These jobs would be on-site jobs, as well as jobs supported in the construction supply chain.
- 14.36 Total indicative construction cost estimates (excluding wider site infrastructure and services) could potential be of the order of £64m. This level of construction expenditure could support 1,260 person years of employment over the course of the Phase 1 development period. This is equivalent to supporting, on average, around 420 jobs per annum (the majority of which is in the house-building element of the proposed scheme). These jobs would be on-site jobs, as well as jobs supported in the construction supply chain.
- 14.37 Total indicative construction cost estimates (excluding wider site infrastructure and services) could potential be of the order of £990m. This level of construction expenditure could support 19,300 person years of employment over the course of the Full Masterplan development period. This is equivalent to supporting, on average, around, 550 jobs per annum (the majority of which is in the house-building element of the proposed scheme). These jobs would be on-site jobs, as well as jobs supported in the construction supply chain.
- 14.38 These impacts will be important for the economy of Aberdeen over the proposed development period. The sensitivity of the receptor is judged to be high throughout all of the identified scenarios (Phase 1, PPIp, Full Masterplan), given that Aberdeen lost over 10,000 jobs (2008-2011) and that job creation activities are, and will remain, a key focus within local economic development policy.
- 14.39 The most appropriate approach to judging the magnitude of construction employment, under each development scenario, is to assess the level of annual construction employment generated against existing construction employment levels in Aberdeen. In 2011, around 6,300 people were employed in the construction sector in Aberdeen¹⁵. Across each scenario the proposed development has potential to support between 420-590 construction jobs per annum, both on and off site¹⁶. On this measure, the

¹⁵ BRES, 2011

¹⁶ Off-site jobs could be supported in the supply chain in Aberdeen, but also across other areas of Scotland and the UK. This will be dependent on procurement approaches and sourcing of materials.

magnitude of impacts under each scenario are judged as medium, given the consistent level of annual construction employment which would arise (while the overall scale of employment is greater under the PPIp and Full Masterplan scenarios, given the development timeframes, the actual level of annual employment remains broadly consistent). These impacts would equate to between 6.6% and 9.4% of all construction related employment in Aberdeen (based on 2011 estimates).

- 14.40 Based on judgements made on sensitivity (high) and magnitude (medium), via an assessment of the annual uplift in temporary construction employment as a result of all three scenarios, the significance of the temporary employment effects are assessed as moderate and positive at the city-wide level.

Permanent Effects on Population

- 14.41 To estimate the population which will reside in each completed phase of development, evidence on average residents per type of dwelling was used. This was taken from the English Survey of Housing which is the most robust source of data in England on this issue. At this juncture, there does not appear to be a publicly available Scottish equivalent that matches the comprehensive nature of this survey. The population breakdown for the proposed development is set out in Table 14.6.

Table 14.6: Population Breakdown

Type Of Dwelling		Phase 1		PPIp		Masterplan		Average number of residents
		No Units	Estimated Population	No Units	Estimated Population	No Units	Estimated Population	
1 bed	Flat	35	45	392	501	553	708	1.3
1 bed	Mews	15	19	168	215	238	305	1.3
2 bed	Flat	30	55	309	568	447	822	1.8
3 bed	Flat	0	-	-	-	-	-	2.9
2 bed	Mews	30	55	309	571	447	826	1.8
3 bed	Mews	80	204	680	1,736	1,048	2,676	2.6
4 bed	Mews	25	80	235	749	351	1,119	3.2
2 bed	Semi	40	74	412	761	596	1,101	1.8
3 bed	Semi	80	204	680	1,736	1,048	2,676	2.6
4 bed	Semi	50	159	470	1,498	700	2,231	3.2
5 bed	Semi	5	18	47	173	71	262	3.7
3 bed	Detached	40	102	340	868	524	1,338	2.6
4 bed	Detached	50	159	470	1,498	700	2,231	3.2
5 bed	Detached	20	74	188	693	280	1,032	3.7
Total		500	1,250	4,700	11,569	7,000	17,327	2.5

Source: Regeneris Consulting based on the DCLG Survey of English Housing – 2012 update on average household size. There does not appear to be an equivalent Scottish Survey of Housing which identifies average number of residents by dwelling type. Detailed results from the Scottish Census 2011 have not yet been released.

- 14.42 The Bridge of Don/Danestone population has contracted by approximately 4% over the last decade. While the local population base has declined, Aberdeen's population has increased by around 8,500 people. The policy context for Aberdeen reflects the drive

for population and economic growth more generally in Aberdeen and Aberdeenshire. The Local Plan, and other related policies, point to the need to provide new housing to meet the needs of existing residents, as well as growing the population base to meet economic growth priorities. Therefore, taking the socio-economic data and policy into consideration, the sensitivity of the receptor is judged to be high for all three assessment scenarios (Phase 1, PPIp, overall masterplan).

- 14.43 The PPIp scheme would comprise approximately 11,600 residents by 2038 (23 years from 2015-2038). Based on the Bridge of Don/Danestone area's 2011 population, this growth is equivalent to a 53% increase, while at the Aberdeen level it is equivalent to a 5.3% increase in the city's overall population base. On the basis of this level of population growth, the magnitude of impact is judged to be high at the Bridge of Don/Danestone level, and medium at the Aberdeen level.
- 14.44 Phase 1 would comprise approximately 1,250 residents (2015-2018). In gross terms, this level of population is equivalent to a 6% increase in the total population within the Bridge of Don/Danestone area (based on 2011 population), and a 0.6% increase at the Aberdeen level. Given that the Bridge of Don/Danestone area has seen a decline in population of around 4% over the last decade, such an increase as a result of Phase 1 would ultimately reverse the position of the last 10 years. On the basis of this level of population growth, the magnitude of impact is judged to be low at the Bridge of Don/Danestone level, and negligible at the Aberdeen level.
- 14.45 The overall masterplan would comprise approximately 17,300 residents by 2050. (35 years from 2015-2050). Based on the Bridge of Don/Danestone area's 2011 population, this growth is equivalent to a 79% increase, while at the Aberdeen level it is equivalent to an 8% increase in the city's overall population base. On the basis of this level of population growth, the magnitude of impact is judged to be high at both the Bridge of Don/Danestone area and at the Aberdeen level.
- 14.46 An alternative approach to interpreting the magnitude of the levels of population increase is to assess the annual population change in the context of the potential contribution this makes to overall annual population change for Aberdeen City Region (+35 000 residents based on population projections within the 2013 Strategic Development Plan for Aberdeen and Aberdeenshire – 2011-2035). On this basis, it is estimated that under Phase 1 (which generates c.420 residents per annum over 3 years), this would equate to around 30% of annual population growth (which is c.1,460 people per annum).
- 14.47 Under the PPIp scenario (500 residents per annum over the next 23 years), this equates to around 35%. While projections do not go beyond 2035, if the annual change is rolled forward, under the Full Masterplan scenario (350 residents per annum over the next 35 years) this equates to 25%. Given this level of contribution to the city's future population growth, the magnitude of these impacts is judged to be high under all scenarios.
- 14.48 The significance of the population effects at the city-wide level is considered to be minor for Phase 1, moderate for the PPIp scheme and major the overall masterplan. The significance of the population effects at a local (Bridge of Don/Danestone) level is considered to be moderate for Phase 1 and major for the PPIp scheme and overall masterplan.

Permanent Effects on Labour Supply

14.49 The assessment of labour supply effects has considered:

- the projected working age population (16-64) of the proposed development, which represents the key component of the labour force;
- the proportion of the projected population that are estimated to be economically active, either in employment or seeking employment; and
- the proportion of the projected population likely to be in higher skilled and managerial occupations, a key indicator of a higher skilled labour market.

14.50 The assessment assessed the impacts assuming 70% of the population were of working age (a figure close to the current average for Bridge of Don/Danestone and Aberdeen City), and assuming 80% of the population were of working age (a figure consistent with areas in which a significant majority of properties are owner occupied). It considered two variants of economic activity rates – a 75% rate in line with the average rate in the UK at a time when the economy was assumed to be in near full employment in 2007, and an 80% rate which is the current rate in Aberdeen city (Annual Population Survey, 2013). The breakdown of labour supply effects is set out in Table 14.7.

Table 14.7: Labour Supply Effects

Key Indicators	70% working age			80% working age		
	Phase 1 (2015-18)	PPiP (2015-38)	Full Masterplan (2015- 2050)	Phase 1 (2015- 18)	PPiP (2015- 38)	Full Masterplan (2015- 2050)
Working age population (16-64)	875	8,098	12,129	1,000	9,255	13,862
Economically active residents (75%)	656	6,074	9,097	750	6,941	10,396
Economically active residents (80%)	700	6,479	9,703	800	7,404	11,090
Higher managerial and professional residents	195 to 210	1,820 to 1,940	2,730 to 2,910	225 to 240	2,080 to 2,220	3,120 to 3,330

14.51 The key receptor for this effect is the area's labour supply, including that of the Danestone/Bridge of Don area and the wider Aberdeen City area. The receptor is assessed as having high sensitivity across all three scenarios. Any increase in the population of the area will be reflected in the size and characteristics of the labour force. The increase in the resident labour force (working age population) at Grandhome has been considered in relation to the existing resident labour force.

- 14.52 The PPIp scheme could have a population of between 8,100 and 9,255 working age residents. This equates to a 50.6%-57.6% increase in Bridge of Don/Danestone working age residents, and a 5.6%-6.4% increase in Aberdeen working age residents (based on 2011 population data). The magnitude of this impact is judged to be high at the Bridge of Don/Danestone level and medium at the Aberdeen level.
- 14.53 Phase 1 could support between 875-1,000 working age residents. This equates to around a 5.5%-6.2% increase in Bridge of Don/Danestone working age residents, and a 0.6%-0.7% increase in Aberdeen working age residents (based on 2011 population data). The magnitude of this impact is judged to be low at the Bridge of Don/Danestone level, and negligible at the Aberdeen level.
- 14.54 The overall masterplan could support between 12,130-13,860 working age residents. This equates to around a 75.8%-86.6% increase in Bridge of Don/Danestone working age residents, and a 8.4%-9.6% increase in Aberdeen working age residents (based on 2011 population data). The magnitude of this impact is judged to be high at the Bridge of Don/Danestone level, and high at the Aberdeen level.
- 14.55 The significance of the effects at a city-wide level is considered to be minor for Phase 1, moderate for the PPIp scheme and major for the overall masterplan. The significance of the effects at a local (Bridge of Don/Danestone) level is considered to be moderate for Phase 1 and major for the PPIp scheme and overall masterplan.
- 14.56 The development will also contribute towards supporting Aberdeen's need for skilled and professional workers. The PPIp and Full masterplan could deliver between 2,100-3,100 working age residents with higher level skills. This will be important in meeting the needs of the growing energy-related sector in Aberdeen, as well as the business and professional services sector.
- 14.57 An alternative approach to assessing magnitude of impacts is to consider the proportion that the resident labour force (working age population) of Grandhome represents of projected growth in Aberdeen's labour force. This approach draws on the 2010 Aberdeen and Aberdeenshire sub-national population projections and illustrates the contribution the Grandhome scheme can make to achieving Aberdeen's growth objectives. Again, the effects are positive since they represent a boost to the area's labour supply with 75-80% of the working age population projected to be economically active. Whilst population projections for Aberdeen and Aberdeenshire are available for the periods covered under the Phase 1 and PPIp scenarios, projections are not available up to 2050.
- 14.58 Under the PPIp timeframe (2015-2038) the projected annual rate of growth in the working age population of Aberdeen and Aberdeenshire combined would be 1,060. Grandhome's working age population is estimated to grow by 350-400 per annum from 2015-38, representing around 30% of the projected annual growth in Aberdeen and Aberdeenshire. This impact is judged to have a high magnitude.
- 14.59 Under the Phase 1 timeframe (2015-2018) the projected annual rate of growth in the working age population of Aberdeen and Aberdeenshire combined from is 1,400. The working age population of Grandhome in this period would grow by around 300-330 per annum. This represents c. 20% of the projected growth rate for Aberdeen and Aberdeenshire. This impact is judged to have a medium magnitude.

- 14.60 Under the overall masterplan timeframe (2015-2050) population projections to 2050 are not available. However, the magnitude of the labour supply impact would be high, with a projected annual growth in working age population of 350-400 residents.
- 14.61 This 'contribution' approach produces a slightly different significance judgement, ranging from moderate under Phase 1 to major under the PPIp and full masterplan scenarios. However, it is important to recognise that these labour supply effects would not be 100% net additional to Aberdeen City. Given Aberdeen's growth ambitions and the need for the area to attract new households to support its economy, it is reasonable to expect that Grandhome would support further in-migration to the area. In addition, there would be some relocation of working age people from elsewhere within Aberdeenshire or Aberdeen City although the extent of this local movement is difficult to quantify.

Permanent Effects on Employment

- 14.62 Potential employment effects comprise the employment generated by the commercial premises and social infrastructure to be provided as part of the development; the wider multiplier effects businesses operating in Grandhome; and the employment supported by household expenditure by future residents, which would support employment in Grandhome itself, in the local Bridge of Don/Danestone area and in Aberdeen/Aberdeenshire.
- 14.63 The assessment of the significance of employment effects in this chapter focuses on the employment impact estimates for the commercial developments and social and community infrastructure. While it refers to household expenditure related employment, some of this expenditure would support jobs in businesses on Grandhome and this should not be double counted. Separate commentary is therefore provided on the household expenditure effects. The potential breakdown of employment is set out in Table 14.8.

Table 14.8: Direct Employment Generation

	Phase 1 (2015-18)	PPIp (2015-38)	Full Masterplan (2015-2050)
Total Employment (FTE jobs) associated with commercial floorspace on-site	47	2,159	2,220
Total Employment (FTE jobs) healthcare provision on-site		16	16
Total Employment (FTE jobs) associated with education provision on-site (only twin-entry primary assessed here)		35	35
Total Employment	47	2,210	2,271

- 14.64 A breakdown of employment in commercial premises and social infrastructure is set out in Table 14.9.

Table 14.9: Employment Breakdown by Category

	Phase 1 (2015-18)	PPiP (2015-38)	Full Masterplan (2015-2050)
Retail and Leisure	38	887	935
Office		1,093	1,093
Financial and professional (retail)	5	74	81
Social and community infrastructure	4	105	112

- 14.65 The relevant receptor is the employment base of Bridge of Don/Danestone, Aberdeen and Aberdeenshire. Its sensitivity to the employment impacts generated by Grandhome is high, since new jobs created as a result of the developments could increase total employment in the area, providing jobs for residents and supporting the development and expansion of businesses. In policy terms, the long term potential for Aberdeen and Aberdeenshire is to continue to be amongst the highest performing areas of the UK economy. High priority is attached to this in national, regional and local policy, underpinned by a Scottish growth strategy that emphasises the need to create new private sector employment.
- 14.66 The magnitude of the employment impacts have been assessed against current employment levels in the area (based on 2011 employment data). Detailed employment forecasts were not available for this part of the assessment to provide an alternative 'contribution' assessment of magnitude of impacts.
- 14.67 The employment impacts of the PPiP would be substantial, with much of the commercial development, along with the social and community infrastructure, assumed to be complete by 2038. At the level of Bridge of Don/Danestone, 2,210 jobs would represent 16% of current employment in the area, a magnitude of impact assessed as high. At the level of Aberdeen the magnitude of the impact would be low, representing only 1-2% of total employment. However, it should also be seen in the context of its contribution to overall employment growth in the area, with Grandhome effectively building employment at a rate of 96 jobs per annum from 2015-38.
- 14.68 Phase 1 would accommodate only a small quantity of employment, and the magnitude of this impact would be negligible for the impact areas (Bridge of Don/Danestone, Aberdeen).
- 14.69 The difference between the employment impacts of the PPiP and the overall masterplan are marginal (+61 jobs) and therefore a similar assessment of the magnitude of the impacts is applied.
- 14.70 The employment that would be supported by household expenditure in Bridge of Don/Danestone and Aberdeen City may be summarised as follows:
- PPiP household expenditure is estimated to support 625 jobs across Aberdeen City, with 230 of these in the Bridge of Don/Danestone area.
 - The spending of 500 households in Phase 1 is estimated to support 70 direct and induced jobs at the level of Aberdeen City, with 25 jobs in Bridge of Don and Danestone.

- Household expenditure in the full masterplan would support 930 FTE jobs across the Aberdeen City area as a whole, with an estimated 340 in the Bridge of Don/Danestone impact area.

14.71 The employment effects at city-wide level would be minor for Phase 1, and moderate for the PPIp and overall masterplan. The employment effects at a local (Bridge of Don/Danestone) level would be minor for Phase 1 and major for the PPIp and overall masterplan. As is the case with the labour market effects, some of the employment accommodated at Grandhome might be expected to have relocated to the developments from elsewhere in Aberdeen. The employment effects would not therefore be 100% net additional to the area.

Permanent Effects on the Housing Market

14.72 The breakdown between market and affordable housing is summarised in Table 14.10.

Table 14.10: Composition of Proposed Housing

	Market Housing	Affordable Housing	Total
Phase 1	376	124	500
PPIp	3,526	1,174	4,700
Overall masterplan	5,251	1,749	7,000

14.73 The key receptor for these effects is the local housing market. The receptor is assessed as having very high sensitivity to changes, since any change in the supply of housing generated by specific development schemes represents change to the stock of housing in the area as a whole. Grandhome is explicitly identified in the Aberdeen Local Development Plan (2012), the Aberdeen and Aberdeenshire Structure Plan (2009) and the emerging Aberdeen and Aberdeenshire Strategic Development Plan (2013) as a key location for residential and new commercial development. The weight attached to it in policy terms reflects the priority given to the growth of Aberdeen's housing supply over the next 20 years. An annual requirement of 1,250 dwellings per annum for Aberdeen City has been identified in the Strategic Development Plan.

14.74 The magnitude of the housing market impacts have been assessed against this annual dwelling requirement for Aberdeen City and how this relates to housing stock. Housing stock estimates are not available at the Bridge of Don/Danestone level from the GROS statistical web portal. However, dwelling (stock) data is available from GROS for Aberdeen for 2012 – approximately 112,100 dwellings.

14.75 PPIp: This phase covers the period 2015-2038, with the construction of 4,700 new dwellings at Grandhome. While the dwellings projections only run to 2035, we have rolled the annual requirement forward to 2038 to match the PPIp period. At the end of 2038 housing stock in Aberdeen is estimated to be 144,600 (if annual requirements are added to the 2012 stock level). The dwellings brought forward under the PPIp scenario would account for 3.3% of estimated 2038 housing stock in Aberdeen. As such, the magnitude at the Aberdeen level is judged to be low.

14.76 Phase 1 covers the period 2015-2018, with the construction of 500 new dwellings at Grandhome. At the end of 2018 housing stock in Aberdeen is estimated to be 119,600 (if annual requirements are added to the 2012 stock level). The dwellings brought

forward under Phase 1 would account for just 0.4% of estimated 2018 housing stock in Aberdeen. As such, the magnitude at the Aberdeen level is judged to be negligible.

- 14.77 The overall masterplan covers the period to 2050, while the requirement is forecast up to 2035. However, if we continue to roll forward annual requirements the 7,000 dwellings brought forward as a result of Grandhome would account for 4.4% of estimated 2050 housing stock in Aberdeen. As such, the magnitude at the Aberdeen level is judged to be low.
- 14.78 Given the growth trajectory for housing in Aberdeen (i.e. an expansion in housing), this approach to assessing magnitude of the quantum of housing brought forward at Grandhome will always appear relatively modest in terms of overall stock. However, at the Bridge of Don/Danestone level the expansion of 500 new homes through to 7,000 new homes will have a magnitude which would range from low-high across the three development scenarios.
- 14.79 An alternative approach to assessing the magnitude of the housing market impacts can be undertaken by illustrating the annual contribution the scheme makes under the various scenarios towards Aberdeen's annual housing requirement, which may be summarised as follows:
- PPIp: The magnitude of the impact of delivering 4,700 homes at a rate of c. 200 per annum between 2015 and 2038 is assessed as medium, representing c. 16% of the 28,750 requirement identified by Aberdeen City from 2015-2038.
 - Phase 1: The development of 500 dwellings at an average rate of around 170 per annum would represent around 13% of Aberdeen City's annual requirement. The magnitude of this impact is assessed as medium and positive, since it would be an important component of the delivery of new homes in this early period of the Local Development Plan.
 - Overall masterplan: It is more difficult to assess the effect of 7,000 homes over the full masterplan period since Aberdeen City's requirements from 2038-2050 are yet to be established. Nevertheless, the magnitude of the impact is likely to be medium given the scale of the contribution that Grandhome would make to the area's housing supply.
- 14.80 The significance of the housing market effects at the city-wide level is considered to be minor for Phase 1 and moderate for the PPIp and overall masterplan. The significance of the housing market effects at a local (Bridge of Don/Danestone area) is considered to be moderate for Phase 1 and major for the PPIp and overall masterplan.
- 14.81 However, based on the contribution of each scenario to Aberdeen's annual housing requirement, the overall assessment of significance would be major. This reflects the importance of Grandhome both in terms of the contribution it makes to meeting an annual requirement of 1,250 dwellings over the Local Development Plan period, and to national, regional and local policy which emphasises the need to deliver economic growth in the area underpinned by population growth.
- 14.82 Three additional aspects of the housing market impacts should be highlighted, which would reinforce the positive effects identified above:

- The developments would deliver 1,750 affordable homes over the full masterplan, contributing to unmet need for affordable homes in the area. Aberdeen City has identified a need for 415 affordable homes per annum over the 10 years from 2012.
- The potential benefits of substantial new housing development on house prices. A failure to provide a sufficient number of new homes to meet demand has been a contributory factor in house purchase and rental price inflation over the past decade. New supply has a role to play in efforts to slow house price increases.
- Masterplanned developments of the type proposed for Grandhome would be expected to have wider benefits in terms of the profile of Aberdeen and its attractiveness to potential in-migrants and investors. These catalytic effects are difficult to quantify but should be considered in assessing the scheme.

Permanent Effects on Social Infrastructure

Education

- 14.83 The scale and nature of education provision for Grandhome is the subject of on-going negotiations between the Grandhome Trust and Aberdeen City Council. Both parties have recognised that there is substantial unfilled capacity in the locality and that provision of new schools to serve Grandhome should take this into account. In view of this, the Trust has agreed to provide a new primary school on the completion of 500 homes.
- 14.84 The Grandhome masterplan also includes proposals for two primary schools and an Academy for the overall development (7,000 homes). The current position of the Trust is that this new Academy would be part of a community campus alongside one of the three potential primary schools. These schools would become the centre of a 'socio-educational' hub for Grandhome. However, given the long period over which the full development will take place, Grandhome will not in itself generate sufficient students to require the provision of a new Academy.
- 14.85 The scale of potential school provision required for Grandhome is driven by the Pupil Product Ratios (PPR) agreed with Aberdeen City Council, which are: Primary - 0.25 child per dwelling; and Secondary - 0.10 student per dwelling. PSE Consulting, who are providing specialist advice on education to the Grandhome Trust, advise that the primary ratio is the same as the ratio generally applied to all residential development across Aberdeen.
- 14.86 Using this city-wide formula, the Council and the Trust calculate that 100 homes will mean around 25 primary aged children (0.25 children per dwelling) living at Grandhome in 2015. A further 50 children will arrive each year as development continues. This means that initially there will be very small numbers of primary children living at Grandhome. The secondary school PPR is consistent with the ratio for the Academies close to the proposed development. These ratios are applied to all dwellings, including one bedroom properties.
- 14.87 It is difficult to assess the likely build-up of demand for school places at Grandhome, given the long-term nature of the development, which is expected to take place over

the period to 2050. There is substantial unfilled capacity in both primary and secondary schools in neighbourhoods around the Grandhome site at present. This will have a bearing both on the provision required at Grandhome and the extent to which demand from Grandhome residents could be met at neighbouring schools. However, as a major new urban extension, schooling is central to the way that Grandhome will function as a settlement, an issue recognised in the masterplan. For this reason it is important to assess potential demand in indicative terms.

- 14.88 Evidence generated by PSE Consulting suggested that demand for primary school places arising from Phase 1 could be met in existing nearby schools. Danestone Primary School is forecast to have a high level of unfilled places over the years 2015-2020 with a mean average of c. 140 unfilled places in each year. Based on the formula discussed above, 560 homes could be built before filling these 140 unfilled places (560 x 0.25). It has been agreed with Aberdeen City Council that Danestone Primary School can accommodate all primary children likely to arrive in Grandhome during Phase 1. As discussed above, the lengthy timescale for development means that there will be a steady but limited flow of new Grandhome children needing school places.
- 14.89 Development of a further 4,200 homes (Phases 2-5) for the PPIP scheme at a rate of c. 200 per annum would imply a primary pupil yield of 50 per annum, and a secondary yield of 20 per annum. Some primary pupils would enter into secondary schooling, thus freeing up primary school capacity in Grandhome primary schools. The implication is that new primary schools will need to be located in such a way as to serve the needs of the wider Grandhome development. Later potential expansion of primary capacity would need to be managed in such a way as to prevent the development of surplus capacity.
- 14.90 Full Masterplan: While the timing of future development remains to be determined, applying the PPR would give an absolute total of c. 1,750 primary and 700 secondary pupils for a development of 7,000 homes. However, as stated above, these new school users would arrive over a period of 35 years which equates to several school generations. Therefore again, any expansion of schooling at Grandhome would need to be carefully managed so as not to result in either under-provision or surplus capacity.
- 14.91 Given the scale of the new residential community at Grandhome, and the level of school age children it supports, the local education infrastructure in the surrounding areas of Bridge of Don and Danestone will be the receptor affected by the proposed development, and is considered to be of high sensitivity.
- 14.92 For Phase 1 the magnitude of impacts on local education infrastructure is judged to be negligible. This judgement is made in light of the evidence of existing surplus capacity within local schools, particularly Danestone Primary School which can comfortably accommodate Grandhome's potential level of primary school children during this phase. This is also a positive outcome for local schools which have surplus places to fill.
- 14.93 The assessment of magnitude for the PPIP and Full Masterplan scenarios is also judged to be negligible as a result of the increase in school age children as a result of Grandhome. While there will be an increase in total children of school age, this judgement is made in light of the proposed provision of new primary schools and an Academy at Grandhome. However, the magnitude from an additional supply of infrastructure perspective is judged to be medium. The additional educational infrastructure that will be developed will extend supply locally, as well as the

quality/modernity of supply. This will serve and benefit a wider community than just Grandhome.

- 14.94 The assessment of significance of the effect on educational infrastructure for Phase 1 is that it will have minor, but positive significance. This is as a result of Grandhome's school age children taking up existing surplus places at Danestone Primary. Under the PPIp and overall masterplan scenarios, the assessment of significance is also judged to be minor and positive in considering the effect on local infrastructure of additional school age children. The Grandhome development will accommodate new education infrastructure for its residents (and those of neighbouring areas), so will be self-sustaining during these phases. As such, combined with using surplus local places, as well as Grandhome's new provision, the development will not have adverse effects for local infrastructure. In terms of adding to local infrastructure supply, the significance of effects is judged to be moderate and positive. The provision at Grandhome will extend supply locally will serve and benefit a wider community than just Grandhome.

Healthcare

- 14.95 The key receptor for this effect is the area's local health care infrastructure. Health facilities in the area are identified in Technical Annex 10. The receptor has medium sensitivity to the impacts of the proposed Grandhome development in terms of the demand that its resident population would generate, since any new demand is additional and requires a local response. However, Grandhome's facilities will also add to the supply of health care infrastructure in the area.
- 14.96 No health care provision is proposed in the Grandhome development in Phase 1, which would have a resident population of 1,250 by 2018. The socio-economic assessment suggests that there are no significant shortages of GPs in the area, and it is assumed that the Phase 1 population's needs would be met locally by existing facilities. This impact is assessed as having low magnitude, since it implies only one additional GP to meet a population of this size.
- 14.97 The full masterplan for Grandhome includes provision for a 16 chair health facility to be developed between phases 2 and 5 (i.e. within the PPIp phase). This would represent a GP: patient ratio of 1:720 by the end of the PPIp phase and 1:1,100 at the end of the full masterplan. This ratio is significantly better than the 1:1,500 ratio recommended by the School of General Practitioners. The magnitude of this impact would be low but positive for the wider area beyond the Grandhome development, as other residents from neighbouring communities can access this facility.
- 14.98 It is difficult to assess the magnitude or significance of the effects of Grandhome on acute health care provision (hospitals) or dentist facilities. It is assumed that NHS Grampian's strategic plans make provision for Aberdeen's hospital facilities to respond to population growth in the city over the long term. A similar conclusion is drawn about emergency services in the area.
- 14.99 The assessment indicates that there are 6 dental practices in close proximity to the Grandhome development site. For a population of 1,250 in 2018, the socio-economic assessment suggests that there is no current shortage of NHS and private dentist provision in the area, and it is assumed that demand from Grandhome's resident population would be absorbed by local facilities. The magnitude of this impact would be low.

14.100 A population of 11,600 over the full masterplan would imply a need for 7-9 dentists. The magnitude of this impact is potentially medium, although it is not clear how the NHS or private providers would respond in the long term as additional demand is generated by Grandhome and other developments.

14.101 The significance of the health care effects is therefore mixed, depending on the nature of the facilities and services in question. Overall, the significance of effects ranges from minor to moderate as the population of Grandhome builds from the PPIP phase and creates additional demand for local acute health care, emergency services and dentistry. However, the provision of a 16 seat GP practice as part of the Grandhome masterplan represents an effect of moderate and positive significance in the Bridge of Don/Danestone area.

Cumulative Effects

Construction

14.102 It is understood that the three additional development schemes will be completed by 2018. This is the same year that the Grandhome Phase 1 development will be completed. During the period up to 2018 a further 1,275 dwellings would be constructed at the Davidson's Mill site at Bucksburn and at Dubford. As well as residential construction, the scheme at Berryhill (the 'Aberdeen Core' business park) will lead to the potential development of approximately 30 acres of a 90 acre site. There is potential for Class 4, 5 and 6 facilities to be built at this site, although the mix and scale of development that might be in place by 2018 is not yet clear.

14.103 The cumulative effects of the construction of 1,775 dwellings (500 via Phase 1 at Grandhome, and 1,275 from these other schemes), as well as the construction of mixed-use floorspace at Berryhill alongside 1,215 sqm of employment floorspace at Grandhome would further increase the positive direct and indirect benefits of construction activity outlined earlier, up to 2018. Taking the implied ratio of construction jobs to homes for Grandhome, the construction of 1,775 homes over a 3 year build period between 2015 and 2018 would support just under 1,500 jobs on site, locally off site and further afield. Taking these impacts together with the impact associated with Phase 1 of Grandhome, the cumulative effects would be of moderate, positive significance at the Aberdeen level.

Population and Labour Supply

14.104 Table 14.11 presents the cumulative population impacts of Grandhome Phase 1 and the Davidson's Mill and Dubford schemes. In total, the Davidson's Mill and Dubford schemes have the potential to generate 3,200 residents in Aberdeen. Taken together with Grandhome Phase 1, the total population at 2018 (assuming full occupancy) leads to a total population of approximately 4,450 residents.

Table 14.11: Cumulative Population Effects

Development Schemes	Population by 2018 (2018 onwards - assumes full occupancy)
Davidsons Mill (575 units)	1,438

Dubford (700 units)	1,750
Grandhome (500 units)	1,250
Total Population of Development Schemes	4,438
Note: Indicative population estimates for other schemes based on Grandhome's average resident per dwelling estimate (2.5 residents per dwelling)	

14.105 The cumulative impact of these additional schemes would lead to the total population under the PPiP scenario rising to 14,750, and under the Full Masterplan scenario it would rise to 20,500 residents. It is judged that the cumulative effect of these three schemes would be of moderate to major, positive significance on the population for Aberdeen when considered across these different scenarios and timeframes.

14.106 The cumulative labour market effects are assessed on the same basis, since they are directly linked to the population that would be accommodated by the new developments. Taking the Davidsons Mill and Dubford developments alongside Grandhome, the working age population would be of the order of 3,100-3,550 residents based on a working age population range of 70-80%. This would represent an effect of moderate to major, positive significance for labour supply for Aberdeen when considered across these different scenarios and timeframes.

Employment

14.107 Precise details of the scale, type and phasing of commercial floorspace to be developed at Berryhill are not yet available. However, the implication is that a large quantity of employment would be accommodated by the proposed development on a 30 acre site. When considered in light the Grandhome scenarios, this could be of moderate to major, positive significance to Bridge of Don/Danestone and the wider Aberdeen area.

14.108 For the purposes of the cumulative assessment it is assumed that there is a similar proportional breakdown of housing types and tenure for the 1,275 dwellings at Davidson's Mill and Dubford, as there was for Grandhome. Applying comparable expenditure per dwelling benchmarks to these developments would lead to the combined impacts estimated to be £19.5m of annual spending from households in the Aberdeen (£14m from the further 1,275 dwellings) after 2018. This expenditure has the potential to support up to 240 jobs in Aberdeen, including multiplier effects. While some residents of the Davidson's Mill scheme may spend in other centres than Bridge of Don/Danestone (given its location), it is judged that a substantial level of expenditure on convenience retail and other local services would be undertaken relatively locally.

14.109 The cumulative household expenditure impacts do not change the overall assessment of these indirect benefits of new housing development. They have minor, positive significance in the overall context of the area's employment base (and given the new employment floorspace proposed at Grandhome, it is important not to double count employment effects). However, the cumulative effects represent further, additional demand for goods and services in Aberdeen. In turn it would further reinforce the contribution of new housing development to the sustainability of local facilities and services. Seen in cumulative terms, a boost to the number of working age households would be expected to enhance its attractiveness to investors.

Education

Berryhill

14.110 This site is entirely devoted to office, industrial and storage/distribution space with no residential element of any kind. Therefore, this development will have no impact on local education infrastructure.

Dubford

14.111 Dubford: This development is reported to be delivering c.700 new homes on a site approximately 1.2 miles north east of Grandhome Phase 1. These homes are likely to be completed by 2018. Examination of the catchment maps for Aberdeen City Council indicates that Dubford is zoned to Scotstown Primary School and to Oldmachar Academy. The Development Framework for Dubford notes that 'with some re-zoning Scotstown and Greenbrae Primary Schools should be able to accommodate new development'.

14.112 In 2012, at a meeting to determine the planning application, it was agreed that additional primary school capacity will be required through developer contribution but that the development can be accommodated within existing secondary school capacity. Within the 2012 pupil number forecasts for Scotstown the Council have already assumed significant housing development in this school zone with over 800 homes being taken into account between 2013-2019. Forecasts for Scotstown show that additional capacity will be required from 2016 and it is assumed that this additional capacity is that to be provided by developer contribution and referred to above. Similarly, over 500 homes are included in forecasts for Oldmachar although this is likely to include elements of the Grandhome Phase 1 development.

14.113 There are no implications for primary education as Grandhome Phase 1 children will continue to be offered places at Danestone Primary School as agreed with Aberdeen City Council.

14.114 In terms of secondary education, parts of the Grandhome site are also zoned to Oldmachar Academy. Other areas of the site are zoned to Bucksburn Academy. Oldmachar has substantial unfilled capacity at present and the level of unfilled places is forecast to increase from c.300 in 2013 to c.450 towards the end of this decade. Based on the same secondary PPR of 0.1 per dwelling (as is applied to Grandhome) then Dubford will generate an additional 70 students in total. To this must be added the effect of primary children joining secondary education each year. At most, Dubford should require places for fewer than 100 students. This should not have a significant impact on plans for Grandhome students to attend Oldmachar.

Davidson's Mill

14.115 This development is reported to be delivering 575 new homes by 2018. Davidson's Mill is zoned to Bucksburn Primary School and Bucksburn Academy. The Development Framework for this site states that if there are 700-900 units there is 'insufficient capacity at the nearest primary schools' to accommodate this. The City Council have already committed to a merger of Bucksburn Primary School and Newhills Primary School on the Newhills site. This new school is to be called Brimmond Primary School, and opens on 22 August 2013. The Newhills site is further away from Davidson's Mill

than Bucksburn Primary, although there are no indications as yet that there are plans to re-zone Davidson's Mill.

14.116 There are no implications for primary education as Phase 1 children will continue to be offered places at Danestone Primary School as agreed with Aberdeen City Council.

14.117 In terms of secondary education, parts of the Grandhome site are currently zoned to Bucksburn Academy. Bucksburn Academy has some unfilled capacity at present but the level of unfilled places is forecast to decrease and, by the latter part of the decade, will have a shortfall of places. This shortfall is undoubtedly generated by the substantial housing developments proposed in the locality. Over 2,750 new homes are taken into account in the 2012 forecasts. This may include some elements of the Grandhome development, although this is unclear. Based on the same secondary PPR of 0.1 per dwelling (as is applied to Grandhome) Davidson's Mill will generate an additional c.58 students in total. To this must be added the effect of primary children joining secondary education each year. At most, Davidson's Mill should require places for fewer than 100 students.

14.118 The potential for Grandhome students to attend Bucksburn Academy is compromised by this development. However, the current Grandhome masterplan indicates that Grandhome will become home to a new Academy and, furthermore, the City Council have already speculated publicly over the future of Oldmachar Academy and Bridge of Don Academy. Potential exists for a merger of these two Academies on a site to be determined. This new Academy could also accommodate the extremely limited numbers of students generated by Grandhome.

Healthcare

14.119 Grandhome Phase 1 scheme, Davidson's Mill, and Dubford would generate a population of 4,450 residents. The magnitude of these cumulative impacts would be as follows:

- For primary health care provision, the magnitude of this impact would be low since it implies demand for at least 3 GPs.
- Based on the benchmarks outlined earlier, it would generate demand for 2.5 dentists by 2018. Again, this represents an impact of low magnitude.
- For other health facilities and services, although it is difficult to assess how far such demand is already catered for in the plans of NHS Grampian and other service providers.

14.120 The significance of these effects is assessed as minor adverse given the additional demand they would place on local facilities and services. However, evidence shows that Aberdeen and the local area is currently very well served with GP facilities and dentists, and that there are no significant shortages of GPs or dentists in the local area and the city.

14.121 For the PPIp and Full Masterplan scenarios, the cumulative effect of the two residential developments alongside that of Grandhome is assessed in similar terms. Their significance would range from minor to moderate adverse, although it is difficult to assess accurately without access to the long term plans of public and private health

care providers in the area. The effects would be mitigated to some extent by the development of health care facilities at Grandhome. Residents at other development may be able to access care here.

Conclusions

- 14.122 The framework used to assess significance of effects points to the need to consider moderate and major effects (positive or adverse) for the development. Where appropriate these have been considered at the Bridge of Don/Danestone impact area and at the Aberdeen impact area for each scenario (Phase 1, PPIP, Full Masterplan). The assessment has also highlighted negligible or minor significant effects.
- 14.123 Under Phase 1, the development of 500 homes and very modest levels of commercial floorspace, the significance of effects for the Bridge of Don/Danestone area are relatively limited, but positive. The increase in population and housing supply will be of moderate significance locally, while there is surplus capacity within existing local schools and health services to accommodate initial need from Grandhome residents. Given the scale of development at this phase, the identified effects at the Aberdeen level are judged to be of minor significance.
- 14.124 Under the PPIP and Full Masterplan scenarios, the significance of effects markedly alters. At the Bridge of Don/Danestone level the effect of the increase in new dwellings, the associated population (and hence labour supply), levels of employment associated with the extensive commercial and town centre developments, and are judged to be effects which have moderate to major significance locally. The provision of new education and healthcare infrastructure at Grandhome will also accommodate the needs of Grandhome residents (putting little extra demand on existing infrastructure), as well as providing new supply which can be accessed by neighbouring communities.
- 14.125 At the Aberdeen level, the expansion in population and labour supply will be an effect which has major significance for the city (given economic and population growth objectives); while the expansion in housing supply and employment (jobs) is judged to be of moderate significance in terms of existing and projected levels. Grandhome would deliver a significant quantity of new employment opportunities, boost the size and depth of the local labour supply, and play an important part in enabling the area to meet its future housing requirements.
- 14.126 Seen alongside the developments considered as part of the cumulative assessment, these conclusions on significance of effects are reinforced. Grandhome is expected to generate substantial direct and indirect economic benefits, together with wider, catalytic benefits in terms of profile to investors and new residents as part of the expansion of the northern area of Aberdeen.

15. Transport

Introduction

- 15.1 This chapter assesses the potential effects on existing and proposed transport networks. The identification of access arrangements to serve the proposed development, and the consideration of traffic impacts, has been the subject of extensive investigation and consultation with the Roads Authorities and the wider community. This has culminated in the preparation of a Transport Assessment (TA), which is presented as **Technical Annex 11**. This chapter summarises the findings of the Transport Assessment process and the environmental impact of the proposals in line with the IEMA Guidelines.

Scope and Methodology

- 15.2 Access is currently gained to the site from Whitestripes Road (which bisects the site) from Grandhome Road (which forms the western and south western site boundary) and from Whitestripes Avenue (which forms the south east boundary). Both Whitestripes Road and Whitestripes Avenue are classed as 'Urban Roads' in Aberdeen City Council's 'Roads Descriptor Map'. Whitestripes Avenue intersects in turn with the A90 Parkway, forming the southern site boundary, which is presently part of the national trunk road network. Whitestripes Road to the north intersects with the B997 Scotstown Road providing a future connection to the proposed Aberdeen Western Peripheral Route (AWPR).
- 15.3 The AWPR, which will provide a bypass route for strategic traffic around Aberdeen (taking on the present strategic function of the Parkway) is one of a number of committed schemes that will result in significant improvements to the strategic road network serving the Bridge of Don area. Others include a Third Don Crossing providing a direct connection towards Aberdeen City Centre from the Whitestripes Avenue/Parkway junction, and reconfiguration of the key Haudagain junction between the present A90 and A96 trunk roads south of the Don at Persley. Taken together the implementation of these schemes will radically improve the accessibility of the Grandhome site.
- 15.4 Being located on the fringe of the existing built up area adjoining existing neighbourhoods at Middleton Park and Danestone, the Grandhome site is also relatively well served by existing public transport (bus) routes operating in the Bridge of Don and Persley corridors. Provision of the Third Don Crossing will also enhance the public transport accessibility of the Grandhome site, facilitating the extension of direct services presently terminating in the Tillydrone area south of the river.
- 15.5 Pedestrian accessibility to adjoining areas such as Middleton Park is facilitated by the existing Core Path network and the proposal for a new pedestrian/cycle bridge across the Don to the redeveloped Davidson's Mill site. These networks are to be extended into the site as part of the Grandhome proposals.
- 15.6 Taking account of this context, the TA has addressed the following matters:
- assessment of travel demand taking account of the proposed mixed uses within the development and the promotion of sustainable travel choices;
 - adoption of the 'Designing Streets' policy for local traffic management and roads infrastructure design;

- assessment of detailed junction performance at junctions in the vicinity of the site;
 - assessment of the impacts of additional traffic generated by the development on wider networks serving the Bridge of Don area; and
 - identification of mitigation options.
- 15.7 The scoping response on behalf of Transport Scotland (see **Technical Annex 1**) confirms the requirement for assessment of environmental effects of traffic to be undertaken in accordance with the IEMA Guidelines, requiring consideration of noise and vibration, air quality and impacts such as severance, driver delay, pedestrian amenity and safety. Noise and vibration are addressed in Chapter 13 and Air Quality is addressed in Chapter 6. Scoping responses on behalf of the City Council reiterated the same requirements but also required the identification of key recreational routes as well as functional connections between existing employment and residential areas.

Policy Context

- 15.8 National policy confirms the importance of ‘Creating attractive, healthy, accessible and sustainable places’ in accommodating continuing pressure on demand for housing. Scottish Planning Policy stresses the importance of creating places with a ‘distinct character’ which are well integrated with a mix of land uses and with public transport and active travel networks. ‘Designing Streets’ provides key policy guidance on layouts suggesting that ‘Good street design should derive from an intelligent response to location, rather than the rigid application of standards, regardless of context.’
- 15.9 The approved Aberdeen City and Shire Structure Plan sets the context for significant growth and regeneration in North East Scotland over the next 20 years. It identifies ‘Strategic growth areas’ focused on Aberdeen City and the main transport corridors as the location for all development meeting more than local needs with Grandhome located within the Aberdeen City area.
- 15.10 The City Council’s adopted LDP confirms the allocation of the Grandhome site for the provision of up to 4700 homes to 2023 and suggests the possible future allocation of up to a total of 7000 homes subject to confirmation through future review of the Structure Plan.

Baseline Conditions

- 15.11 The suitability of the Grandhome site for development reflects its accessibility from the existing and proposed principal transport corridors serving Aberdeen City and the region. This is the basis of the strategy for development under-pinning the Structure Plan. At the local level the site is traversed by a network of footpaths inter-connecting with Core Paths terminating on the site boundaries.
- 15.12 Public transport is primarily accommodated by the bus network radiating out from Aberdeen city centre via the Bridge of Don and Persley Bridge corridors. Extensive bus priority measures are accommodated in the Bridge of Don corridor, enhancing journey times and serving a Park & Ride site at the Aberdeen Exhibition Centre. Rail access is available via the East Coast Main Line and Aberdeen-Inverness line accessed via

stations in Aberdeen city centre and Dyce. Finally international air access is available from Aberdeen Airport some 3km to the north west of the site.

- 15.13 Principal road access to the site from the wider area is presently provided via the A90 trunk road, part of the national network of strategic routes extending between Edinburgh and Fraserburgh. In the vicinity of the site it comprises a high capacity single carriageway distributor road route carrying some 20,000 vehicles per day with a heavy vehicle content of 1.7%. The road follows an inner orbital route within Aberdeen city centre, carrying a mix of local traffic as well as strategic longer distance traffic resulting in congestion at key intersections during peak periods.
- 15.14 Access to the site from the A90 is currently accommodated by an existing roundabout junction with Whitestripes Avenue at Buckie Farm. Whitestripes Avenue provides access to existing residential development at Middleton Park to the east as well as providing connections to Whitestripes Road which presently accommodates local traffic movements to the A947 to the north-west and commuter movements to Dyce bisecting the Grandhome site.
- 15.15 Proposals for major expansion of the strategic network allowed for in the future impact assessment of the Grandhome proposals at 2023 and 2032 involve the provision of a Western Peripheral Route around Aberdeen and a Third Don Crossing. Described as 'the most important infrastructure project taking place in the North East (which will bring a range of substantial benefits to the region)' the AWPR is expected to be operational by 2018, with future access from the Grandhome site to a proposed junction at Parkhill provided via Whitestripes Road. Provision of the Third Don Crossing will provide a direct connection between the site and Aberdeen City Centre (interconnecting with the existing network at the Buckie Farm roundabout) and is due to become operational by Autumn 2015.

Predicted Effects of the PPIp

Introduction

- 15.16 Implementation of the proposals will result in fundamental changes to the present character of the Grandhome site area, amounting to a new urban settlement with all the movement demands and associated impacts that such provision implies. The principal challenge is to do this in such a way as to minimise the adverse impacts and to help to create an attractive and balanced community which discourages the need to travel and contains demands locally as far as possible.
- 15.17 These objectives will be realised through the implementation of design and management features aimed at prioritising the use of sustainable modes (walking, cycling and public transport). The design principles embodied in the masterplan are aimed at achieving sustainable urbanism based on walkable neighbourhoods, so as to reduce car dependency and promote a sense of wellbeing and community. Complementing these objectives, the implementation of a Sustainable Travel Strategy will help to ensure that travel demands are appropriately managed.

Construction

- 15.18 Potential effects during the construction phase include the capacity, safety and environmental implications of construction traffic; and temporary closures of existing

highway networks (e.g. at site accesses or for the installation of utilities). A Construction Logistics Plan will be implemented as part of the CEMP. In view of the scale of the development, it is envisaged that traffic impacts could be minimised through the establishment of a local construction depot and batching plant.

- 15.19 Quantification of demands for volumes of materials and associated lorry movements will only be possible once the development programme and implementation strategy are identified in detail. However, based on the capacity of existing batching plants in the area it is considered unlikely that total movements would exceed 50 loads per day, which is not anticipated to result in perceptible impact on the principal access routes via the A90.
- 15.20 The Logistics Plan would incorporate a mandatory routeing plan to direct traffic to suitable routes such as the existing A90, Whitestripes Avenue and Whitestripes Road and the Third Don Crossing when that becomes available. The environmental impact of construction traffic, based on the IMEA guidelines, is anticipated to be “Negligible”.

Effects within the Development

- 15.21 It is anticipated that the potential transport-related effects on new residents of Grandhome would be accommodated satisfactorily through a combination of design and management measures. Each neighbourhood will be designed to contain a range of facilities within a 400m radius, comprising a 5 minute walk distance, emphasising the attractiveness of this mode. Cyclists will be accommodated on a network of shared-use paths and local access roads directly linking residential areas and major concentrations of employment within and beyond the site. Public transport is accommodated by a core network of roads capable of delivering appropriate penetration by buses.
- 15.22 Internal traffic movements will be accommodated by a hierarchy of streets that will deliver acceptable levels of accessibility, safety and amenity within each part of the development. Proposals will be designed to comply with policy advice set out in ‘Designing Streets’ aimed at achieving a sense of place and will be subject to a quality audit process to ensure that an appropriate balance is struck between highway design and urban design priorities.
- 15.23 Whilst no detailed assessment of internal network performance has been undertaken at this stage, it is anticipated that the demands for movement by all modes will be accommodated appropriately by the new infrastructure being provided. In particular, the network of complementary alternative routes or thoroughfares will help to ensure ease of movement, avoiding the bottlenecks typically arising with implementation of a more conventional hierarchical road network. In such circumstances it is not anticipated that demands for internal movements will result in significant adverse impacts.

Effects on External Networks

- 15.24 Despite provisions to maximise the accommodation of travel demands within the site, it is inevitable that external networks will be affected, both in the provision of suitable connections and due to impacts on the wider network. Such effects clearly have the potential to be felt by the greatest number of recipients and have therefore been a major focus of consideration.

- 15.25 At full development, external path connections will be designed to maximise opportunities for tying into existing networks and supporting their upgrading. A network of Primary Active Travel Paths will be provided traversing the site and interconnecting with the existing Core Path network to the north-east and the proposed pedestrian/cycle bridge link to the adjoining Davidson's Mill site to the south-west. In addition, a new north-south connection will be accommodated from the principal neighbourhood centre via a new signalised crossing across the Parkway to Danestone, radically improving connectivity in this direction.
- 15.26 Proposals for public transport to serve the development will result in the intensification and expansion of existing bus service provision and frequencies to the benefit of existing and future users. Principal connections will involve the extension of services on route 19, presently terminating in the Tillydrone area south of the Don via the Third Don Crossing. Similar modifications to routes 1 and 4, presently operating via the Bridge of Don and Persley Bridge corridors respectively, and intensification of service frequencies, will ensure that adequate capacity is available to accommodate the predicted demands for movement of up to 600 passengers per hour at peak hours. Investigations have also identified the potential for introducing new regional orbital bus services linking a number of future development allocations and existing centres and it is envisaged that the Grandhome development would make proportionate contributions to the initial introduction of such services.
- 15.27 Vehicle access to serve the development will be provided primarily via a major new signalised junction onto the Parkway, with additional provision of a number of accesses onto Whitestripes Avenue and Whitestripes Road. The access onto the Parkway facilitates direct connections within the Aberdeen conurbation, whilst the provision of accesses onto Whitestripes Road recognises the future significance of this route in providing for access to the strategic network of regional routes via the AWPR.
- 15.28 Mitigation required to accommodate the predicted traffic impacts will include the progressive upgrading of Whitestripes Road to appropriate standards (including signalisation of the junction with Whitestripes Avenue) and the replacement of the Buckie Farm roundabout by a high capacity signalised cross roads. These latter works recognise the enhanced status of this junction in accommodating the Third Don Crossing as well as the development, and include upgrading of the Parkway approaches necessary to accommodate predicted traffic demands.
- 15.29 Elsewhere across the wider road network serving the Bridge of Don area the network modelling exercise reveals no more than modest increases in journey times and reductions in speeds related to the increased traffic demands. These changes are primarily predicted to arise in locations where committed network upgrades independent of the development are yet to be defined in detail (Haudagain junction and St Machar Drive). It is therefore anticipated that any mitigation requirement in these areas would be the subject of possible contributions towards the implementation of suitably robust improvements.
- 15.30 The environmental impacts relating to safety, disruption and driver delay, fear, intimidation and pedestrian amenity, and severance, based on the IMEA guidelines, are predicted to be negligible.

Predicted Effects of Phase 1

- 15.31 The modest scale of the Phase 1 development will give rise to commensurately smaller effects across the same range of issues. Internal pedestrian and cycle movements will be appropriately prioritised through good design, but whilst there will be reduced demand for such movements there will also be reduced scope for maximising their potential with more limited opportunities for local attractions.
- 15.32 Proposals for public transport for Phase 1 will see the extension of existing services, initially from Bridge of Don and ultimately from Tillydrone following the construction of the Third Don Crossing. A new terminus will be provided within the Phase 1 site, with the amended service pattern resulting in the provision of regular high frequency bus services to Aberdeen city centre and beyond.
- 15.33 Vehicular access would be provided from Whitestripes Avenue, providing direct connections to the wider strategic network via the Buckie Farm roundabout onto the Parkway and the Third Don Crossing.
- 15.34 The development programme envisages that Phase 1 would be unlikely to be completed before 2018, well after completion of the Third Don Crossing in 2015, but before the opening of AWPR and the relief it is expected to provide to operation of the Parkway. However, detailed peak period traffic modelling of flows in the local A90 corridor identifies no capacity issues arising with the continued operation of the Buckie Farm roundabout within this timescale, with increases in traffic demands over the wider network classed as increasingly insignificant.
- 15.35 The environmental impacts relating to safety, disruption and driver delay, fear, intimidation and pedestrian amenity, and severance, based on the IMEA guidelines, are predicted to be negligible for Phase 1.

Predicted Effects of Overall Masterplan

- 15.36 The overall masterplan is likely to be completed beyond the horizon for accurate transport modelling, by which time economic influences and changes to transport provision in the area could fundamentally affect the demand for travel and the relative attraction of different modes. However, on the assumption that the remaining phases of the masterplan would be developed in accordance with the Development Framework, and that any necessary upgrades to transport infrastructure would take place, any residual effects are unlikely to be significant.

Cumulative Effects

- 15.37 The traffic modelling on which the assessment is based has incorporated committed and other prospective developments, and the predicted effects are therefore cumulative.

16. Waste

Introduction

- 16.1 This chapter assesses the potential effects relating to waste generation, both during the construction phase and from the completed development. It should be read in conjunction with the supporting material presented in **Technical Annex 12**.

Consultation

- 16.2 A discussion was held with Noel Taylor, Waste and Recycling Manager at Aberdeen City Council (ACC) on 30 January 2013, in order to confirm the Council's likely waste management requirements in relation to Grandhome.
- 16.3 Additional discussions were held on 15 April 2013 with ACC's Waste Strategy Manager, Amy Gray, in order to confirm what waste management infrastructure ACC would expect to see incorporated within the scheme. Ms Gray explained that, assuming the Council adopts a co-mingled collection scheme, ACC would strongly recommend that underground waste containers are used, particularly for multi-occupancy properties, bring sites and on-street collection.
- 16.4 Under the current arrangements, multi-occupancy buildings would typically require a minimum of two 1280 litre containers (for general waste and recyclables). However the key benefits of underground containers are that they take up little above-ground space, which is ideal for pedestrian areas or areas where space is limited.
- 16.5 Ms Gray also explained that the existing contract with SITA is currently being re-negotiated so that recycling performance is maximised. Whilst SITA will continue to provide the waste collection service, ACC considers it likely that the current arrangements will change in the near future.

Assessment Methodology

- 16.6 The methodology used for assessing the potential waste impacts is detailed in Appendix 16-1 (including Tables 16.1 to 16.4) in Technical Annex 12, together with a description of the assumptions made in estimating waste quantities.

Policy and Guidance

- 16.7 A description of the national and local waste planning policy relevant to the development is provided within Appendix 16-2 (including Table 16.5) in Technical Annex 12.

Baseline Conditions

Application Site

- 16.8 The site is mainly agricultural land, together with a number of isolated properties. Most waste arising is assumed to be agricultural in nature and to be managed within the normal farming regime for the estate. Small amounts of household waste are also produced and are managed as part of Aberdeen's collection service.

Management Capacity for Construction Waste

- 16.9 Appendix 16-3 (Table 16.6) in Technical Annex 12 contains details of sites in the vicinity of Grandhome involved in the management of construction waste. Construction and demolition (C&D) waste is widely recycled to produce secondary aggregates and disposal rates to landfill are therefore currently low. This can be seen by the actual throughputs to Loch Hills and Park Quarry Landfill Sites in Table 16.6 (Appendix 16-3). ACC has confirmed that landfill capacity for C&D wastes is not currently considered to be a significant issue.
- 16.10 Garden and food waste from Aberdeen is currently sent to Keenan Recycling's composting facility at New Deer. This facility has adequate remaining capacity and would potentially provide a local facility for managing organic waste from site clearance works during the construction phase of development.

Management Capacity for Operational Waste

- 16.11 Appendix 16-3 (Table 16.7) in Technical Annex 12 contains details of sites in the vicinity of the proposed Grandhome development (typically 25km radius) which would be involved in the management of municipal (household and commercial) waste produced during the operational phase of the development. Where there is a lack of available facilities within Aberdeen, appropriate facilities have been identified outside the district.
- 16.12 Residential household waste from Grandhome would be collected by SITA North East on behalf of Aberdeen City Council under the terms of a 25 year waste management contract which was awarded in 2000 and runs until 2025. Whilst the terms of the contract are currently being re-negotiated with SITA so that recycling performance is improved, SITA will continue to provide the waste collection contract for Aberdeen until 2025. ACC advise that the provision of a co-mingled scheme is being discussed with SITA.
- 16.13 At present Aberdeen City Council operates a source segregated waste collection system. Currently the scheme allows for the separate collection of cans, glass, foil and plastic bottles in a 44 litre black box, together with cardboard and paper in a 35 litre white plastic sack. Garden and food waste is collected in a 240 litre brown wheeled bin. Non-recyclable/general waste is collected in a 240 litre black (or grey) wheeled bin. This scheme is currently in place across the majority of the authority. From Summer 2013 (street level) food waste bins will be provided for high-rise and tenement properties and these would be supplemented with kitchen caddies and bio-liners.
- 16.14 In 2012, 79,986 tonnes of waste was collected from households within Aberdeen with a further 17,474 tonnes collected from HWRCs (civic amenity sites). The recycling rate in Aberdeen for 2011/2012 was 35.4%, i.e. 34,500 tonnes of household waste was sent for recycling. Source segregated dry recyclable household waste collected from the kerbside is currently transported to the materials recycling facility (MRF) at Sclattie Quarry, operated by SITA, where it is separated, bulked up and sent for reprocessing. This entire facility at Sclattie Quarry is licensed to accept approximately 80,000 tonnes per annum (tpa) and in 2012 the MRF accepted 13,336 tonnes. ACC confirms that currently there are no problems with capacity at this facility.
- 16.15 There is a further MRF proposed in Altens within Aberdeen which would provide additional recycling capacity, and it is currently proposed that this site would open in March 2016. However this scheme is yet to be confirmed. Food and garden waste is collected from properties within Aberdeen which are offered a collection service. The

waste is sent to Sclattie Quarry MRF where it is bulked up and sent to Keenan Recycling Limited's composting facility. This facility is licensed to accept 60,000tpa and in 2010 accepted approximately 21,000 tonnes. It is therefore considered that this facility does not currently have any significant capacity issues.

- 16.16 In addition to the sites listed in Table 16.7 (Appendix 16-3), in Technical Annex 12, there are forty-six mini-recycling centres within Aberdeen which provide 'bring' facilities for use by the general public. These allow the public to recycle a range of items, such as glass, textiles, plastics, books, cartons, tins, cans, cardboard, paper etc. Whilst most facilities only accept a selection of these waste types, details of the accepted waste types are provided on Aberdeen City Council's website.
- 16.17 Aberdeen is served by four main Household Waste Recycling Centres (HWRCs): Greenbank Crescent, in the south-east of the city; Pitmedden Road, Dyce in the north west of the city; Perwinnes Moss on Scotstown Road in the north of the city; and Sclattie CA Site, Bankhead Avenue, which is also in the north-west of the city. A fifth HWRC is soon to be developed at the former Grove Nursery on Hazlehead Avenue in the west of the city. This facility will have a capacity of 8,000tpa, providing a much needed recycling facility for residents in the west of Aberdeen, which will exceed foreseeable capacity needs. No additional HWRC capacity is likely to be required in the short- or medium-term. These HWRCs are operated by SITA North East Limited.
- 16.18 Residual household waste which cannot be recycled is currently sent for disposal at Stoneyhill Landfill Site, near Peterhead. This site has a licensed annual throughput of approximately 355,000tpa and in 2010 accepted approximately 160,000 tonnes of waste. According to ACC, approximately 67,540 tonnes of residual household waste was sent to Stoneyhill Landfill in 2012. The landfill is due to close in December 2024. There are no known capacity issues in terms of the local and sub-regional landfill capacity. Furthermore, ACC is a supporter of 'Zero Waste Scotland' and as such is aiming for zero waste to landfill by 2020. No waste from Aberdeen currently goes for energy recovery. An application for an energy from waste facility was refused. A new proposal by ACC has been approved in principle and will be at the planning stage within the next 3-5 years.
- 16.19 There are a large number of private waste management contractors in the Aberdeen area which collect commercial and industrial wastes. However ACC also offer a commercial waste collection service (which includes waste from schools and local authority run premises). The small quantities of commercial waste collected by ACC are managed as per council collected household waste, i.e. recyclable waste is sent to Sclattie Quarry MRF for sorting and bulking whilst residual commercial waste is sent to Stoneyhill Landfill for disposal.
- 16.20 ACC advise that there are no known capacity issues for commercial waste and Table 16.7 (Appendix 16-3) in Technical Annex 12 demonstrates that there are a large number of available commercial waste operators within Aberdeen and the wider Aberdeenshire area.

Receptors

- 16.21 The receptors relevant to this assessment comprise:

- Landfill void-space capacity;
- Capacity at facilities for the sorting, recycling and other management of waste; and

- Household Waste Recycling Centre (HWRC) capacity.

16.22 Due to its limited potential for substitution and rarity, landfill void-space capacity is considered to be of high sensitivity. The capacity at facilities for the local sorting, recycling and other management of waste is considered to be of low sensitivity. The capacity at HWRCs is also considered to be of low sensitivity. Human receptors are considered to be of very high sensitivity to waste.

Predicted Effects during Construction

16.23 The proposed development comprises a range of residential, commercial and retail units, along with leisure and communal recreational areas. All aspects of the development will generate waste during the construction phase, which will principally comprise inert soils, and construction wastes (bricks, stone, concrete, cladding, steel, timber, glass etc) which are generally inert in nature.

16.24 There are a number of inherent mitigation measures which will be incorporated into the project design in order to minimise the potential impacts associated with waste, either through minimising the quantities produced or by enabling waste arisings to be managed higher up the waste hierarchy.

16.25 In Scotland, Site Waste Management Plans are not a statutory requirement. However, Aberdeen City Council's Sustainable Building Code requires all developments to be covered by a SWMP that seeks to identify opportunities for recycling and landfill diversion. As part of the detailed design process, a SWMP detailing the strategy for managing waste during the construction phase will be produced which will aim to improve materials resource efficiency. It is proposed that the initial SWMP produced for Phase 1, would be updated for each subsequent development phase.

16.26 Construction development phases will be laid out to ensure that there is sufficient space to manage waste and to allow it to be effectively segregated and securely stored prior to removal and off-site management. Under the Duty of Care, producers of waste have a legal obligation to ensure wastes are handled responsibly and in line with relevant legislation and guidance. Adherence to both Duty of Care obligations and relevant health and safety legislation will minimise any potential impacts upon construction site workers and local residents.

PPiP

Waste Generation

16.27 All aspects of the construction phase are likely to generate waste (C&D type waste) such as soils, organic waste, bricks, stone, concrete, cladding, steel, timber, glass etc, which are generally inert in nature. Later phases of development which include fitting out premises will generate non-inert wastes, such as packaging, paints, oils, plastics etc.

16.28 It is not possible to estimate the quantity of earthworks waste which will be generated from the site preparation works at this stage of the proposed development. The quantity of excavation material requiring off-site management will depend on factors such as the detailed development layout, approved final ground contours and landscape design. It is likely that most of the waste soils arising from earthworks would be suitable for on-site re-

use. Green waste from preparatory works can be composted on-site, although there is local provision for off-site composting at licensed waste facilities.

- 16.29 In order to estimate the quantity of construction waste generated from the proposed residential development, benchmark data from BRE has been used (BRE, June 2012). Using proposed floorspace figures for 1, 2, 3, 4 and 5 bedroom properties provided by the Grandhome Trust it is estimated that the quantity of construction waste arising from the proposed 4,700 homes (Phases 1-5) will equate to approximately 81,454 tonnes. This quantity of construction waste would be produced over the entire construction period for Phases 1-5 (i.e. from 2014 until 2025). Assuming a construction period of 11 years, this would equate to approximately 7,404tpa for 11 years.
- 16.30 Based on the proposed floorspace figures for commercial development for Phases 1-5 it is estimated that approximately 16,142t of construction waste will be generated over the entire construction period for Phases 1-5 (i.e. from 2014 until 2025). Assuming a construction period of 11 years, this would equate to approximately 1,467tpa for 11 years. The total quantity of construction waste generated from both the residential and non-residential elements of Phases 1-5 equates to approximately 8,871tpa for 11 years.

Effect on Sorting and Recycling Facilities

- 16.31 The EU Waste Framework Directive sets a target of recycling/reusing 70% of C&D waste by 2020. Although, based on information provided by WRAP, it is considered that a recycling figure of 80% for construction and demolition waste is readily achievable (i.e. good practice) and that many sites are recycling in excess of 90% of this waste stream (i.e. best practice). Based on the assumption that 80% of the total quantity of construction waste would require off-site management at recycling facilities, this would equate to around 7,097tpa from the residential and commercial elements of the proposed scheme (assuming that all waste requires off-site management). Additionally, waste soils and green waste would be produced during the initial phases of development which cannot be quantified at this stage, but would also potentially require off-site management at sorting and recycling facilities.
- 16.32 There are currently a number of facilities which are permitted to accept C&D waste within Aberdeen and Aberdeenshire providing a relatively large amount of permitted capacity for sorting and recycling. However as most of the inert waste arisings within Aberdeen are recycled, the facilities have relatively high throughputs so that available capacity at some of the sites is limited. Notwithstanding this, Aberdeen City Council considers that overall there are no current capacity issues with respect to C&D waste. Furthermore, due to the significant timescales of the Grandhome development project, it is reasonable to assume that additional waste recycling infrastructure will be developed in the future, providing additional recycling capacity within Aberdeen.
- 16.33 The magnitude of impact on waste recycling infrastructure capacity (of low sensitivity) arising from construction waste arisings is Slight Negative which results in an effect of Minor-Neutral significance. This is not a significant impact. The nature of this impact is a direct and temporary impact on recycling infrastructure capacity.

Effects on Waste Disposal

- 16.34 A residual amount of up to 20% of the construction waste will require further management. Whilst a proportion of this waste may be suitable for on or off-site reuse or energy recovery, the final residual fraction will require disposal to landfill. In order to

represent the worst case scenario, we have assumed that all of the remaining construction waste (20%) will need to be landfilled (as there is currently no licensed capacity for energy recovery). This equates to approximately 1,774tpa arising from the residential and commercial development of Phases 1-5 (for an 11 year period). Additional C&D waste quantities arising from the earthworks and site clearance are unknown but are considered unlikely to require landfill disposal.

- 16.35 Landfill void-space is of high sensitivity due to its limited nature and there are clear national and local policy objectives to reduce the volume of materials being disposed of to landfill. However, the quantity of material requiring landfill disposal per annum is relatively small and there are two inert landfill sites within the Aberdeen area. Furthermore, it is understood from Aberdeen City Council that current landfill capacity for C&D waste is sufficient and this is evident in Table 16.6 (Appendix 16-3) in Technical Annex 12.
- 16.36 The magnitude of impact of construction waste disposal from the development on available landfill capacity is considered to be Slight Negative. This is regarded as having an Intermediate-Minor adverse significance. The disposal of waste to a landfill site is a direct and permanent impact on landfill capacity. This is not considered to represent a significant impact.

Effects on Human Population

- 16.37 Construction workers are potentially at risk from construction and demolition wastes and their exposure to these materials is likely to be high. Site workers will generally handle waste and would possibly be exposed to a variety of wastes in storage and general construction areas. Workers may also be exposed to special wastes, including oils, paints, etc. which can potentially have hazardous properties.
- 16.38 As a baseline, it has been assumed that site workers handle waste and operate in accordance with environmental and health and safety legislation, including the use of appropriate Personal Protective Equipment (PPE). The magnitude of the impact from wastes on construction workers is therefore assessed as being Negligible Negative. The significance of this impact on site workers (of very high sensitivity) is assessed as being Minor Adverse in the absence of any additional mitigation. This is not regarded as a significant impact.
- 16.39 Residents living in close proximity to the site are very unlikely to be exposed to construction waste as there would be no public access to the construction site and the site would be secured. The magnitude of the impact on the local residents is assessed as being Negligible Negative. The significance of this impact on residents (of very high sensitivity) is therefore considered to be Minor Adverse. This is not a significant impact. The nature of these potential impacts on human receptors is direct (from physical contact with waste), temporary and reversible.

Phase 1

Waste Generation

- 16.40 The quantity of excavation wastes predicted from the earthworks and site clearance activities of Phase 1 is not yet known. However it is considered that the majority of the waste will be suitable for reuse on site and will not therefore require off-site management. The exception to this is likely to be green waste arisings from vegetation clearance.

- 16.41 Based on the proposed floorspace figures, the predicted quantities of C&D waste arising from the proposed 500 residential dwellings is 8,778 tonnes, over a predicted 2 year construction period. This equates to approximately 4,389tpa for two years.
- 16.42 Based on the predicted floorspace figures for the commercial development proposed in Phase 1, it is estimated that approximately 362 tonnes of construction waste will be produced over the duration of Phase 1, which equates to approximately 181tpa for 2 years. The combined waste quantities for the residential and commercial elements of Phase 1 of the scheme is therefore approximately 4,570tpa for a 2 year period.

Effect on Sorting and Recycling Facilities

- 16.43 It is considered that a recycling figure of 80% for construction and demolition waste is readily achievable (i.e. good practice) and that many sites are recycling in excess of 90% of this waste stream (i.e. best practice). Based on the assumption that 80% of the construction waste arisings from Phase 1 would require off-site management at recycling facilities, this would equate to around 3,656tpa from the residential and commercial elements of the proposed scheme (assuming that all waste requires off-site management). Additionally, waste soils and green waste would be produced during the initial phases of development which cannot be quantified at this stage, but would also potentially require off-site management at sorting and recycling facilities.
- 16.44 There are currently a number of facilities which are permitted to accept construction and demolition waste within Aberdeen and Aberdeenshire and Aberdeen City Council does not consider that there are any current capacity issues with respect to C&D waste. Furthermore the quantities of waste anticipated to arise from Phase 1 are relatively small. It is therefore considered that there is sufficient waste recycling capacity within the local area to enable this waste to be managed appropriately and without the need for it to be transported long distances.
- 16.45 The magnitude of impact on waste recycling infrastructure capacity (of low sensitivity) arising from construction waste arisings is Negligible Negative which results in an effect of Neutral significance. This is not a significant impact. The nature of this impact is a direct and temporary impact on recycling infrastructure capacity.

Effects on Waste Disposal

- 16.46 On the assumption that 80% of the construction waste is able to be recycled, the remaining 20% will need to be landfilled. For C&D waste arising from Phase 1, this equates to approximately 914tpa arising from the residential and commercial development for a 2 year period. Additional C&D waste quantities arising from the earthworks and site clearance are unknown but are considered unlikely to require landfill disposal.
- 16.47 Landfill void-space is of high sensitivity however, the quantity of material requiring landfill disposal per annum is small and there are two inert landfill sites within the Aberdeen area. Furthermore, it is understood from Aberdeen City Council that current landfill capacity for C&D waste is sufficient and this is evident in Table 16.6 in Technical Annex 12.
- 16.48 The magnitude of impact of construction waste disposal from the development on available landfill capacity is considered to be Negligible Negative. This is regarded as having a Neutral significance. The disposal of waste to a landfill site is a direct and

permanent impact on landfill capacity. This is not considered to represent a significant impact.

Effects on Human Population

- 16.49 Construction workers from the development of Phase 1 would be potentially at risk from construction and demolition wastes and their exposure to these materials is likely to be high. The magnitude of the impact from wastes on construction workers is assessed as being Negligible Negative. The significance of this impact on site workers (of very high sensitivity) is assessed as being Minor Adverse in the absence of any additional mitigation. This is not regarded as a significant impact.
- 16.50 Residents living in close proximity to the site are very unlikely to be exposed to construction waste. The magnitude of the impact on the local residents is assessed as being Negligible Negative. The significance of this impact on residents (of very high sensitivity) is therefore considered to be Minor Adverse. This is not a significant impact. The nature of these potential impacts on human receptors is direct (from physical contact with waste), temporary and reversible.

Overall Masterplan

Waste Generation

- 16.51 Based on a proposed 7,000 residential dwelling community (using proposed floorspace figures provided by the applicant), the residential element of the scheme would be predicted to produce approximately 121,895 tonnes of C&D waste over an estimated period of 36 years. As an average figure over a 36 year period, this would equate to approximately 3,385tpa.
- 16.52 Based on the proposed non-residential floorspace figures, C&D waste arisings for the commercial element of the entire masterplan (Phases 1-7) is estimated to amount to approximately 17,212 tonnes of waste over a 36 year period. This equates to approximately 478tpa for a 36 year period. The combined quantities of C&D waste arising from the residential and commercial developments of the masterplan for Phases 1-7 averaged out over the development period amounts to approximately 3,863tpa for a 36 year period.

Potential Effects on Receptors

- 16.53 Whilst the 'total' quantities of C&D waste predicted to be generated from development phases 1-7 are relatively high, they will be generated over a long period of time. The majority of the construction works will be carried out between 2016 and 2025 and therefore higher annual waste arisings are likely to be generated during this period. Notwithstanding this, the waste recovery infrastructure within the local area currently has sufficient capacity for the additional quantities of waste and future provision is likely to become available given the relatively long timescales involved.
- 16.54 Beyond 2025, the Scottish Government requires that less than 5% of all waste will be sent to landfill. Alternative means of managing non-recyclable C&D waste will therefore be required. It is difficult to predict the types or locations of such waste management facilities. However, in the meantime, landfill capacity within Aberdeenshire is sufficient to manage the C&D waste arisings from Grandhome until alternative solutions become available.

- 16.55 Construction workers are potentially at risk from their contact with construction waste however it has been assumed that as a minimum, workers will adhere to current health and safety and Duty of Care legislation and would use appropriate PPE to protect themselves from potential risks. The risk to site workers is not therefore considered to be significant. As with the proposals for Phase 1 and Phases 1-5 assessment scenarios, the construction site will be secured and no public access will be permitted. The risk to local residents from waste arisings is therefore negligible.

Predicted Effects of the Completed Development

- 16.56 From the completion of Phase 1 in 2016 the Grandhome development will produce waste which will comprise both household and commercial waste streams. Recyclable and non-recyclable household waste will be collected by the Council's appointed waste contractor, which is currently SITA North East. Whilst it is acknowledged that current collection arrangements are likely to change in the short or medium term, it is not currently possible to state exactly what form these changes may take. A co-mingled dry recyclable scheme is likely to be introduced, if shown to be viable given the current waste management infrastructure.
- 16.57 The design of the development will ensure that sufficient space is provided for waste containers and that household waste can be collected from properties in accordance with ACC and its contractor's requirements. ACC has stated that if the co-mingled scheme is introduced, it would urge developers to incorporate underground collection containers within new developments, particularly for multi-occupancy developments and 'bring sites'. However, this does not accord with Council's current guidance on waste management provision for new developments.
- 16.58 The Grandhome development will include provision of mini-recycling ('bring') sites to enable householders to recycle a range of waste streams. Typically these sites are located within supermarket, library and school car parks etc as these locations usually provide easy and safe public access. ACC has confirmed that the number of bring sites provided within Grandhome can be at the lower end of the typical range of provision as there are a number of existing bring sites across Aberdeen, there is a nearby HWRC and the proposed co-mingled scheme will collect the same types of materials as is collected at the bring sites.
- 16.59 WRAP has produced guidance on 'bring site' recycling. The guidance (WRAP, Bring Site Recycling, 2013) considered bring sites in England and states that the number of bring sites in England has decreased in recent years. The average density of bring sites (number of households per bring site) for all local authorities in England has also decreased from an average of 1,807 households per bring site in 2006/07 to 2,602 households per bring site in 2010/11. Based on these statistics, it is proposed that a minimum of three bring sites would be provided within Grandhome as part of the development of Phases 1-7. The detailed design of the sites will be discussed with ACC. However, if possible, underground containment systems will be provided.
- 16.60 Local businesses and schools will produce quantities of commercial waste, which will be collected by private waste contractors unless ACC is appointed to manage the waste. There is a range of commercial waste management contractors based within and around Aberdeen which provide commercial waste collection services. Local capacity for commercial waste recovery and disposal is understood to be sufficient.

PPiP

Waste Generation

- 16.61 Based on a waste generation figure of 1.1tonnes of household waste per household per annum, it is estimated that approximately 5,170tpa of household waste will be produced from the residential element of Phases 1-5.
- 16.62 Estimates of the quantity of commercial waste which would be produced from Phases 1-5 have been based on research undertaken by Urban Mines (RWM/CIWM, A Review of Business Waste Production in England; Past, Present and Future. 2011). Based on a figure of 1.9 tonnes of waste per employee per annum (retail and wholesale sector) and 2,150 Gross Additional Full-Time Equivalent (FTE) Jobs, the predicted quantity of commercial waste arising from Phases 1-5 is approximately 4,085tpa of commercial waste. The combined annual tonnage of household and commercial waste (otherwise known as municipal waste) generated by Phases 1-5 is therefore approximately 9,255tpa.

Effect on Sorting and Recycling Facilities

- 16.63 The Scottish Government has set a target for 70% of waste to be recycled, composted or prepared for re-use by 2025. Current recycling rates within Aberdeen are at 35% (2011/12) and whilst it is acknowledged that the Government target of 70% includes preparation for re-use, significant changes in management and performance of municipal waste (i.e. household and commercial waste) within Aberdeen will be required in order to meet the target. However, changes in waste collection and its management are proposed within Aberdeen and it is therefore probable that the current recycling performance will improve in the short term.
- 16.64 In order to assess the likely impact on waste recycling infrastructure, a recycling figure of 70% has been used. Based on the assumption that 70% of the total quantity of municipal waste would require off-site management at recycling facilities, this would equate to around 6,478tpa from the residential and commercial elements of the proposed scheme (assuming that all waste requires off-site management).
- 16.65 There are currently a number of facilities which are permitted to accept household and commercial wastes, including composting of green and food wastes. Current capacity at these facilities indicates that there is significant remaining capacity to accommodate waste arising from the proposed Grandhome development. This has been confirmed by officers at ACC.
- 16.66 The magnitude of impact on waste recycling infrastructure capacity (of low sensitivity) arising from municipal waste arisings is Slight Negative which results in an effect of Minor-Neutral significance. This is not a significant impact. The nature of this impact is a direct and temporary impact on recycling infrastructure capacity.

Effects on Waste Disposal

- 16.67 We have assumed that 70% of the municipal waste is able to be recycled and therefore will not be landfilled. In order to represent the worst case scenario, we have assumed that all of the remaining municipal waste (30%) will need to be landfilled. For waste arising from Phases 1-5, this equates to approximately 2,776tpa arising from the residential and commercial development.

- 16.68 Landfill void-space is of high sensitivity however, the quantity of material requiring landfill disposal per annum is relatively small and the Stoneyhill Landfill Site has relatively long remaining life. Post 2025, the Government's landfill diversion targets will mean that alternatives to landfill will be required. However it is not possible to assess the adequacy of such alternatives at this time.
- 16.69 The magnitude of impact of municipal waste disposal from the development on available landfill capacity is considered to be Slight Negative. This is regarded as having an Intermediate-Minor adverse significance. The disposal of waste to a landfill site is a direct and permanent impact on landfill capacity. This is not considered to represent a significant impact.

Potential Effects on Human Population

- 16.70 Aberdeen City Council will provide householders with appropriate secure waste containers which will be emptied regularly as part of the Council's waste collection scheme. Commercial occupants will be able to appoint either ACC or a private waste contractor to collect their commercial waste. However, the Duty of Care places specific requirements on them to ensure the waste is managed in accordance with legislation.
- 16.71 Householders and businesses will not be adversely affected by municipal waste produced during the occupation of Grandhome. The magnitude of the impact on the local residents and business occupants is assessed as being Negligible Negative. The significance of this impact on residents and businesses (of very high sensitivity) is therefore considered to be Minor Adverse. This is not a significant impact. The nature of these potential impacts on human receptors is direct (from physical contact with waste), temporary and reversible.

Phase 1

Waste Generation

- 16.72 Based on a waste generation figure of 1.1tonnes of household waste per household per annum, it is estimated that approximately 550tpa of household waste will be produced from the residential element of Phase 1.
- 16.73 The proposed commercial element of Phase 1 is considered unlikely to generate significant quantities of commercial waste. Based on an estimated employment figure of 100 for Phase 1, it is calculated that approximately 190tpa commercial waste would be produced from the commercial element of Phase 1 (based on a figure of 1.9 tonnes of waste per employee per annum (Urban Mines)). An estimated annual tonnage of 740tpa of municipal waste would therefore be produced from Phase 1.

Effect on Sorting and Recycling Facilities

- 16.74 Based on the assumption that 70% of the total quantity of municipal waste would require off-site management at recycling facilities, this would equate to around 518tpa from the residential and commercial elements of the proposed scheme (assuming that all waste requires off-site management).
- 16.75 The estimated quantity of waste requiring recycling from Phase 1 is small and there are currently a number of facilities which are permitted to accept household and commercial wastes, including composting of green and food wastes. Current capacity at these

facilities indicates that there is significant remaining capacity to accommodate waste arising from Phase 1 of Grandhome. This has been confirmed by officers at ACC.

- 16.76 The magnitude of impact on waste recycling infrastructure capacity (of low sensitivity) arising from construction waste arisings is Negligible Negative which results in an effect of Neutral significance. This is not a significant impact. The nature of this impact is a direct and temporary impact on recycling infrastructure capacity.

Effects on Waste Disposal

- 16.77 On the assumption that 70% of the municipal waste is able to be recycled, the remaining 30% will need to be landfilled. For waste arising from Phase 1, this equates to approximately 222tpa arising from the residential and commercial development.
- 16.78 Whilst landfill void-space is of high sensitivity, the quantity of material requiring landfill disposal per annum is very small and the Stoneyhill Landfill Site has sufficient remaining capacity. The magnitude of impact of municipal waste disposal from Phase 1 on available landfill capacity is considered to be Negligible Negative. This is regarded as having a Neutral significance. The disposal of waste to a landfill site is a direct and permanent impact on landfill capacity. This is not considered to represent a significant impact.

Effects on Human Population

- 16.79 Aberdeen City Council will provide householders with appropriate secure waste containers which will be emptied regularly as part of the Council's waste collection scheme. Commercial occupants will be able to appoint either ACC or a private waste contractor to collect their commercial waste. However, the Duty of Care places specific requirements on them to ensure the waste is managed in accordance with legislation.
- 16.80 Householders and businesses will not be adversely affected by municipal waste produced during the occupation of Grandhome. The magnitude of the impact on the local residents and business occupants is assessed as being Negligible Negative. The significance of this impact on residents and businesses (of very high sensitivity) is therefore considered to be Minor Adverse. This is not a significant impact. The nature of these potential impacts on human receptors is direct (from physical contact with waste), temporary and reversible.

Overall Masterplan

Waste Generation

- 16.81 Based on a proposed 7,000 residential dwelling community (using a waste generation figure of 1.1 tonnes of household waste per household per annum) it is calculated that approximately 7,700tpa of household waste would be produced from Phases 1-7.
- 16.82 Based on a figure of 1.9 tonnes of waste per employee per annum (retail and wholesale sector) and 2,210 Gross Additional Full-Time Equivalent (FTE) Jobs, the quantity of commercial waste arising from Phases 1-7 is approximately 4,199tpa of commercial waste. The combined estimated annual tonnage of household and commercial waste (municipal waste) generated by Phases 1-7 is therefore approximately 11,899tpa.

Effects on Receptors

- 16.83 The predicted 7,700t of household waste arising from Phases 1-7 equates to approximately 8% of the quantity of household waste collected by ACC in 2012 (i.e. from households and civic amenity sites). This is not considered to be a significant increase in the annual quantity of waste which will require management by the Council, particularly considering that the increase will occur over a long period of time, enabling the Council to adapt its collection scheme to accommodate the additional quantities of household waste. Furthermore, the predicted quantities of household waste are not considered to be significant in the context of the available remaining capacity within local waste management infrastructure.
- 16.84 Beyond 2025, the Scottish Government requires that less than 5% of all waste will be sent to landfill. As with the conclusions for Phases 1-5, alternative means of managing non-recyclable municipal waste will therefore be required. It is difficult to predict the types or locations of such waste management facilities. However, in the meantime, landfill capacity within Aberdeenshire is sufficient to manage the residual municipal waste arisings from Grandhome until alternative solutions become available.
- 16.85 Household waste arisings from all phases of development will be collected and managed by ACC. Householders will be provided with appropriate receptacles to collect their waste, in accordance with SITA's collection requirements. This will ensure both the safe storage and collection of household waste within the development. Commercial occupants will be required to appoint an authorised waste contractor to manage their waste in accordance with the Duty of Care. The risk to both householders and commercial occupants is considered to be low.

Cumulative Effects

Cumulative Effects

- 16.86 It is considered that cumulative impacts may arise where a number of large developments are permitted in close proximity to each other which produce large quantities of the same waste types. The most significant cumulative impacts are thus likely to arise from local developments which produce high levels of C&D waste and/or municipal waste. Of the information obtained, it is considered that the following developments, which are all to be completed by 2018, may potentially give rise to cumulative impacts, assuming that the Grandhome scheme is permitted:
- Davidsons Mill, 575 residential units;
 - Dubford, 700 residential units; and
 - Berryhill, 30 acres of mixed use.
- 16.87 All of the above developments will result in quantities of C&D waste arisings, which will require management at local sites. However, it is considered most of this waste stream can be reused or recycled, and therefore treatment and reprocessing capacity is likely to be a more important factor than disposal capacity. There is sufficient treatment and reprocessing capacity within the local area for managing C&D wastes and in the medium to long term this capacity is likely to increase as new planning applications for waste facilities are put forward.
- 16.88 On completion, the above developments will generate a mixture of household, commercial and industrial wastes, although this cannot at present be quantified. Based

on the types of waste that are likely to arise, any cumulative impacts are unlikely to be significant as there is sufficient existing capacity to manage a wide range of municipal wastes on a local and regional basis.

- 16.89 The Grandhome development would be phased and early parts of the site will be occupied whilst construction works on subsequent phases continue. There is potential for cumulative effects to arise from the generation of both construction and municipal wastes from the site. However, the combined annual arisings of these waste streams would be relatively small and it is unlikely that a single local facility would manage the different waste streams. The cumulative effects are not therefore considered to be significant.

Residual Effects

Construction Waste

- 16.90 Whilst quantities of construction waste will be generated from the proposed development, the capacity of local and regional waste facilities is considered to be adequate to manage the predicted quantities and types of waste arisings. Furthermore, measures will be taken to ensure that waste is minimised as far as possible and managed sustainably in accordance with the waste hierarchy.
- 16.91 No significant effects are therefore anticipated as a result of the management of construction waste arising from either the PPIP or Phase 1. The residual impact magnitude associated with both recycling infrastructure and landfill disposal capacity will be negligible negative. The residual significance is therefore assessed as being neutral.
- 16.92 The residual impacts associated with the management of construction wastes on site workers and residents will constitute a negligible negative impact. The residual significance of impact on workers and residents is therefore assessed as minor adverse.

Operational Waste

- 16.93 The current arrangements for the collection of household waste rely on the kerbside segregation of materials by the householder. This scheme is supplemented by the provision of HWRCs and additional bring sites throughout Aberdeen. The collection scheme in place when Phase 1 becomes occupied may differ significantly from the current scheme and may result in a greater proportion of recyclable material being captured from the household waste stream.
- 16.94 There is currently sufficient recycling capacity within Aberdeen and the local area to manage both the additional waste generated by Grandhome as well as any potential increase in recycling throughput arising from changes in the Council's collection arrangements. It is considered that the residual impacts associated with the management of operational waste on recycling capacity (from both the PPIP and Phase 1) on an ongoing basis, will be of a negligible negative impact magnitude. The residual significance of impact on recycling capacity arising from operational waste is therefore assessed as being neutral.
- 16.95 There is sufficient landfill capacity within Aberdeenshire to accommodate the predicted residual waste arisings from the post-completion phases of Grandhome. Due to the Scottish Government's target of sending less than 5% of all waste to landfill post 2025, it is likely that the volume of residual waste being sent to landfill will decrease throughout

the lifetime of the development, potentially resulting in zero waste to landfill in the long term. It is considered that the residual impacts associated with the management of operational waste on landfill disposal capacity, on an ongoing basis, will be of a negligible negative impact magnitude. The residual significance of impact on landfill capacity arising from operational (municipal) waste is therefore assessed as being neutral.

- 16.96 The adequate provision of waste collection systems within Grandhome, together with individual waste containers at properties and commercial premises, will discourage fly tipping of waste within the development and local area. The regular removal of waste by an appointed waste management contractor will minimise the risk to human health from waste being stored for long periods of time. It is considered that the specified mitigation measures will adequately control municipal waste arisings from the development. The predicted magnitude of impact on human health is therefore considered to be negligible negative and the residual significance of impact is therefore assessed as being neutral. Table 16.1 below provides the summary of the assessment of waste impacts.