



CRAIGFORTH CAMPUS, STIRLING

ENVIRONMENTAL IMPACT ASSESSMENT REPORT
VOLUME 1:
WRITTEN STATEMENT

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1 Introduction

1.1 Introduction

- 1.1.1 This Environmental Impact Assessment Report (EIA Report) is submitted in support of two applications made by Ambassador LB Holdings LLP (the Applicant), for Planning Permission in Principle, for a mixed use development and a Detailed Planning Application for a proposed office development on land at the Craigforth Campus, Stirling (hereafter 'the Proposed Development').
- 1.1.2 This EIA Report has been prepared in accordance with the requirements of Schedule 2 Category 10(b) of The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (the 'EIA Regulations').
- 1.1.3 The EIA Report presents information on the identification and assessment of the likely significant positive and negative environmental effects of the Proposed Development. Further details of the statutory requirements for EIA are set out in Chapter 6: EIA Methodology and Approach.

1.2 Site Context

- 1.2.1 The Site encompasses all the land within Figure 1.1 which includes the boundaries of both the detailed planning application and planning permission in principle application.
- 1.2.2 The Site is located to the west of Stirling in Central Scotland and encompasses the established Craigforth Campus. It is on the south west corner of Junction 10 of the M9 and is accessible from the A84.
- 1.2.3 The Site is bounded by the mid-point of the bed of the River Forth to its west, the A84 to its north, the M9 to its east and flat agricultural land to the south.
- 1.2.4 The Site comprises 54 hectares in total and is in the shadow of Craigforth Crag which dominates the centre of the Site.
- 1.2.5 The current use is Prudential's existing office operations which wrap round the north side of the Crag. This involves buildings which house around 3,000 employees and also includes a large proportion of the Site being covered in car parking (over 1350 spaces). The buildings are predominantly offices, designed and built in the 1970's, mostly coloured white with flat roofs.

1.3 Application Details

- 1.3.1 The applications seek to deliver a regional employment, leisure, and residential destination at Craigforth. The Proposed Development offers an opportunity for expanding and enhancing the existing facilities to deliver a new active business campus with improved amenities, public realm and upgraded accessibility with additional employment opportunities for the wider community.
- 1.3.2 A detailed application for planning permission has been submitted, covering the North Site (see Figure 1.2), for the development of an office building including car parking, landscaping, and associated infrastructure. The new HQ office building will replace the existing HQ Prudential buildings.
- 1.3.3 Planning Permission in Principle is also sought for the redevelopment of the wider Craigforth Campus (see Figure 1.1) which will comprise:

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- Offices (Class 4);
 - Retail (Class 1);
 - Leisure (Class 11);
 - Public Houses (Sui Generis);
 - Restaurants (Class 3);
 - Residential (Class 9);
 - Hotel (Class 7);
 - Care Home (Class 8);
 - Nursery (Class 10);
 - Car Parking;
 - Landscaping; and
 - Associated infrastructure.
- 1.3.4 The extensive redevelopment proposed will involve the demolition of the existing buildings (excluding Lomond View and Craigforth House) leading to the creation of improved development plots for alternative uses, improving the amenities available on Craigforth Campus and complementing the improved office accommodation to be delivered on the northern portion of the Site.
- 1.3.5 The Proposed Development does not involve physical alterations to the Category B Listed Craigforth House. It will be subject to separate Listed Building Consent approvals at the appropriate time.
- 1.3.6 A new access point is proposed from the A84 which will serve the purpose built HQ building and alleviate existing traffic issues.

1.4 The Applicant

- 1.4.1 Ambassador LB Holdings LLP is part of the Ambassador Group, a Scottish development and investment firm, which has a substantial UK wide property portfolio spanning office, retail, leisure, industrial, residential and mixed-use projects. Ambassador Group has extensive expertise in developments of this nature.
- 1.4.2 Ambassador Group has experience in developing all of the uses proposed in the redevelopment of Craigforth Campus and understand how to deliver successful developments which provide genuine benefit locally, regionally, and nationally with targeted objectives such as employment.
- 1.4.3 Ambassador Group has funding in place to deliver the project and are committed to bringing forward the new purpose built HQ building in advance of the wider redevelopment proposals.

1.5 The Project Team

- 1.5.1 The EIA Report has been compiled by Savills for the Applicant. While Savills had overall responsibility for the EIA Report, sub-consultants prepared specialist assessment chapters and provided input to the EIA as indicated in Table 1.1 below. Savills prepared the introductory chapters of the EIA Report (Chapters 1-6). The members of the project team and their respective roles are presented in Table 1.1, alongside details of their professional expertise.
- 1.5.2 The EIA process was managed/coordinated by Alastair Wood of Savills. Alastair is a Planning Director with Savills. Alastair has over 22 years' experience in the management and co-ordination of EIAs for commercial developments in Scotland.

Table 1.1 EIA Project Team Expertise and Qualifications

Chapter Number	Title	Organisation	Expertise/Qualification
7	Landscape and Visual Impact Assessment	ASH	The LVIA has been undertaken by ASH design + assessment Ltd, Chartered Landscape Architects, in accordance with best practice guidance, set out within GLVIA3 (Landscape Institute (LI) / Institute of Environmental Management and Assessment (IEMA), 2013). ASH is a registered practice with the LI, the Chartered body for professional landscape architects, with over 20 years' experience in undertaking LVIA. The assessment has been undertaken and verified by two Landscape Professionals (chartered members of the LI) for robustness.
8	Cultural Heritage	CFA	The Cultural Heritage Assessment has been carried out by George Mudie MA (Hons) FSA Scot MCIfA, of CFA Archaeology Ltd (CFA) based in Musselburgh, East Lothian, a Registered Organisation (RO) of the Chartered Institute for Archaeologists (CIfA). Mr Mudie is Principal Consultant with CFA and is a Member of the Chartered Institute for Archaeologists (MCIfA). He has over 18 years full-time experience of producing Environmental Impact Assessments (EIAs) for a wide range of industrial and commercial developments across the UK.
9	Biodiversity	Babbity Environmental Ltd	The survey team was led by Colin Nisbett, a fully qualified ecologist of 15 years' experience. He is a full member of the Chartered Institute of Ecology and Environmental Management (MCIEEM) and a full Member of the Association of Environmental & Ecological Clerks of Works (MAEECoW). The ecological impact assessment has been prepared by Dr Gen Cannibal, a specialist who holds a degree in Ecology and a Doctorate in EIA, with 35 years' experience, who is a full member of the Institute of Environmental Sciences (IES) and a Chartered Environmentalist (CEnv) with the Royal Society for the Environment.
10	Flood Risk	Fairhurst	This assessment has been carried out by a suitably qualified hydrologist with over seven years' experience in carrying out environmental impact assessments in relation to the water environment. The flood risk assessment has been completed by a chartered engineer with over 35 years' experience as water engineering specialist and the chapter reviewed by a chartered environmental consultant with over ten years' experience in delivering EIA reports.

Chapter Number	Title	Organisation	Expertise/Qualification
11	Drainage and Hydrology	Fairhurst	This assessment has been carried out by a suitably qualified hydrologist with over seven years' experience in assessing impacts on the water environment, and reviewed by a chartered consultant with over ten years' experience in delivering EIA reports.
12	Ground Conditions	Fairhurst	This assessment has been carried out by a suitably qualified geo-environmental engineer with over 15 years' experience in assessing impacts of developments on the risk to future site users and the wider environment. The assessment was reviewed by a Chartered Geologist, with over 15 years' experience in undertaking such assessments.
13	Traffic and Transport	SWECO	This assessment has been carried out by Ruth Mustard. Ruth is a Technical Director in the Transport Planning team and has over 20 years' experience in transport planning for the private sector covering transport input to EIAs and Transport Assessments.
14	Noise & Vibration	Babbity Environmental Ltd	This noise assessment has been conducted by Steve Fraser BSc MPhil CEnv MICWM MloA who has more than 35 years of professional experience as an environmental consultant, Environmental Health Officer and Environmental Protection Officer. The baseline surveys were conducted by Jon Champion BSc who has an Institute of Acoustics Certificate of Competence for Measurement of Environmental Noise and a Diploma in Acoustics and Noise Control with more than 10 years practical experience in noise survey fieldwork.
15	Air Quality	Babbity Environmental Ltd	This assessment was conducted by Steve Fraser BSc MPhil CEnv MloA CIWM. Steve has more than three decades of experience in air quality impact assessment in the public and private sectors.
16	Socio-Economics	Savills	Danny Collins prepared the socio-economic impact assessment for the project. Danny is a Director in the economics team and has over 12 years' experience of undertaking social and economic impact assessments for a range of projects, including numerous mixed-use schemes across the UK and specifically in Scotland and a range of other commercial projects.
17	Human Health	Savills	Alastair Wood prepared the human health chapter for the project. Alastair is a Planning Director with Savills, Alastair has over 22 years' experience in the preparation of EIA's for commercial developments in Scotland.
18	Sustainability	Resources	David Bowman LLB MSc prepared the

Chapter Number	Title	Organisation	Expertise/Qualification
	& Climate Change	Unlimited LLP & Atelier Ten	Sustainability & Climate Change Chapter. David has 8 years' experience advising clients operating in the master planning development sector. David has advised developers, landowners and funders on a wide range of energy masterplan projects in relation to the sustainability, planning and regulatory aspects of their schemes. The energy review and related statement has been carried out by Bernie Carr BSc(Hons), MSc, WELL AP. Bernie is a senior sustainability consultant with over 10 years' experience and manages the delivery of environmental and benchmarking projects in Scotland. His role includes assessing the technical and financial feasibility of low and zero carbon technology solutions as well as quantifying the potential of passive design solution. This is achieved through Bernie's extensive experience of energy and thermal modelling. In addition, Bernie is also a BREEAM assessor and has recently become one of the first WELL AP accredited assessors in Scotland.
19	Cumulative Impacts	Savills	Alastair Wood prepared the cumulative impacts chapter for the project. Alastair is a Planning Director with Savills, Alastair has over 22 years' experience in the preparation of EIA's for commercial developments in Scotland.
20	Summary of Mitigation	Savills	Alastair Wood prepared the summary of mitigation chapter for the project. Alastair is a Planning Director with Savills, Alastair has over 22 years' experience in the preparation of EIA's for commercial developments in Scotland.

1.6 Legislative Requirements for Environmental Impact Assessment

- 1.6.1 The Applicant has considered the Proposed Development in light of the EIA Regulations and concluded that, due to its nature and scale, the Proposed Development exceeds the thresholds outlined in Schedule 2 Category 10(b) of The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, and has the potential for significant environmental effects, therefore there is a requirement for EIA.

1.7 The EIA Report

- 1.7.1 This EIA Report presents the findings of the EIA for the Proposed Development during the construction and operation phases.
- 1.7.2 The general methodology for the EIA Report is detailed in Chapter 6. The EIA Report has been compiled by Savills on behalf of the Applicant.

- 1.7.3 The EIA Report comprises three volumes:
- Volume 1: Main Text (Chapters 1-20);
 - Volume 2: Figures; and
 - Volume 3: Technical Appendices.
- 1.7.4 In addition to the EIA, the following standalone documents also support the applications:
- A Non-Technical Summary (NTS);
 - A Design and Access Statement;
 - An Energy Statement;
 - A Pre-Application Consultation Report; and
 - A Planning Statement.
- 1.7.5 **Chapters 1-6** of Volume 1 of the EIA Report are considered to be introductory chapters and comprise the following:
- **Chapter 1: Introduction** provides a brief introduction to the proposals and the legislative requirements and outlines the structure of the EIA Report.
 - **Chapter 2: Site Description** explains the context of the Site.
 - **Chapter 3: Alternatives and Design Evolution** defines the benefits of the proposals, summarises the reason for site selection and provides details of the approach to the design strategy and layout modifications.
 - **Chapter 4: Description of the Proposed Development** provides a detailed description of the proposals.
 - **Chapter 5: Planning Policy** summarises the national and local planning policy context.
 - **Chapter 6: EIA Methodology and Approach** provides more details on the EIA process.
- 1.7.6 **Chapters 7-20** of Volume 1 describe the potential environmental effects of the Proposed Development in relation to the topic areas included in Table 1.1 above.

2 Site Description

2.1 Site Location

- 2.1.1 Craigforth Campus is a landmark site located to the west of Stirling in Central Scotland. The Site is situated 3.8km to the west of Stirling City Centre. Figure 1.1 illustrates the location of the Site and surrounding context.
- 2.1.2 It is framed by its Crag, Stirling Castle and the Wallace Monument and sits between the Touch/Gargunnoch Hills to the south and the Ochils/Sherrifmuir to the north.
- 2.1.3 It is accessed via the south-west corner of Junction 10 of the M9 and is also accessible from the A84 to the north and from Dumbarton Road, via Kersebonny Road, to the south. The Site is bounded by the mid-point of the bed of the River Forth to its west, the A84 to its north, the M9 to its east and the Raploch Burn and flat agricultural land to the south.

2.2 Site Context

- 2.2.1 The Site comprises 54 hectares in total and is in the shadow of the distinctive 68m high Craigforth Crag which dominates the centre of the Site. The current use is Prudential's existing office operations which wrap round the north side of the Crag. This comprises of buildings which house around 2,250 employees and also includes a large proportion of the Site currently covered in car parking (over 1,350 spaces) and provision for 15 coaches.
- 2.2.2 The buildings are predominantly offices, designed and built in the 1970s, mostly coloured white with flat roofs, which are now showing signs of age. These buildings vary in scale but are predominantly 3 to 5 storeys in height and are mainly clustered within the central portion of the Site.
- 2.2.3 Craigforth Crag is a natural rampart, a crag and tail created by a volcanic plug of very hard igneous rock which was formed into a crag and tail when the ice-sheets of the last ice-age passed over this area.
- 2.2.4 This Crag is of high visual prominence and viewed as having high amenity and biodiversity value. The Crag is covered by trees categorised as ancient and semi-natural woodland and is listed as long-established woodland of plantation origin. Craigforth Crag is proposed to be designated as a Local Nature Conservation Site (LNCS).
- 2.2.5 The Crag is open to access by the public and the Proposed Development aims to protect and further encourage such access (more details contained in Chapter 4 and the Design & Access Statement).
- 2.2.6 Drip Bridge Conservation Area is located adjacent to the north-west of the Site. The designated Conservation Area incorporates Old Drip Bridge and the surrounding houses which are set in a flat agricultural landscape locally termed Carse. The wider carse landscape comprises a broadly flat expanse of valley floor accommodating a looping, meandering river, with surrounding hills and distant mountains providing a panoramic backdrop.
- 2.2.7 The Site abuts both sides of Old Drip Bridge which is a Category A listed structure built circa 1773. Old Drip Bridge is currently used only as a pedestrian bridge which occupies a low-lying riverside location with open views to the south-east along the riverbank towards Craigforth Crag.

- 2.2.8 The Site also includes Craigforth House which stands on the north-east side of Craigforth Crag. Any development involving Craigforth House would be subject to securing the necessary detailed approvals and Listed Building Consent. It was formerly a stately home and remains a Category B listed building of the 17th or early 18th Century. Craigforth House can be seen from the M9, when travelling south.
- 2.2.9 The mid-point of the bed of the River Forth bounds the majority of the western limits of the Site. This stretch of the River Forth is in close proximity to the nearby River Teith SAC (Special Area of Conservation). The River Teith SAC is located approximately 525m to the north of the Site. The SAC is designated for Atlantic salmon and brook lamprey, river lamprey and sea lamprey.
- 2.2.10 With the Site incorporating both the Crag and a stretch of the River Forth and with the wider environmental setting including Stirling Castle and the Wallace Monument, the Proposed Development seeks to minimise the environmental impacts upon both the Site and the wider context. The footprint of the Proposed Development consists largely of previously developed land (including car parking areas) with the exception of land within the south-west of the Site.

2.3 Designations in the Wider Locality

- 2.3.1 There a number of statutory designated sites within close proximity of the Site:
- Stirling Castle, Scheduled Monument (1.6km);
 - Stirling Royal Gardens including Kings Knot, Scheduled Monument (1.65km);
 - Hollandbush (industrial kiln), 100m west of Limekilns, Scheduled Monument (1.2km);
 - Drip Bridge, Conservation Area (partially within the Site boundary);
 - Stirling Town & Royal Park, Conservation Area (1.35km);
 - Cambusbarron, Conservation Area (2.2km);
 - Touch, Garden & Designed Landscapes (2.5km);
 - Kings Knot, Garden & Designed Landscapes (1.65km);
 - Battle of Bannockburn, Battlefield (2.5km);
 - Battle of Stirling Bridge, Battlefield (1.75km);
 - Drip Old Bridge, Category A Listed Building (partially within the Site boundary);
 - Drip Old Bridge – Tollhouse, Category C Listed Building (0.05km); and
 - Inn, Drip Bridge by Stirling, Category C Listed Building (0.07km).
- 2.3.2 These various designations are described and assessed in further detail within the relevant technical chapters to follow.

2.4 Physical Characteristics

Biodiversity

- 2.4.1 Semi-natural habitats present within the northern area of the Site comprise lines of standard trees, most notably a group of oak trees, which are very mature in nature. An area of rank marshy grassland lies to the north-west of the car park, beyond which lies the River Forth. A small pond lies in the west of the northern section however this feature holds little to no standing water.
- 2.4.2 Semi-natural habitats in the central section of the Site comprise a line of standard lime trees associated with the internal road which runs through the Site and small areas of amenity

grassland.

- 2.4.3 A small section of woodland lies in the central section, which is part of the wider woodland that lies around the Crag, which is encapsulated between the central and southern section of the Site. This woodland is listed on the Ancient Woodland Inventory as 'Long Established Woodland of Plantation Origin'. The 'Crag Woodland' comprises a canopy formed by a range of native and ornamental species.
- 2.4.4 The southern section of the Site largely comprises farmland which is being managed for arable purposes and a silage crop associated with Kaimes Farm. A hedgerow comprised largely of snowberry, separates this section of the Site from the Crag Woodland.
- 2.4.5 The western boundary of the Site is largely comprised by the mid-point of the bed of the River Forth. The river channel meanders naturally and varies between 10-15 m in width. The water is deep and slow flowing in this section of the River Forth. There is abundant bankside cover provided by riparian woodland, which largely comprises alder, sycamore, ash trees.

Hydrology & Drainage

- 2.4.6 The Site is located entirely within the catchment of the River Forth, see Figure 10.1, which drains a total of over 1,000 km², commencing at Ben Lomond and flowing south-east to discharge to the Firth of Forth. The wider catchment contains not only the River Forth, but a number of major tributaries including the River Teith.

Ground Conditions

- 2.4.7 There is no recorded presence of made ground within the Site on the British Geological Survey (BGS) maps. Given the historical land uses towards the southern limits of the Site it is considered that there is limited potential for undocumented made ground to be present. There is potential for made ground related to historic and current developments within the developed areas of the Site.

3 Alternatives and Design Evolution

3.1 Introduction

- 3.1.1 The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 state in Schedule 4, Part 2 that an EIA Report must include ‘a description of the reasonable alternatives studied by the developer.....and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects’. Assessment of alternatives and the reporting of them are also widely regarded as best practice.
- 3.1.2 This Chapter reviews the principle land use and siting options explored and the reasoning behind the current design for the Proposed Development. The following three alternative options were considered:
- The ‘do nothing’ alternative where the Proposed Development is not progressed;
 - Alternative locations and uses for the Site; and
 - Alternative design/layout for the Proposed Development in the context of the design evolution.
- 3.1.3 The Proposed Development has been influenced and informed by a range of aspects, including the previously consented masterplan (07/00673/OUT) which was renewed twice (10/0458/FUL and 13/00803/FUL), landscape character, flood risk, requirements in relation to future occupiers and environmental impact assessment.

3.2 The ‘do nothing’ Alternative

- 3.2.1 In terms of the ‘do nothing’ alternative, if the Proposed Development were not to proceed, the Site would remain an existing employment destination, albeit one with dated accommodation that does not reflect the current market demands of office occupiers.
- 3.2.2 This scenario does not address the uses identified by the Stirling Local Development Plan 2018¹, for the Site which are broadly outlined as further employment uses, leisure uses and hotel provision.
- 3.2.3 It is considered that a ‘do nothing’ approach is not feasible and the following key benefits would not occur:
- Delivering the positive redevelopment of an existing employment location to create a high quality mixed use destination with improved employment facilities;
 - Supporting the creation of employment benefits and recreational benefits to new and existing occupiers and residents:
 - 290 net additional construction jobs on and offsite per annum for the duration of the construction period;
 - 2,190 onsite direct and offsite indirect and induced jobs;
 - Increase tourism expenditure in Stirling by an estimated £5.5 million per annum; and
 - generate an estimated £1.8 million of retail and food and beverage expenditure per annum within the Study Area.
 - Providing a sustainable new community which will contribute to the economic growth of the area;

¹ Stirling Council, 2018, Local Development Plan 2018.

- Taking advantage of the natural assets of the Crag and the River Forth to open access up to the public;
- Improving the Green Network, establishing safe, high quality pedestrian and cycle routes across the Site which connect into the wider network; and
- Provision of a site-wide infrastructure solution to mitigate the existing flooding constraints and a sustainable solution to drainage management going forward.

3.2.4 The 'do nothing' approach is not feasible given the requirement by the main existing tenant requiring new office accommodation. This has led to the submission of the applications for the Proposed Development (Detailed Application) and Proposed Development (PPiP Application) to bring forward the mixed use redevelopment of the Site.

3.2.5 In addition, new high quality multi-generational residential accommodation will be delivered, which will contribute towards meeting a variety of housing needs across Stirling Council. This would not be the case under the 'do nothing' alternative.

3.3 Consideration of Alternative Locations and Uses

3.3.1 There has been no consideration of an alternative location for the Proposed Development due to the fact the Site is an existing employment location. The refurbishment of the existing buildings located on the Site has been considered but is not feasible given the currently buildings are time expired for modern employment use.

3.3.2 In terms of alternative uses for the Site, it is considered that a mixed use development is the most appropriate for the Site, providing new Grade A employment space with ancillary facilities which will provide additional employment opportunities and deliver tangible benefits for occupiers and residents.

3.3.3 The Site is safeguarded for employment use with additional complementary uses deemed acceptable by Stirling Council, including leisure and hotel uses. Residential development is required to support the delivery of the mixed use development and employment generating uses on the Site. Further information in relation to this is included within the supporting Planning Statement.

3.4 Consideration of Alternative Designs

3.4.1 The evolution of the design of the Proposed Development has been the subject of discussion and consultation with Stirling Council, the local community and the requirements of potential future occupiers. These discussions are documented within the Planning Application Consultation (PAC) Reports submitted in support of the Proposed Development.

3.4.2 The previously consented masterplan for the Site, consented in July 2008 (07/00673/OUT) and renewed twice (10/0458/FUL and 13/00803/FUL), included an expansion of Craigforth Campus into an extensive business park with commercial and residential accommodation, see Figure 3.1 and Figure 3.2. The previous masterplan proposed the retention of the existing office accommodation in the centre of the Site, which is now no longer considered appropriate for the long term viability of retaining key occupiers within the Site. The Proposed Development (PPP Masterplan), see Figure 3.3, seeks to deliver a similar level of floorspace, albeit less than that previously consented, but in such a way as to optimise employment opportunities whilst introducing a mix of uses which will complement the primary employment function.

3.4.3 From a detailed review of the previous consented masterplan through to an updated illustrative masterplan, the design has evolved through an iterative process which has been informed by

a suite of technical information, as well as in response to a detailed EIA scoping exercise. The findings of the various technical and environmental surveys were considered to identify areas of least constraint that offered the greatest development potential.

- 3.4.4 The following information outlines the main design alterations that occurred within the Site (broken down into three key development sub-areas, see Figure 3.4), as well as the reasoning for the final design decision. Further details are contained within the Design and Access Statement (DAS) which has been submitted in support of both applications.

North Sub-Area

- 3.4.5 Two riverside pavilions, suitable for employment use, proposed for the north western portion of the Site adjacent to the River Forth have been removed from the initial design due to flooding constraints confirmed in the flood risk assessment work carried out. They were positioned within the floodplain and therefore could not be suitably sited in this location. This area will now be comprehensively landscaped and provide waterfront access for campus users and residents.
- 3.4.6 Three options were considered for the office building in terms of footprint, quantum of floorspace and height. Provision of increased floorspace and scale within the building were discounted following discussions with occupiers regarding identified operational requirements.
- 3.4.7 Furthermore, the constraints identified within the flood risk assessment also required the minor relocation of the proposed office building to ensure it was wholly out with the floodplain and would not be susceptible to a 1:200 year flood event. This resulted in reconfiguration of the car parking and locations suitable to accommodate the necessary coach stands.

Central Sub-Area

- 3.4.8 Initially, 5 blocks of riverside apartments (7 storeys) were proposed which were located along the eastern banks of the River Forth. Through detailed flood risk assessment and identifying the technical constraints, the riverside apartments have now been relocated further to the east, up the bank, out of the floodplain to avoid potential impacts from a 1:200 year flood event. This relocation has resulted in the scale of the apartments being reduced and lower density buildings being included to achieve the most sensitive solution and high quality public realm in line with the evolving illustrative masterplan. There are now 9 blocks of riverside apartments proposed expected to be 3 and 4 storeys in height.
- 3.4.9 The relocation of these riverside apartment blocks then influenced the location and orientation of the uses in the centre of the Site, including the pub/restaurant, small retail unit, nursery and gym. Consequently, these amendments to the design due to technical constraints means the provision of a riverside café has now been removed.

South Sub-Area

- 3.4.10 The iterative design process has resulted in the southern part of the Site shifting from predominantly accommodating detached and semi-detached housing to incorporate more intergenerational living uses. This has resulted in the inclusion of a care home, supported living accommodation and retirement housing to create an inclusive residential development. The residential component has also been supplemented with space in the central square suitable for a range of community uses.
- 3.4.11 Information from the technical studies, particularly the flood risk assessment, required minor revisions to the layout and orientation of residential units to the western boundary of the southern site. This was to ensure all residential uses were located away from the floodplain.

3.4.12 Vehicular access from Kersebonny Road was discussed as an option to service the southern part of the Site and the associated residential uses proposed. Notwithstanding, following the relevant stages of the design process, including feedback from the public consultation event, this vehicular access point will only service emergency vehicles access. Improvements will be made to ensure it can be utilised by pedestrians and cyclists who intend to connect into the site-wide active travel routes proposed.

4 Description of the Proposed Development

4.1 Introduction

4.1.1 This Chapter provides a description of the characteristics of the components comprising the Proposed Development for which consent is being sought, for the purposes of informing the identification and assessment of likely potential significant environmental effects. In addition, this Chapter also describes the demolition, construction, and operational processes.

4.2 Overview of the Proposed Development

4.2.1 The Proposed Development seeks to deliver a viable and vibrant mixed use campus which creates a regional employment, leisure, and residential destination at Craigforth. The Site offers an opportunity for expanding and enhancing the existing facilities to deliver a new active business campus with improved amenities, public realm and upgraded accessibility with additional employment opportunities for the wider community.

4.2.2 The vision is to create a sense of place that will open up access for all through the creation of a new campus set against the picturesque riverside backdrop and surrounding landscape.

4.2.3 The delivery of the Proposed Development is two-fold. The Applicant seeks detailed planning permission for the Proposed Development (Detailed Application) of an office including car parking, landscaping and associated infrastructure which is located on the North Site.

4.2.4 The formal description of development for the detailed planning permission is:

“Proposed office development including new access, car parking, landscaping and associated infrastructure.”

4.2.5 The Applicant is also seeking Planning Permission in Principle (PPiP) for the Proposed Development (PPiP Masterplan) mixed-use redevelopment of the Site. The formal description of development for the PPiP is:

“Redevelopment of The Craigforth Campus to comprise offices, retail, leisure, public houses, restaurants, residential, hotel, care home, nursery, car parking, landscaping and associated infrastructure.”

4.3 Detailed Application – North Site

Land Use

4.3.1 The proposal is to provide a new 9,243 sqm ‘Grade A’ headquarters office building on the North Site of Craigforth Campus (see Figure 4.1).

4.3.2 The delivery of a new purpose built HQ building, to replace the existing HQ buildings, supports the long term vision for employment at Craigforth Campus. In return this will provide higher quality and more sustainable work spaces for a key employer within the local authority area and beyond.

4.3.3 The new office building has been designed to sit sensitively within the landscape and minimise the visual impact of the building.

4.3.4 The required net office area will be arranged over 3 storeys which will achieve a low rise building that is comparative in height to the existing adjacent tree line. This arrangement involves a rectangular plan footprint.

- 4.3.5 The entrance has been positioned on the south elevation, minimising the effect of noise from the main road (A84) and providing a southern aspect entrance which maximises natural light and views out across the surrounding landscape.
- 4.3.6 The building will provide ancillary staff facilities such as cycle storage, changing rooms and showers along with a gym at ground level.
- 4.3.7 Further details on the design are included within the Design & Access Statement which has been submitted as part of the planning application.

Access

- 4.3.8 The primary point of vehicular access will be from a dedicated new (entry only) junction off the A84. The new access will extend through the North Site to connect with the existing internal access road and the existing Lomond View building. Egress will be via the existing internal road network onto Craigforth Roundabout.
- 4.3.9 This west-east internal access road establishes a south facing main entrance and allows the remaining existing car parking to be retained while suitably linking with the existing Lomond View layout.
- 4.3.10 Pedestrian and cycle access will be provided throughout the North Site.
- 4.3.11 Full details are shown within the 'North Site – Access Strategy/Plan' (Figure 4.2), and within the Design & Access Statement.

Open Space/Green Infrastructure

- 4.3.12 The Proposed Development (Detailed Application) has been sited predominantly on existing surface car parking allowing the large area of existing natural landscape along the south and west to be retained and enhanced to create a linear green network which will provide valuable amenity open space.
- 4.3.13 The majority of existing mature trees on the periphery and within the centre of the North Site are to be retained with the building and car parking working around the existing trees where possible. New trees and hedgerow planting are to be incorporated to soften the new building and associated infrastructure within the setting of the Category A Listed Old Drip Bridge and Drip Bridge Conservation Area.
- 4.3.14 Landscaped external amenity areas adjacent to the proposed office building are provided along with access to the substantial natural landscaping to west and south of the Site.
- 4.3.15 A new multi-user path is proposed to connect to Old Drip Bridge, existing bus stops, the wider campus and provide connectivity to the proposed Riverside Park.

Energy, Sustainability and Climate Change

- 4.3.16 Further details are contained within Chapter 18, the Design & Access Statement and Energy Statement.

4.4 PPIp – Masterplan Site

Masterplan Framework

- 4.4.1 In the case of the wider campus masterplan, it would not be feasible to make a detailed application to encompass the entire Proposed Development at this stage. Notwithstanding, to ensure that as the Proposed Development (PPIp Masterplan) evolves over time and remains

consistent with what has been assessed within this EIA Report, a Masterplan Framework and its associated Development Specification (see Design & Access Statement) sets out the key development parameters including mix and quantum of uses that have been established and assessed (Figure 4.3).

- 4.4.2 The Masterplan Framework is underpinned by a series of placemaking principles which seek to take advantage of the Site’s existing assets. These principles establish a coherent strategy for access, development areas and landscape. Further information on the masterplan principles is detailed within the Design & Access Statement.
- 4.4.3 The Masterplan Framework (Figure 4.3) establishes the key spatial elements associated with the Proposed Development (PPiP Masterplan).

Table 4.1 Masterplan Framework

Access and Movement	<ul style="list-style-type: none"> • A new access point from the A84 to the northern part of the Site • A new internal access road providing access between the three sub areas and defining a series of development plots • The upgrading of the existing path along the eastern side of the Crag to allow emergency access within the Site which is clear of the 200 year flood zone • The upgrading of the access road from Dumbarton Road
Landscape and Public Realm	<ul style="list-style-type: none"> • A new riverside park accessible from all areas of the Site • Landscape enhancements along the south-eastern area of the Site to provide visual screening from the wider area and buffer to the M9
Development Zones and Land Uses	<ul style="list-style-type: none"> • A North Sub Area – including the North Site – for office use, the existing Lomond House office building as well as wider landscaping and infrastructure improvements. • A Central Sub-Area containing a mix of uses including residential, leisure, retail, food and beverage, hotel, nursery and potential for additional office/employment uses. This sub area includes the refurbishment of Craigforth House. • A South Sub-Area containing residential development with potential for inclusion of a residential care home/supported living in combination with community uses and social infrastructure.

- 4.4.4 Development Parameters detail all the limits, or controls, necessary to define and fix those aspects of a development capable of having significant environmental effects whilst allowing flexibility as to the detailed design of those elements which are reserved for future approval. This will enable planning conditions to be drawn up and agreed to control the implementation of the Proposed Development (PPiP Masterplan). The Development Parameters to be defined by such conditions include:

- The location and types of land use;

- The maximum quantum of floorspace for the use proposed;
- The maximum heights of development;
- Landscaping and open space; and
- Access and linkages.

4.4.5 The key parameters that have been assessed in this EIA Report are provided in Table 4.2 below and are shown in Figure 4.4 and Figure 4.5. In the interests of robustness the EIA Report has assessed the Site's maximum potential development footprint. In EIA terms this provides for a robust assessment covering the worst case scenario in terms of environmental impacts generated from the delivery of the Proposed Development (PPiP Masterplan). In doing so, sufficient flexibility is provided within the EIA Report allowing the subsequent detailed design elements to be finalised in future planning approvals.

4.4.6 The Development Parameters utilised in this EIA Report (Figure 4.4) are below the quantum's of development consented in July 2008 under the previous masterplan for the Site (07/00673/OUT) (Figure 3.2). It should be noted that this previous, consented scheme was also subject to EIA and supported by an Environmental Statement at the time.

4.4.7 The Illustrative Masterplan (Figure 3.3) demonstrates one way in which the Proposed Development (PPiP Masterplan) could be delivered as part of a cohesive placemaking vision and in accordance with the Masterplan Framework (Figure 4.3) and Development Parameters (Figure 4.4). The Illustrative Masterplan allows for an understanding of the potential placemaking qualities of the proposal alongside an indication of the massing, townscape and landscape aspects.

Land Use

4.4.8 Table 4.2 below details the upper quantum of floor area for each of the proposed land uses capable of being suitably accommodated within the Site, which has therefore been used as the 'worst case' scenario for EIA purposes. Table 4.2 also provides the quantum of floor area for each proposed land use contained within the Illustrative Masterplan, which forms the Proposed Development (PPiP Masterplan) as submitted.

4.4.9 In line with the Masterplan Framework, Figure 4.4 'Development Parameters - EIA' and Figure 4.5 'Development Parameters – Illustrative Masterplan' separates the Site into three key development sub-areas (North Sub-Area, Central Sub-Area and South Sub-Area) and provides a breakdown of the proposed land uses.

Table 4.2 Comparative Floor Areas

Land Use	EIA Gross Floor Area (sqm)	Illustrative Masterplan Gross Floor Area (sqm)
Office (Class 4)	16,132 (includes existing Lomond View)	13,051 (includes existing Lomond View)
Retail (Class 1)	1,350	850
Leisure (Class 11)	1,480	740
Restaurants (Class 3) / Public Houses (Sui Generis)	1,480	740
Hotel (Class 7)	9,152 (includes existing Craigforth House and proposed holiday villas)	8,152 (includes existing Craigforth House and proposed holiday villas)

Care Home (Class 8)	2,400	2,400
Nursery (Class 10)	700	700
Residential (Class 9)	360 units	360 units
Car Parking	1,553 spaces	1,471 spaces

Employment

4.4.10 The Proposed Development (PPiP Masterplan) will provide a new purpose built office building (9,243sqm) which will be located in a dedicated employment area on the North Site. This will complement the existing Lomond View office building which is to be retained.

4.4.11 It is anticipated that the maximum (to ridge line) height for proposed office development will be 3 storeys, the equivalent of 15.5m.

Retail

4.4.12 It is proposed that up to 850sqm of retail space is located on the Site. This will be located within the central portion of the Site with the potential for additional local retail facilities to be located on the southern portion of the Site. The inclusion of this retail space is anticipated to provide a small convenience store for users of the employment facilities and new residents.

4.4.13 The anticipated maximum (to ridge line) height for the proposed retail uses is single storey, or 5m.

Leisure

4.4.14 The Proposed Development (PPiP Masterplan) will provide a new 150 bedroom hotel (6,000 sqm) located on the central portion of the Site. There is also potential to accommodate a 30 bedroom hotel within Craigforth House (this would be subject to securing the necessary Listed Building Consent). It is anticipated that the maximum height (to ridge line) of the 150 bedroom hotel will be 5 storeys, the equivalent of 18m.

4.4.15 The proposals include 11 holiday villas within the Central Sub-Area (75 sqm each).

Residential

4.4.16 The Proposed Development (PPiP Masterplan) will provide up to 360 dwellings and will focus on intergenerational living by incorporating a varied housing typology that includes starter homes, apartments, retirement homes, supported living and family housing.

4.4.17 An indicative housing mix for the Proposed Development (PPiP Masterplan) is provided in Table 4.3 below. The number and type of affordable dwellings will be confirmed following further discussion with Stirling Council. However, the Applicant is committed to providing 25% affordable housing as per the requirement for the area which is set out in the LDP¹ and has been confirmed with Stirling Council.

Table 4.3 Indicative Housing Mix

House Type	No. of units
Detached	75

¹ Stirling Council, 2018, Local Development Plan 2018.

Semi-detached	100
Apartments (includes retirement flats)	165
Sheltered Housing	20

4.4.18 In terms of the maximum heights for any residential development, the maximum (to ridge line) is likely to be seen in the apartments which are anticipated to be 3 and 4 storeys, or 14.5/17m.

Care Home

4.4.19 A Care Village providing a 60 bed care home is proposed within the Site, located in the southern section within walking distance of the proposed services in the centre of the Site and the Crag. The Care Village will also include 30 retirement flats (as referred to in Table 4.3).

4.4.20 It is anticipated that the maximum height (to ridge line) for the Care Village is 3 storeys, the equivalent of 12m.

Nursery

4.4.21 The Proposed Development (PPiP Masterplan) will provide a nursery with capacity for 120 places (700 sqm). This will be located on the central portion of the Site. It is anticipated that the maximum height (to ridge line) for the nursery is one storey, or 5m.

Access

4.4.22 Vehicular access to the Proposed Development (PPiP Masterplan) will be from three access points. The primary (i.e. main) point of access will be from the Craigforth roundabout at Junction 10 of the M9 located to the north-east of the Site. Two secondary access points are proposed via the A84, to provide an additional link to the North Site, and another secondary access point from the south of the Site from Dumbarton Road (emergency vehicles only).

4.4.23 The vehicular access strategy within the Site utilises existing road infrastructure as well as new roads and access points to create a coherent means of accessing and servicing the Site.

4.4.24 Pedestrian and cycle access will be provided throughout the Site. The Illustrative Masterplan shown in Figure 3.3 has been developed to encourage a modal shift in transport, which will create clearly defined points and routes; thereby avoiding or significantly reducing the risk of pedestrians and cyclists coming into conflict with vehicular traffic.

4.4.25 Full details are shown within the Illustrative Masterplan (Figure 3.3), and within the Design & Access Statement.

Open Space/Green Infrastructure

4.4.26 Retaining and enhancing a significant portion of the open space across the Site is a key component to the Proposed Development (PPiP Masterplan).

4.4.27 A significant portion of the Site is to be retained and enhanced for open space (approximately 30ha). Ensuring this open space becomes more accessible is integral to the Proposed Development (PPiP Masterplan). This will involve making the Crag, Riverside and wider areas of landscaping easy to access for the public and campus users.

4.4.28 The following character areas have been identified within in the Site, each unique and integrated into the landscape framework developed:

- Riverside Park;
- Craigforth Crag;
- Northern Site;
- Central Site;
- Southern Site;
- Landscape / Green Buffer;
- Wet Meadows; and
- Site Entrances.

4.4.29 The Proposed Development (PPiP Masterplan) will make the Site more permeable and attract the public to pass through and make the most of the natural assets of the river and the Crag. Cycling and pedestrian routes, both segregated and shared surfaces, have been provided throughout the Site promoting sustainable and active travel options.

4.4.30 Each identified character area will be subject to distinctive planting, increasing the overall green network within the Site.

4.4.31 Further information on the comprehensive landscape and public realm strategy can be found in the submitted Design & Access Statement.

Energy, Sustainability and Climate Change

4.4.32 An Energy Statement has been submitted as part of the planning application which presents an initial feasibility study into various low and zero carbon generating technologies for the Proposed Development (PPiP Masterplan). It is anticipated that further details will be provided at the detailed design stage. notwithstanding an outline energy strategy for the Proposed Development (PPiP Masterplan) has been provided which considers the opportunities for site wide energy efficiency measures as well as building performance characteristics that will assist in the delivery of a low carbon development.

4.4.33 Further information on the proposed sustainable measures can be found within the relevant technical chapters within the EIA Report. Additionally, the detailed design and construction of each proposed use in terms of building design will consider the necessary resource efficient outcome through the Approval of Matters Specified in Conditions planning application process.

Demolition

4.4.34 The existing office buildings that are proposed for demolition (see Figure 4.6) mostly date from the 1960's and 1970's. The buildings, predominantly 3 to 5 storeys in scale, were constructed over a number of decades and are increasingly showing signs of age.

4.4.35 Mainly constructed as office accommodation, they were designed to meet the specific requirements and the standards of their time, for a specific end user. As such, their design and layout is dated and inefficient, does not meet today's office design standards, including the British Council of Offices recommendations and are not easily refurbished or adapted to suit current requirements.

4.4.36 In addition, the buildings have poor fabric performance, are expensive to maintain and are very inefficient in terms of energy use.

4.5 Construction Phase

4.5.1 In addition to the operational impacts of the Proposed Development, the EIA Report has assessed the impacts of the construction phase of the Proposed Development. Chapter 13

Traffic and Transport, Chapter 14 Noise and Vibration and Chapter 15 Air Quality in particular address potential construction impacts associated with the Proposed Development.

- 4.5.2 In each assessment, mitigation measures are proposed to minimise the impacts of the construction phase upon the site and the surrounding area. It is anticipated that construction methodology statements will be produced for each of the development phases for submission to and approval by Stirling Council. It is expected that the submission of these statements would be conditioned in any planning permission that may be issued by Stirling Council.

4.6 Operational Phase

- 4.6.1 The operational phase of the Proposed Development will consist of the office, commercial, hotel and residential occupation of buildings along with the supporting ancillary retail facilities. Chapter 13 Traffic and Transport, Chapter 14 Noise and Vibration and Chapter 15 Air Quality in particular address potential operational impacts associated with the Proposed Development.

5 Planning Policy

5.1 Introduction

5.1.1 This chapter considers the legislative and policy context against which the Proposed Development will be assessed and determined by Stirling Council. The chapter considers planning policy at a national and local level, as well as the legislative context of relevance to the Proposed Development. The chapter also identifies other matters that will be material to the decision by Stirling Council.

5.1.2 Section 25(1)(a) of the Town and Country Planning (Scotland) Act 1997 as amended states that planning applications shall be determined in accordance with the development plan unless material considerations indicate otherwise:

‘Where in making any determination under the planning Acts, regard is to be had to the development plan, the determination is, unless material considerations indicate otherwise – (a) to be made in accordance with that plan.’

5.1.3 The Site is within the Stirling Council boundary therefore the Development Plan for the determination of the Proposed Development consists of the Stirling Local Development Plan (2018).

5.1.4 This chapter does not assess the accordance of the Proposed Development against planning policy; instead separate Planning Statements have been prepared to support both applications (Proposed Development (PPP Masterplan) and Proposed Development (Detailed Application)) and should be referred to for a detailed planning policy appraisal.

5.2 Scottish Planning Policy and Advice

5.2.1 National planning policy and advice of relevance to the determination of the Proposed Development currently comprises, primarily, the National Planning Framework for Scotland 3 (2014) and Scottish Planning Policy (2014). Both of these are material considerations in the determination of the application.

The National Planning Framework for Scotland 3 (NPF3)

5.2.2 The National Planning Framework 3 for Scotland (NPF3)¹, published in June 2014, represents a spatial expression of the Scottish Government’s aspirations for sustainable economic growth in Scotland over the next 20-30 years. It sets out at the national level, the Scottish Government’s strategy for the country’s development, in terms of how we are to develop our environment and includes development proposals identified as schemes of national importance. NPF3 sets out a vision of Scotland as follows:

- *“A successful, sustainable place;*
- *A low carbon plan;*
- *A natural resilient place; and*
- *A connected place”* (Paragraph 1.2).

5.2.3 NPF3 specifically refers to Stirling as a historic city in the heart of Scotland. The city vision is for Stirling to be a location of choice with a vibrant and growing economy. NPF3 states that

¹ Scottish Government, (2014), ‘National Planning Framework 3’, Available [online] at: <http://www.scotland.gov.uk/Publications/2014/06/3539>

Stirling as a whole intends to be a city with “...*jobs and opportunities for all and providing a high quality of life for residents and visitors*” (P. 15). NPF3 notes that due to Stirling’s central and well-connected location, it is “...*ideally positioned to attract investment*” (P. 15).

- 5.2.4 Whilst it is not prescriptive, NPF3 will form a material consideration when determining applications and, as such, will be a consideration in determining the applications for the Proposed Development.

Scottish Planning Policy (SPP)

- 5.2.5 Scottish Planning Policy (SPP)² was published in June 2014 and is a statement of Scottish Government policy on land use planning. SPP promotes consistency in the application of policy across Scotland whilst allowing sufficient flexibility to reflect local circumstances.

- 5.2.6 SPP forms a material consideration when determining the application for the Proposed Development. The following paragraphs set out the policy issues which are most relevant to the Proposed Development.

- 5.2.7 Paragraph 4 of SPP sets out the core values of the Scottish planning system:

- *“Focus on outcomes, maximising benefits and balancing competing interests;*
- *Play a key role in facilitating sustainable economic growth, particularly the creation of new jobs and the strengthening of economic capacity and resilience within communities;*
- *Be plan-led, with plans being up-to-date and relevant;*
- *Make decisions in a timely, transparent and fair way to provide a supportive business environment and engender public confidence in the system;*
- *Be inclusive, engaging all interests as early and effectively as possible;*
- *Be proportionate, only imposing conditions and obligations where necessary; and*
- *Uphold the law and enforce the terms of decisions made.”*

Sustainable Economic Growth

- 5.2.8 Both SPP and NPF3 share the following single vision for the planning system in Scotland:

“We live in a Scotland with a growing, low-carbon economy with progressively narrowing disparities in well-being and opportunity. It is growth that can be achieved whilst reducing emissions and which respects the quality of environment, place and life which makes our country so special. It is growth which increases solidarity – reducing inequalities between our regions. We live in sustainable, well-designed places and homes which meet our needs. We enjoy excellent transport and digital connections, internally and with the rest of the world” (Paragraph 11).

- 5.2.9 Key to achieving this vision is the need to increase sustainable economic growth. SPP introduces a presumption in favour of development that contributes to sustainable development. The Scottish Government seeks to enable development that balances the costs and benefits of a proposal over the longer term (Paragraph 28).

- 5.2.10 The Scottish Government states that policies and decisions should be guided by the following sustainable economic growth principles, many of which are relevant to the Proposed Development at the Craigforth Campus,:

- *“giving due weight to net economic benefit;*

² Scottish Government, (2014), ‘Scottish Planning Policy’, Available [online] at: <http://www.scotland.gov.uk/Resource/0045/00453827.pdf>

- *responding to economic issues, challenges and opportunities, as outlined in local economic strategies;*
- *supporting good design and the six qualities of successful places;*
- *making efficient use of existing capacities of land, buildings and infrastructure including supporting town centre and regeneration priorities;*
- *supporting delivery of accessible housing, business, retailing and leisure development;*
- *supporting delivery of infrastructure, for example transport, education, energy, digital and water;*
- *supporting climate change mitigation and adaptation including taking account of flood risk;*
- *improving health and well-being by offering opportunities for social interaction and physical activity, including sport and recreation;*
- *having regard to the principles for sustainable land use set out in the Land Use Strategy;*
- *protecting, enhancing and promoting access to cultural heritage, including the historic environment;*
- *protecting, enhancing and promoting access to natural heritage, including green infrastructure, landscape and the wider environment;*
- *reducing waste, facilitating its management and promoting resource recovery; and*
- *avoiding over-development, protecting the amenity of new and existing development and considering the implications of development for water, air and soil quality.”* (Paragraph 29).

Placemaking

5.2.11 Placemaking is promoted by the Scottish Government in order to create better places that are sustainable, well-designed, and meet people’s needs. There are three policy principles identified to ensure planning promotes the creation of high quality places:

- *“Planning should take every opportunity to create high quality places by taking a design-led approach;*
- *Planning should direct the right development to the right place; and*
- *Planning should support development that is designed to a high quality, which demonstrates the six qualities of successful places”* (P. 12-13).

Supporting Business and Employment

5.2.12 The Scottish Government recognises that planning can support sustainable economic growth by providing a positive policy context for development that delivers economic benefits (Paragraph 92). SPP sets out that the planning system should:

- *“Promote business and industrial development that increases economic activity while safeguarding and enhancing the natural and built environments as national assets;*
- *Allocate sites that meet the diverse needs of the different sectors and sizes of business which are important to the plan area in a way which is flexible enough to accommodate changing circumstances and allow the realisation of new opportunities; and*
- *Give due weight to net economic benefit of Proposed Development”* (Paragraph 93).

Enabling Delivery of New Homes

5.2.13 The key aim of SPP with regard to housing is to ensure Local Authorities identify generous supplies of housing land in response to continuing pressure for growth. The Scottish Government encourages planning for housing to be undertaken through joint working between housing and planning officials within Local Authorities and with developers, social landlords and local communities.

5.2.14 In order to facilitate new housing development, particularly in areas where there is continuing pressure for growth, SPP states that the planning system should:

- *“identify a generous supply of land for each housing market area within the plan area to support the achievement of the housing land requirement across all tenures, maintaining at least a 5-year supply of effective housing land at all times;*
- *enable provision of a range of attractive, well-designed, energy efficient, good quality housing, contributing to the creation of successful and sustainable places; and*
- *have a sharp focus on the delivery of allocated sites embedded in action programmes, informed by strong engagement with stakeholders”* (Paragraph 110).

5.2.15 SPP places emphasis on the role of Local Authorities in actively managing the housing land supply. SPP also states that local development plans should set out the scale and distribution of affordable housing requirements for their area.

Valuing the Historic Environment

5.2.16 SPP encourages the consideration and protection of the designated and non-designated historic environment and its contribution to sense of place, cultural identity, social well-being, economic growth, civic participation and lifelong learning (Paragraph 137).

5.2.17 SPP states that the planning system should enable positive change in the historic environment informed by a clear understanding of the importance of the heritage assets affected. SPP advises that the siting and design of development should take account of all aspects of the historic environment.

5.2.18 Chapter 8, Cultural Heritage sets out a review of cultural heritage issues.

Delivering Heat and Energy

5.2.19 SPP outlines the role of the planning system in supporting the transformational change to a low carbon economy. SPP reiterates national objectives and targets are to derive:

- *“30% of overall energy demand from renewable sources by 2020;*
- *11% of heat demand from renewable sources by 2020; and*
- *the equivalent of 100% of electricity demand from renewable sources by 2020.*

5.2.20 For new buildings, SPP recognises that reductions in energy use and emissions can be achieved through encouraging:

- *Energy efficiency;*
- *Heat recovery;*
- *Efficient energy supply and storage;*
- *Electricity and heat from renewable sources; and*
- *Electricity and heat from non-renewable sources where greenhouse gas emissions can be significantly reduced”* (Paragraph 154).

5.2.21 SPP states that local development plans should support new build developments which deliver energy efficiency.

5.2.22 Chapter 18 sets out how the Proposed Development will address the reduction of CO2 emissions.

Planning for Zero Waste

5.2.23 The Scottish Government published its Zero Waste Policy in June 2010³. This seeks to minimise waste as far as possible and recognises the value of resources for our economy. SPP states that new developments should promote resource efficiency and the minimisation of waste during construction and operation.

Valuing the natural environment

5.2.24 SPP recognises that the natural environment is a valued national asset offering a wide range of opportunities for enjoyment, recreation and sustainable economic activity. SPP states in Paragraph 194 that the planning system should:

- *“facilitate positive change while maintaining and enhancing distinctive landscape character;*
- *conserve and enhance protected sites and species, taking account of the need to maintain healthy ecosystems and work with the natural processes which provide important services to communities;*
- *promote protection and improvement of the water environment, including rivers, lochs, estuaries, wetlands, coastal waters and groundwater, in a sustainable and co-ordinated way;*
- *seek to protect soils from damage such as erosion or compaction;*
- *protect and enhance ancient semi-natural woodland as an important and irreplaceable resource, together with other native or long-established woods, hedgerows and individual trees with high nature conservation or landscape value;*
- *seek benefits for biodiversity from new development where possible, including the restoration of degraded habitats and the avoidance of further fragmentation or isolation of habitats; and*
- *support opportunities for enjoying and learning about the natural environment.”*

5.2.25 An assessment of the potential impacts and contributions of the Proposed Development to natural heritage resources is detailed in Chapter 9, Biodiversity.

Maximising the Benefits of Green Infrastructure

5.2.26 The Scottish Government aims to enhance green networks, particularly around towns and cities. SPP acknowledges that green infrastructure and access to open space can help build stronger, healthier communities as well as encouraging investment and development.

5.2.27 SPP states that the planning system should protect, enhance and promote green infrastructure, including open space and green networks, as an integral component of successful placemaking.

5.2.28 As well as green infrastructure provision being well-integrated into new developments, SPP states that arrangements for the long term management and maintenance of green infrastructure should be incorporated into any planning permission.

Managing Flood Risk and Drainage

5.2.29 The Scottish Government recognises that climate change will increase the risk of flooding in some parts of the country and planning can play an important part in reducing the vulnerability of existing and future development to flooding.

5.2.30 SPP notes that the planning system should promote:

³ Scottish Government, (2010), ‘Scotland’s Zero Waste Plan’, Available [online] at: <https://www.gov.scot/publications/scotlands-zero-waste-plan/>

- *“a precautionary approach to flood risk from all sources, including coastal, water course (fluvial), surface water (pluvial), groundwater, reservoirs and drainage systems (sewers and culverts), taking account of the predicted effects of climate change;*
- *flood avoidance: by safeguarding flood storage and conveying capacity, and locating development away from functional flood plains and medium to high risk areas;*
- *flood reduction: assessing flood risk and, where appropriate, undertaking natural and structural flood management measures, including flood protection, restoring natural features and characteristics, enhancing flood storage capacity, avoiding the construction of new culverts and opening existing culverts where possible; and*
- *avoidance of increased surface water flooding through requirements for Sustainable Drainage Systems (SuDS) and minimising the area of impermeable surface”* (Paragraph 255).

5.2.31 The findings of the flood risk assessment are outlined in Chapter 10, Flood Risk, and Chapter 11, Drainage and Hydrology.

Promoting Sustainable Transport and Active Travel

5.2.32 The Scottish Government recognises that planning can play an important role in improving connectivity and promoting more sustainable patterns of transport and travel as part of the transition to a low carbon economy.

5.2.33 SPP states that development plans and development management decisions should take account of the implications of development proposals on traffic, patterns of travel and road safety. SPP states that where a new development is likely to generate a significant increase in the number of trips, a transport assessment should be carried out (Paragraph 286). An assessment of transport and traffic implications for the Proposed Development is included in Chapter 13, Traffic and Transport.

5.2.34 SPP states that the planning system should support patterns of development which:

- *“optimise the use of existing infrastructure;*
- *reduce the need to travel;*
- *provide safe and convenient opportunities for walking and cycling for both active travel and recreation, and facilitate travel by public transport;*
- *enable the integration of transport modes; and*
- *facilitate freight movement by rail or water”* (Paragraph 270).

5.3 Development Plan

Current Development Plan

5.3.1 The Proposed Development lies within the administrative boundary of Stirling therefore the current Development Plan for the area comprises the Stirling Local Development Plan 2018⁴ (LDP).

Emerging Local Development Plan

5.3.2 A review of the Stirling LDP is currently under consideration, with Stirling Council awaiting further guidance on the new LDP process from the Scottish Government before setting out timescales. Given the very early stage of the LDP review there is no revised policy or guidance available to consider in the context of the Proposed Development.

⁴ Stirling Council, 2018, Local Development Plan 2018.

Stirling Local Development Plan 2018

- 5.3.3 This section identifies the relevant LDP policies which will be considered in the determination of the application. Policies are arranged by theme and reflect chapter divisions within the EIA Report where possible.
- 5.3.4 The LDP is a statutory document guiding all future development and use of land in Stirling. The purpose of the LDP is to provide clear guidance on what development will or will not be permitted and where.
- General Considerations**
- 5.3.5 The LDP Vision states that, *“By 2037 the Plan will have contributed to the delivery of high quality new development in places which support local businesses; help sustain and build local communities; contributes to the health and wellbeing of local residents; and are attractive to visitors”* (P. 12). The LDP Vision for businesses and the economy states that Stirling will be, *“A place which attracts and supports business: there is a strong and diverse economy, where existing and new businesses within key sectors are supported in sustainable locations, and benefit from Stirling’s high quality and historic environment, and location within central Scotland. Stirling will be a place that provides valuable local opportunity, contributes to national productivity and competes internationally”* (P. 13).
- 5.3.6 The LDP is structured using an overarching policy under which sit a series of primary policies covering a range of topics. Each of the primary policies is backed up by a number of detailed policies within the relevant topic area.
- 5.3.7 The overarching policy (P. 28) states support for good quality development that addresses the community’s needs (social, economic and environmental) in order to deliver vibrant, mixed and healthy communities. There is also a presumption in favour of development that delivers sustainable development and adheres to the Sustainable Development Criteria.
- 5.3.8 Table 5.1 below lists the primary policy topics relevant to the Proposed Development. Further below, these primary policies are set out along with the relevant detailed policies.

Table 5.1 Potentially Relevant LDP Primary Policy Numbers and Names

Policy Number	Policy Name	LDP Policy Page
PP1	Placemaking	30
PP2	Supporting the Vision and Spatial Strategy	36
PP3	Provision of Infrastructure	48
PP4	Greenhouse Gas Reduction	54
PP5	Flood Risk Management	57
PP6	Resource Use and Waste Management	60
PP7	Historic Environment	63
PP8	Conservation and Enhancement of Biodiversity	69
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5.3.9 PP1 Placemaking prioritises the importance of design, urban design and placemaking in order to ensure developments deliver improved character and assets. To achieve the placemaking objectives set out by the Council development of all scales must:

- a) *“Be designed and sited, not only with reference to their own specifications and requirements, but also in relation to the character and amenity of the place, urban or rural, where they are located.*
- b) *Be of quality, having regard to any relevant design guidance, landscape character guidance, Conservation Area Character Assessments and Settlement Statements.*
- c) *Be located so as to reduce the need to encroach onto greenfield sites and to maximise sustainability benefits. Developments should utilise vacant and under-used land and buildings within settlements at higher densities where appropriate.*
- d) *Safeguard and enhance built and natural heritage, contribute to the implementation of the Council’s Open Space Strategy and Green Network objectives, and respect the Green Belts.*
- e) *Have minimal adverse impact on air quality. Air quality assessments and appropriate mitigation measures will be required for any proposed development which the Council considers may significantly impact upon air quality, either on its own or cumulatively” (P. 30).*

5.3.10 Policy 1.1: Site Planning outlines, *“All new development, including alterations and extensions to existing buildings, are required to contribute, in a positive manner, to quality of the surrounding built and natural environment” (P. 31).* Where relevant all proposals are expected to meet the following criteria:

- a) *“The siting, layout and density of new development should; contribute towards or create a coherent structure of streets, spaces and buildings; respect, complement and connect with its surroundings; be safely accessed; and create a sense of identity within the development.*
- b) *All new development should consider and respect site topography, and any surrounding important landmarks (built or natural), views or skylines.*
- c) *The design should be appropriate to both any building to which it relates, and the wider surroundings in terms of appearance, position, height, scale, massing, and should use materials, finishes and colours which complement those prevalent.*
- d) *In urban settings in particular, buildings should be positioned so as to respect an existing building line or establish one where none exists. Thereafter, access, uses and orientation of principal elevations should reinforce the street or areas of open space.*
- e) *All buildings, streets and open spaces should be considered and designed in a manner so as to create safe, accessible, inclusive places for people, which are easily navigable, particularly on foot, bicycle, and public transport. Any core path, established rights of way, and other important access routes should be protected and retained.*
- f) *It should be demonstrated that buildings and spaces have been designed with future adaptability in mind wherever possible and appropriate.*
- g) *Existing buildings, structures and natural features that contribute to local townscape and biodiversity should be retained and sensitively integrated into proposals” (P. 31).*

5.3.11 Relevant to the proposals is Policy 1.2: Design Process which notes to ensure the aims of placemaking and quality site planning:

- a) *“Preparation of Development Frameworks and/or Masterplans will be required for areas or sites requiring a comprehensive approach to the provision, design, and location of uses, open space and infrastructure. Thereafter, detailed proposals coming forward for all or part of the site will be expected to demonstrate cognisance and compliance with the relevant Development Framework/Masterplan.*
- c) *Design Statements and Design and Access Statements will be required in support of Planning Applications in all instances as set out in SG: Placemaking” (P. 31).*

5.3.12 Policy 1.3: Green Infrastructure and Open Spaces states development proposals will be assessed on their impact on and potential to contribute to Green Networks and open space, in terms of the following:

- a) *“The safeguarding of existing, and the provision of new green infrastructure contributing to the Green Network, will be considered in the context of the above objectives, biodiversity conservation, the River Basin Management Plans, the Flood Risk Management Plan, the Core Path Plan and any relevant Conservation Area Character Appraisal.*
- b) *There will be a presumption against the loss of open space, including loss of connectivity or accessibility. In instances where it is agreed by the Council open space can be lost, adequate compensatory measures will be required to ensure that appropriate alternative provision is provided, the remaining elements of green infrastructure are enhanced, loss of any connectivity is minimised and that alternative routes are provided or enabled.*
- c) *Proposals adjacent to, encroaching upon, or in the vicinity of, existing open spaces and green corridors should maintain or enhance functionality and connectivity (active travel routes, habitat networks, etc).*
- d) *New development should, where necessary, incorporate accessible multifunctional open space of the appropriate quantity and quality to meet the needs arising from the nature of the development itself. In some instances, it may be more appropriate to remedy local deficiencies (both in terms of quality and quantity) that have been identified in the Open Space Strategy, and which would be exacerbated by additional development.*
- e) *Financial contributions may be sought for the purposes of providing open space and wider contributions to green infrastructure and the Green Network, consistent with SG: Placemaking, Policy 3.3 and SG: Developer Contributions. Means to ensure the long term maintenance of new and existing open space created in association with development will also secured” (P. 32).*

5.3.13 PP2 Supporting the Vision and Spatial Strategy seeks to direct housing, employment and retail development to areas identified for those particular uses. The Core Area is the preferred location for new build development on sites with good accessibility and connections to major transport routes. New employment development, and other developments that will provide significant economic and social support to the rural area will be encouraged in appropriate circumstances.

5.3.14 Policy 2.1: The 5 Year Effective Housing Land Supply states the Council *“will, at all times, maintain a 5 year effective housing land supply through the annual housing land audit process”* (P. 36). If a shortfall is identified, proposals under SPP’s *“presumption in favour of development which contributes to sustainable development”* (P.36) on sites not identified for housing development will need to meet with the LDP Vision and Spatial Strategy, comply with the established Sustainable Development Criteria and other relevant LDP policies.

5.3.15 Policy 2.2: Planning for Mixed Communities and Affordable Housing outlines that new residential developments should incorporate a variety of housing tenures and sizes. On larger

development (20 units or more) the market housing being delivered should be suitable for local housing needs including smaller households, older people and lower income households. Affordable housing provision or financial contributions to deliver it will be required on market housing sites, Table 5.2 provides further detail on the thresholds. Delivery of affordable housing will be consistent with Policy 3.3 and SG: Developer Contributions.

Table 5.2 Affordable Housing Calculation (Table 6 Stirling LDP)

	Site Size	Contribution	Preference
Highly Pressured Areas	4 – 19 units (inclusive)	33%	On site or financial contribution if there are suitable alternative development sites in the housing market area.
	20 units or more	33%	On site
Remainder of LDP Area	10 – 19 units (inclusive)	25%	On site or financial contribution if there are suitable alternative development sites in the housing market area.
	20 units or more	25%	On site

- 5.3.16 Policy 2.3: Particular Needs Housing and Accommodation outlines that residential developments should be designed to meet the varying needs of people across the authority and be adaptable to future change and requirement. Accommodation should be located where access to local services and facilities exists. Policy 2.3 notes *“there will be a presumption against the further provision of private nursing or residential care home accommodation for adults and older people unless it supports the outcomes and commitments arising from the Integration Joint Board Strategic Plan”* (P. 39).
- 5.3.17 Policy 2.4: Safeguarding Employment Land and Property sets out that employment land and property will be safeguarded for employment generating uses (Class 4, Class 5 and Class 6). Other uses will be supported within allocated sites and Employment Safeguarding Areas if they are ancillary to the overall employment use or are consistent with Policy 2.8 which requires the other uses being delivered to be delivered in conjunction with an employment generating use.
- 5.3.18 Policy 2.5: Employment Development notes support for employment development on allocated employment sites and in areas safeguarded for such uses. Proposals must *“demonstrate considerable economic benefits to the Stirling economy in support of the area’s key business sectors”* (P. 40).
- 5.3.19 Policy 2.7: Retail and Footfall Generating Uses outlines new development including retail, office and commercial leisure will be supported when they are proposed on sites allocated for such uses. Small scale convenience (up to 500m² gross floorspace) will be given support where it will serve existing or new residential/employment/mixed use development with a walk-in catchment. Ancillary retail provision will need to be justified by a locational need associated with the proposed use.
- 5.3.20 Policy 2.8: Sites Suitable for a Mix of Uses states support will be given on allocated sites where the key site requirements identifies a mix of uses, sites within the defined Network of Centres, highly accessible sites, and where it can be demonstrated that the mix proposed is required to deliver/enable development of the primary use. Proposals must demonstrate that the mix and scale of uses proposed is suitable for the location and the built footprint is appropriate.

- 5.3.21 Policy 2.9: Economic Development in the Countryside notes development activity supporting the rural economy should be located surrounding Rural Activity Areas, close to villages or where underutilised buildings can be re-used. Site specific recreational activities will be actively encouraged which require a countryside location.
- 5.3.22 Policy 2.10: Housing in the Countryside outlines a number of criteria whereby, if one or more apply, support will be given to proposals. These include where the proposals relate to an existing building group or cluster, where the proposal is for the conversion of a non-domestic building, or where the proposal results in the positive re-use of a brownfield site.

Ecology

- 5.3.23 PP8 Conservation and Enhancement of Biodiversity states that the importance of nature conservation and biodiversity will be fully recognised in the assessment of development proposals. It notes that there will be support for the protection, conservation and enhancement of international and national designated sites, including, Special Protection Areas, Special Areas of Conservation and Sites of Special Scientific Interest. If there is evidence that protected species may be affected by a development, steps must be taken to establish their presence. Mitigation of any adverse impacts resulting from proposals will be sought from the Planning Authority with biodiversity conservation and enhancement key objectives.
- 5.3.24 Within PP8, Policy 8.1: Biodiversity Duty is of relevance and states proposals will be duly assessed in terms of impacts they may have on biodiversity including on species and their habitats. Proposals resulting in significant loss of biodiversity will need to demonstrate enhancements on or off site can be provided to maintain overall biodiversity levels.

Cultural Heritage and Archaeology

- 5.3.25 PP7 Historic Environment notes that the historic environment is *“important in forming the identity of places and providing a cultural, educational, social, and economic resource”* (P. 63).
- 5.3.26 Within PP7, Policy 7.1: Archaeology and Historic Building Recording (designated and undesignated buildings/sites) is of relevance and states proposals which have a physical impact upon *“either a Scheduled Monument, or on the integrity of its setting”* (P. 63) will not be supported unless exceptional circumstances exist. Evaluation of potential archaeological remains within sites may be required to establish the importance of the site and associated sensitivity for development. An appropriate *“level of archaeological and / or standing building investigation and recording, assessment, analysis, publication and archiving”* (P. 63) will need to be satisfactorily carried out where proposals directly affect historic environment features.
- 5.3.27 Policy 7.2: Development within and outwith Conservation Areas is relevant, outlining proposals impacting on a conservation area should preserve or enhance its character, appearance and setting. Proposals should ensure that they respect the qualities, both visual and architectural, of conservation areas and take into account the wider character of the area.
- 5.3.28 Policy 7.3: Development affecting Listed Buildings is of relevance, stating demolition and proposals that adversely affect listed buildings or their setting will not be supported unless sufficient justification is provided i.e. the building is beyond repair. Proposals must preserve the character of listed buildings and their setting.
- 5.3.29 Policy 7.4: Development in Gardens/Curtilages within Conservation Areas and around Listed Buildings outlines support will be given to developments which sympathetically convert/adapt the existing building to ensure the character can be preserved, are of ancillary use to the main building while respecting the identified qualities, and that retain boundaries and landscape

treatments which contribute to character and appearance.

Woodlands

5.3.30 PP10 Forestry, Woodlands and Trees notes the Council's desire to protect existing woodland while expanding woodland cover across the Local Authority area through the development management process.

5.3.31 Policy 10.1: Development Impact on Trees and Hedgerows outlines individual trees, groups of trees or hedgerows with amenity, conservation or historic interest should be protected within development proposals. Adequate protection during the construction phase should be implemented to retain trees. Proposals should include detail of how the proposals have been informed by the existence of trees within the site and clearly identify any which will be removed or retained. Tree planting is encouraged to compensate for any removal proposed with the long term management strategy needing to be set out for the retained/newly planted trees.

Water Environment

5.3.32 PP5 Flood Risk Management is a substantial policy addressing flooding and surface water management. The policy sets out the following which is relevant to the Proposed Development:

- a) *"The Council will take a precautionary approach to flood risk from all sources, including coastal, watercourse (fluvial), surface water (pluvial), groundwater, reservoirs and drainage systems (sewers, culverts and surface water drains), taking account of the predicted effects of climate change.*
- b) *Development should be avoided in locations at medium to high flood risk (unless it accords with the risk framework in paragraph 263 of Scottish Planning Policy) or where it would lead to an increase in the probability of flooding elsewhere. The functional flood plain will be safeguarded from development in order to maintain its water conveyance and storage capacity. (Note: Scottish Planning Policy states that for planning purposes the functional flood plain will generally have a greater than 0.5% (1:200) probability of flooding in any year.)*
- c) *Development proposals on areas shown to be at risk of flooding on the SEPA Flood Maps, or adjacent to a small watercourse (which has not been assessed on the SEPA Flood Maps i.e. with a catchment area less than 3km²), or in an area known to be at risk of flooding from any source:*
 - i. *Shall be informed by a Flood Risk Assessment (FRA) assessing the risk from all sources of flooding. The FRA shall be carried out in compliance with SEPA's Technical Flood Risk Guidance for Stakeholders.*
 - ii. *Will be assessed against advice and the Risk Framework in SPP relating to Flooding and Drainage.*
 - iii. *Shall not result in a use that is more vulnerable to flooding or has a larger footprint than any previous development on the site. Reference should be made to SEPA's Land Use Vulnerability Guidance.*
 - iv. *Shall not increase the risk of flooding elsewhere.*
- d) *Surface water from new development shall be treated by a Sustainable Drainage System (SuDS) before it is discharged into the water environment, in accordance with the CIRIA C753 document 'The Suds Manual' and, where the scheme is to be adopted by Scottish Water, the Sewers for Scotland Manual 3rd. Edition.*
- e) *All developments will be assessed for their potential to contribute to the reduction of overall flood risk. Developments likely to result in an adverse effect upon sustainable flood management or otherwise not in conformity with the objectives of relevant Flood Risk Management Strategies and Local Plans, will not be permitted.*
- f) *A precautionary approach will be taken in controlling development in areas potentially subject to flooding from small watercourses with no obvious flood plain or from surcharging drainage systems, and in locations prone to landslips and other forms of erosion, which may be exacerbated by changing rainfall patterns.*

- g) *In exceptional circumstances, as set out in SPP, where built development is permitted measures to protect against or manage flood risk will be required and any loss of flood storage capacity mitigated to achieve a neutral or better outcome. Water-resistant materials and construction should be used where appropriate. Elevated buildings on structures such as stilts are unlikely to be acceptable.*
- h) *Development out with the functional flood plain is not necessarily not at risk to flooding. A precautionary approach is therefore advisable and water resilient materials and appropriate construction methods should be utilised as and when determined by an FRA.*
 - i. *Developers of sites out with functional flood plains will be encouraged to provide, where appropriate, features contributing to sustainable flood management.*
 - ii. *Where appropriate land with the potential to contribute to the proper management of flood risk, for example through natural flood management, washland or green infrastructure creation, or as part of a scheme to manage flood risk, will be protected from inappropriate development or changes of use” (P. 57-58).*

5.3.33 Policy 5.1: Reinstatement Natural Watercourses notes in the interests of sustainable flood management (and the protection and improvement of the water environment) development proposals will be expected to incorporate drainage solutions that avoid channel modification, open out previously culverted watercourses, and promote re-naturalisation of water courses.

5.3.34 Policy 3.2: Site Drainage contains guidance in relation to foul and surface water drainage. In terms of foul drainage, public sewer connections will be required where proposals are close to the urban area. Early engagement with Scottish Water to understand capacity is necessary. Private drainage would only be considered as a temporary measure and must meet standards of Scottish Water.

5.3.35 Sustainable Drainage Systems (SuDS) will be required to treat surface water drainage and ensure their design is in accordance with the associated guidance. Certain proposals due to location, scale and type of development will need to be accompanied by a drainage strategy.

5.3.36 PP13 The Water Environment outlines development proposals must protect and enhance, by minimising and mitigating any potential impacts, the quality of the water environment.

Traffic and Transport

5.3.37 PP3 Provision of Infrastructure requires new developments to provide appropriate infrastructure to sustain and support them.

5.3.38 Policy 3.1: Addressing the Travel Demands of New Development sets out that proposals should be accessible by walking, cycling and public transport as well as by private vehicles. Proposals should look to improve these connections and seek to provide new ones. The aim of new development should be to reduce travel demands and ensure a range of accessible travel options are available. New developments will also need to consider the provision of electric vehicle charging points.

5.3.39 PP1 Placemaking also provides relevant content regarding Traffic and Transport matters.

Landscape

5.3.40 PP9 Managing Landscape Change sets out *“the integrity, character and special qualities of key areas of nationally and local valued landscapes will be protected”* (P. 72). Proposals must consider their landscape and visual impacts and ensure they avoid adverse cumulative effects on visual amenity and landscape character. Proposals should seek to provide *“new, high quality*

landscapes with their own distinctive character” (P. 72).

5.3.41 Policy 9.1: Protecting Special Landscapes notes proposals must be of a high quality design and respect the special nature of the area. Proposals must ensure they will not have an adverse impact on the character, scenic interest and qualities of Local Landscape Areas unless there is *“a specific nationally recognised need...and any adverse effects are clearly outweighed by social, environmental or economic benefits of local importance” (P. 72).*

5.3.42 Policy 9.3: Landscaping and Planting in Association with Development sets out how development proposals should incorporate new landscape and planting works. It notes existing landscape and planting features should be safeguarded while the inclusion of new, high quality, landscaping provision is supported. Proposals must provide long term maintenance arrangements.

Climate Change Adaption and Mitigation

5.3.43 PP4 Greenhouse Gas Reduction sets out what new developments should do to contribute towards greenhouse gas reduction. This includes, being located in sustainable locations, increasing active travel opportunities, utilising sustainable construction methods, where possible meeting heat and energy demands on site and ensuring any alterations to buildings increases energy performance.

5.3.44 Policy 4.1: Low and Zero Carbon Buildings outlines that proposals for new buildings be designed to incorporate low and zero-carbon technologies to ensure they reduce carbon emissions in line with Scottish Building Standards.

5.3.45 Policy 4.3: Heat Generation states support will be given to proposals for the renewable generation of heat as part of new developments. If non-renewable generation is being proposed it must be demonstrated that proposals will significantly reduce greenhouse gas emissions.

5.3.46 Investigations into the possibility of accommodating heat networks should be carried out for new developments with high heat demand.

Waste Management

5.3.47 PP6 Resource Use and Waste Management seeks to reduce the amount of waste created from new development. New development will be supported where the reuse of vacant, derelict and brownfield land is progressed and on contaminated land subject to suitable remediation strategies being implemented. Waste should be minimised during construction and operational phases at source and where appropriate a Site Waste Management Plan will be required.

Tourism

5.3.48 PP15 Tourism and Recreational Development acknowledges the significant contribution tourism and recreational activities make to the economy and notes proposals should:

- a) *“Increase the volume and value of tourism and recreation to the local economy, and the duration of the visitor stay and tourism season;*
- b) *Preserve and enhance the quality of the natural and historic environment, and the visitor experience;*
- c) *Where appropriate improve the provision of facilities for the business / conference tourism accommodation offering, particularly within the Core Area; and*
- d) *Where appropriate, improve the provision of recreational facilities which promote local community well-being, health and quality of life benefits” (P.83).*

5.3.49 Policy 15.1: Tourism Development, including facilities and accommodation, outlines criteria whereby tourism and recreational development will be supported. Proposals must be of

appropriate scale for their location, complement existing tourism facilities and allow sustainable access for tourists to key attractions, increase the spread of visitors and ensure responsible access.

Developer Contributions

5.3.50 Policy 3.3: Developer Contributions requires contributions in accordance with Scottish Government Circular 3/2012 ('Planning Obligations and Good Neighbour Agreements')⁵. These contributions are aimed at ensuring infrastructure requirements are addressed fairly and proportionately to ensure development is viable and can proceed. Developer contributions towards the following infrastructure, services and facilities may be sought: affordable housing, transport, education, community, open space, healthcare and household waste.

Supplementary Guidance

5.3.51 In addition to the LDP policies, there are a number of Supplementary Guidance (SG) documents that are adopted as part of the LDP and carry the same weight as the LDP policies in the decision-making process.

- Flood Risk Management and the Water Environment (May 2020).

5.3.52 This SG provides information on national planning guidance and legislation relating to flood risk management and protecting and improving the water environment. The LDP supports a precautionary approach in relation to proposals that increase the number of people in flood plain areas.

5.3.53 There are also a number of SG documents that are currently in draft status, that have been through consultation but are not yet adopted by the Council. Some of these SG documents are relevant to the Proposed Development and are listed below.

- Transport and Access for New Development (July 2019); and
- Developer Contributions (February 2019).

5.3.54 The draft Transport and Access for New Development SG provides information on the requirements for new development, the framework for how the Council will consider how access and transport issues are effectively and efficiently considered to ensure development occurs in an appropriate manner.

5.3.55 The draft Developer Contributions SG provides information on the types and thresholds of development for which contributions will be sought and the amounts payable. This includes education, affordable housing, transport, health care and waste.

5.4 Other Material Considerations

Planning Advice Notes (PANs)

5.4.1 The table below lists the PANs relevant to the Development.

Table 5.3 Planning Advice Notes

Guidance	Title	Summary
Planning Advice Note 1/2013	Environmental Impact Assessment (August 2013,	Planning Advice Note 1/2013 explains the role of individual planning authorities and Consultation Bodies in EIA, as well as providing guidance on the

⁵ Scottish Government, 2012. Planning Circular 3/2012: Planning Obligations and Good Neighbour Agreements. Edinburgh: Scottish Government.

Guidance	Title	Summary
(Revision 1.0 2017) ⁶	amended June 2017)	ways in which EIA can be integrated into the overall development management process. (amended to reflect the EIA Regulations issued in 2017)
Planning Advice Note 2/2011 ⁷	Planning and Archaeology (July 2011)	Planning Advice Note 2/2011 provides advice to planning authorities and developers on dealing with archaeological remains. This PAN is intended to inform the day-to-day work of a range of local authority advisory services and other organisations that have a role in the handling of archaeological matters within the planning process.
Planning Advice Note 1/2011 ⁸	Planning and Noise (March 2011)	Planning Advice Note 1/2011 provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise. It supersedes PAN 56 <i>Planning and Noise</i> . Information and advice on noise impact assessment (NIA) methods is provided in the associated Technical Advice Note. It includes details of the legislation, technical standards and codes of practice for specific noise issues.
Planning Advice Note 2/2010 ⁹	Affordable Housing and Housing Land Audits	This PAN sets out advice on good practice in the preparation of housing land audits. It reiterates that SPP requires a five-year ongoing effective land supply to be available to meet the identified housing land requirements. Consistency and transparency in the preparation and contents of housing land audits is promoted. The PAN identifies the main steps in supporting the delivery of affordable housing. Advice and information is provided on how the planning system can support the Government's commitment to increase the supply of affordable housing. Advice is provided on the design of affordable homes and the wider community.
Planning Advice Note 3/2010 ¹⁰	Community Engagement (August 2010)	Planning Advice Note 3/2010 provides advice to communities on how they can get involved in planning matters and provides advice to planning authorities and developers on ways of effectively engaging with communities. It advises that community engagement must be meaningful and proportionate, and must happen at an early stage to influence the shape of plans and proposals.
PAN 44 2005 ¹¹	Fitting New Housing Development into the Landscape	This PAN offers advice for planners, developers and local communities to help achieve residential developments that are in harmony with their landscape setting. The PAN states that new housing

⁶ Scottish Government, 2017. Planning Advice Note 1/2013 (Revision 1.0): Environmental Impact Assessment. Edinburgh: Scottish Government

⁷ Scottish Government, 2011. Planning Advice Note 2/2011: Planning and Archaeology. Edinburgh: Scottish Government.

⁸ Scottish Government, 2011. Planning Advice Note 1/2011: Planning and Noise. Edinburgh: Scottish Government.

⁹ Scottish Government, 2010. Planning Advice Note 2/2010: Affordable Housing and Housing Land Audits. Edinburgh: Scottish Government.

¹⁰ Scottish Government, 2010. Planning Advice Note 3/2010: Community Engagement. Edinburgh: Scottish Government.

¹¹ Scottish Executive, 2005. Planning Advice Note 44: Fitting New Housing Development into the Landscape. Edinburgh: Scottish Executive.

Guidance	Title	Summary
		development must be seen to make a positive and specific contribution in fulfilling the principle of sustainable development to which the Government is committed. The guiding principle of new housing development is that it should help to maintain and enhance the environment. The Government wishes to ensure that housing proposals are sufficiently responsive to the sense of place and to the general character of the place. The capacity of the landscape to absorb development must be given proper attention alongside the need and demand for housing, the availability of land, energy efficiency and the provision of infrastructure.
PAN 51 2006 ¹²	Planning, Environmental Protection and Regulations (Revised 2006)	The central purpose of PAN 51 is to support the existing policy on the role of the planning system in relation to the environmental protection regimes. This PAN also summarises the statutory responsibilities of the environmental protection bodies, as well as informing these bodies about the planning system.
PAN 60 2000 (revised 2008) ¹³	Planning for Natural Heritage (2000, partially updated January 2008)	PAN 60 provides advice on how development and the planning system can contribute to the conservation, enhancement, enjoyment and understanding of Scotland's natural environment and encourages developers and planning authorities to be positive and creative in addressing natural heritage issues.
PAN 61 2001 ¹⁴	Planning and Sustainable Urban Drainage Systems (SUDS) (July 2001)	PAN 61 gives good practice advice for planners and the development industry complementing the Sustainable Urban Drainage Systems Design Manual for Scotland.
PAN 65 2008 ¹⁵	Planning and Open Space	PAN 65 gives advice on the role of the planning system in protecting and enhancing existing open spaces and providing high quality new space. PAN 65 sets out that the planning system should ensure provision of appropriate quality in, or within easy reach of, new development.
PAN 67 2003 ¹⁶	Housing Quality	PAN 67 sets out that Local Authorities and developers should promote good quality housing which is: Distinctive, Safe and pleasant, Easy to get to and move around, Welcoming, Adaptable, and Resource efficient.
PAN 68 2003 ¹⁷	Design Statements	PAN 68 sets out the role of design statements and promotes design statements to be used more effectively in the planning process in order to create places of lasting quality.
PAN 75	Planning for	PAN 75 aims to create greater awareness of how

¹² Scottish Executive, 2006. PAN 51: Planning, Environmental Protection and Regulations (Revised 2006). Edinburgh: Scottish Executive.

¹³ Scottish Executive, 2000. PAN 60: Planning for Natural Heritage. Edinburgh: Scottish Executive.

¹⁴ Scottish Executive, 2005. PAN 61: Planning and Sustainable Urban Drainage Systems. Edinburgh: Scottish Executive.

¹⁵ Scottish Executive, 2008. PAN 65: Planning and Open Space. Edinburgh: Scottish Executive.

¹⁶ Scottish Executive, 2003. PAN 67: Housing Quality. Edinburgh: Scottish Executive.

¹⁷ Scottish Executive, 2003. PAN 68: Design Statement. Edinburgh: Scottish Executive.

Guidance	Title	Summary
2005 ¹⁸	Transport (August 2005)	linkages between planning and transport can be managed. It highlights the roles of different bodies and professions in the process and points to other sources of information.

5.5 Conclusions

- 5.5.1 This chapter has summarised the planning policy context for the Proposed Development at a national and local level.
- 5.5.2 A full assessment of the Proposed Development against the plans, policies and strategies identified in this chapter is contained within the Planning Statements that accompany both of the planning applications.

¹⁸ Scottish Executive, 2005. PAN 75: Planning for Transport. Edinburgh: Scottish Executive.
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6 EIA Methodology and Approach

6.1 Introduction

- 6.1.1 Environmental Impact Assessment (EIA) is a process that identifies the potential environmental effects (both beneficial and adverse) of a proposed development to assist the consenting authority in considering and determining an application, and identifies any need for mitigation to avoid, reduce and offset any adverse environmental effects. EIA is required where a proposed development is likely to have significant effects on the environment by virtue of factors such as its nature, size or location. The Applicant has considered the Proposed Development in light of description of development 10(b) in Schedule 2 to the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017¹ ('the EIA Regulations'), and has concluded that, due to its nature, size and location, it has the potential to cause significant environmental effects. Therefore, there is a requirement for an EIA to be undertaken and an EIA Report to be submitted in support of the planning applications.
- 6.1.2 This Chapter sets out the broad methodology that has been used in the EIA for the Proposed Development and provides an overview of the key stages that have been followed, in line with EIA good practice as discussed below.

6.2 The EIA Process

EIA Regulations

- 6.2.1 This EIA Report has been prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.
- 6.2.2 The EIA Report has also been prepared in accordance with the following advice and good practice:
- Planning Advice Note 1/2013 (PAN 1/2013) Environmental Impact Assessment (2013) (revised 2017)²;
 - Institute of Environmental Management and Assessment (IEMA) (2004) Guidelines for Environmental Impact Assessment³;
 - Institute of Environmental Management and Assessment (IEMA) (2017) Delivering Proportionate EIA⁴; and
 - Scottish Natural Heritage (SNH) (2018) A Handbook on Environmental Impact Assessment: Guidance for Competent Authorities, Consultees and others involved in the Environmental Impact Assessment Process in Scotland (5th Edition)⁵.
- 6.2.3 The information that a developer is required to submit as part of the EIA process is specified in Schedule 4 of the EIA Regulations.

¹ Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017

² Scottish Government, 2013, Planning Advice Note 1/2013: Environmental Impact Assessment

³ Institute of Environmental Management and Assessment (2004) Guidelines for Environmental Impact Assessment

⁴ Institute of Environmental Management and Assessment (IEMA) (2017) Delivering Proportionate EIA

⁵ SNH (2018) Environmental Impact Assessment Handbook: Guidance for Competent Authorities, Consultees and others involved in the Environmental Impact Assessment Process in Scotland (5th Edition)

Good Practice Guidance

- 6.2.4 PAN 1/2013 provides guidance on good practice, and the key steps to be followed in the EIA process are identified in IEMA and SNH guidance:

Scoping

- Undertake a Scoping exercise to establish likely significant effects.

Baseline Studies

- Examine, through baseline studies, the environmental character of the area likely to be affected by the development.
- Identify relevant natural and man-made processes which may already be changing the character of the site.

Predicting and Assessing Impacts

- Consider the possible interactions between the proposed development and both existing and future site conditions.
- Predict and assess the possible effects, both negative and positive, of the development on the environment.

Mitigation

- Introduce design and operational modifications or other measures to avoid, reduce or offset adverse effects and enhance positive effects.

Integration

- EIA should be an iterative process which aims to ensure early consideration of environmental issues at all stages of project development and is founded on appropriate engagement with planning authorities and the consultation bodies. In addition to meeting the requirements of the EIA Regulations, EIA should add value to the design process, improving environmental outcomes and creating a framework for community engagement.

Proportionality

- EIA should be fit for purpose and must be accessible to the planning authority, consultees, and the public. As such it should focus on significant environmental effects to avoid being overly long in nature.

Efficiency

- Early identification of assessment and information requirements can ensure a coordinated EIA process and minimise delays.

- 6.2.5 The process and outcomes of the assessment are presented in a single document, known as the EIA Report. This EIA Report provides a clear and concise summary of the Proposed Development and its likely environmental effects, including primary, secondary, direct, indirect and cumulative effects, on the natural, built and human environments. This EIA Report provides the determining authority, in consultation with statutory consultees and the wider community, with sufficient information to make an objective judgement as to the acceptability of the Proposed Development, within the context of national, regional and local planning and environmental policy.

6.3 EIA Methodology

- 6.3.1 Good practice in EIA is defined in a number of sources as set out above. The methods followed

in this EIA have drawn on those sources to generate a robust assessment. The EIA process adopted for the Proposed Development can be summarised as follows, and is described further below:

- Scoping and consultation with statutory consultees, non-statutory consultees and the local community to identify the key issues on which the EIA should focus;
- Establishing baseline environmental conditions through desktop research and site surveys;
- Determining how effects could be avoided or reduced through design evolution;
- Identifying the potential effects of the Proposed Development and any proposed mitigation and feeding this into design freeze;
- Assessing the significance of residual environmental effects on the identified receptors against recognised or defined criteria following mitigation;
- Describing how likely significant effects would be monitored (e.g. through conditions attached to a consent); and
- Reporting the process, results, and conclusions of the EIA in the EIA Report.

Scoping and Consultation

Scope of the EIA Report

- 6.3.2 A 'Scoping Opinion' can be requested from the Planning Authority on the information to be provided within an EIA Report under the EIA Regulations. The purpose of the scoping process is to ensure that the EIA focusses on the potential likely significant environmental effects; identifies those effects which are unlikely to need detailed study; and provide a means to reach agreement on the most appropriate methods of impact assessment.
- 6.3.3 A pre-scoping meeting was held with Stirling Council on 18th February 2020 in advance of the formal Scoping process. David Love and Peter McKechnie of Stirling Council attended along with representatives from Savills.
- 6.3.4 The Applicant submitted a request to Stirling Council for a Scoping Opinion on 28th February 2020. This request was accompanied by a Scoping Report prepared by Savills, which set out a summary of the Proposed Development; identified the issues proposed to be scoped out and included in the EIA Report; and proposed an approach to the assessment of effects for each proposed topic area. The Scoping Report was simultaneously issued to a list of statutory and non-statutory consultees as agreed with Stirling Council. A Scoping Opinion was received from Stirling Council on the 23rd April 2020. The key issues that arose through Scoping and how they were subsequently addressed are summarised in each individual technical chapter (Chapters 7-20 of the EIA Report).

Consultation with Statutory and Non-Statutory Consultees

- 6.3.5 Throughout the EIA process, the Applicant has liaised with Stirling Council, SEPA, HES and SNH, amongst others, in relation to the various technical survey elements and to provide updates in relation to consultation and on the progress of the applications.
- 6.3.6 The proposal has been subject to public consultation. Two Proposal of Application Notices (PAN) were submitted on 7th February 2020 to Stirling Council for the wider mixed use redevelopment of the Craigforth Campus and the proposed erection of purpose built office accommodation on the North Site.
- 6.3.7 Public consultation formed a key component of the iterative EIA process. The Applicant consulted the public by conducting two rounds of public exhibitions online, as follows:

- 7th May 2020 (Wider Campus Masterplan); and
 - 8th May 2020 (Office Development).
- 6.3.8 During the online public consultation events members of the public from nearby Raploch, Cambusbarron and Thornhill/Blair Drummond areas were able to view the proposals at the following website: www.craigforth-stirling.com. The online exhibitions included a series of information boards which outlined details of the Proposed Development, including the development parcels, associated uses and anticipated ancillary infrastructure, the reasons for redeveloping the Site, some background to the EIA process, and a programme for submission.
- 6.3.9 In addition to the information boards, key personnel from the project team and the Applicant were on hand to discuss the Proposed Development and answer questions using a live chat function. Two online questionnaires welcoming feedback on the design of the Proposed Development were also made available to complete from the public exhibition website and return to the Applicant.
- 6.3.10 Representatives from Cambusbarron, Raploch and Thornhill/Blair Drummond Community Councils were invited to view the online public consultation. Cambusbarron Community Council engaged with the online public consultation and responded to the proposals being exhibited.
- 6.3.11 Further information is provided in the PAC Reports which accompany the applications.

Baseline Characterisation

- 6.3.12 The purpose of EIA is to predict how environmental conditions may change as a result of a development. This requires that the environmental conditions now and, in the future, assuming no development on the site, are established. These conditions are referred to as the 'baseline' and are usually established through a combination of desk based research, site survey, and empirical studies and projections. Together, these describe the current and future character of the site and surroundings, and the value and vulnerability of key environmental resources and receptors.
- 6.3.13 Making predictions about how parameters such as land use, landscape, views and other environmental characteristics may change in the future relies on assumptions about future development and environmental trends. For this reason, where development is not proposed in the vicinity of the site, the baseline adopted for EIA is normally taken as the current character and condition of the site and surrounds, and the likely significant environmental impacts of the development are then assessed in the context of the current conditions alone. It is accepted that the baseline conditions will gradually alter through time as a result of natural changes which have the potential to alter the landscape and species of flora and fauna within the wider site. However, these natural changes are unlikely to materially alter the findings of the EIA.
- 6.3.14 Baseline conditions, and the means by which these have been established, are set out in Chapters 7-20 of this EIA Report.

Avoidance of Effects through Design

- 6.3.15 EIA is an iterative process which aims to ensure early consideration of environmental issues at all stages of project development. In this way, the findings from the EIA can be fed into the design process, to avoid, reduce and if possible, remedy environmental effects. This approach has been followed in the design of the Proposed Development. Of particular relevance in this process has been the approach to minimising flood risk from the River Forth and ensuring the development proposals are suitably located through the use of modelling to account for the

identified risks. Where potentially adverse significant environmental effects were identified through environmental baseline surveys, or later in the detailed EIA, consideration was given as to how the design should be modified to 'design out' adverse significant environmental effects, or where this was not possible, to determine appropriate mitigation. This process is explained further in Chapter 3: Alternatives and Design Evolution and in the subsequent assessment chapters (Chapters 7 to 20).

Identification of Likely Effects

- 6.3.16 Each technical chapter contains a section that identifies the likely significant effects on the environment that may arise as a result of the demolition, construction and operation of the Proposed Development. The significance of environmental effects in EIA is typically assessed by considering both the character of the change (i.e. the size and duration of the impact) and the value/sensitivity of the environmental resource that experiences this effect (i.e. the receptor).
- 6.3.17 Effects may be direct, indirect, secondary or cumulative. Within these categories, they may also be short, medium or long-term, permanent or temporary, beneficial or adverse. Direct (or primary) effects are changes to the baseline arising directly from activities that form part of the Proposed Development, for example, a localised increase in noise during construction. Indirect (or secondary) effects are those that arise as a result of a direct effect, for example deterioration of water quality in a watercourse due to a discharge could have secondary effects on aquatic biodiversity.
- 6.3.18 Effects and receptors have been described using the quantitative criteria (wherever possible) listed below. Where different terminology has been used, this is stated clearly in the relevant chapter.
- the nature of the effect, described as adverse, neutral or beneficial;
 - the magnitude of the effect, based on a scale of major, moderate, slight, negligible and unknown;
 - the likelihood of the effect occurring, based on a scale of certain, likely or unlikely;
 - the duration of the effect, based on a scale of long, medium and short term;
 - the reversibility of the effect, being either reversible or irreversible;
 - the value of the receptor, based on a scale of international, national, regional, local and negligible;
 - the sensitivity of the receptor to the effect, based on a scale of high, medium and low and in some instances negligible; and
 - the occurrence of the effect during the phased implementation of the Proposed Development.
- 6.3.19 Each of the technical chapters provides the specific criteria, including sources and justifications, for quantifying the different levels of effect. Where possible, this has been based upon quantitative and accepted criteria together with the use of value judgements and expert interpretations to establish to what extent an effect is environmentally significant. The threshold at which effects are likely to be "significant" is defined in each of the technical chapters.
- 6.3.20 Unless stated otherwise in methodologies set out in the individual assessment chapters, effects of 'major' or 'moderate' significance are considered to be 'significant' in the context of the EIA Regulations.

Interrelationship between Effects

6.3.21 Although the EIA Report is structured in standalone topic specific chapters, many of the considerations are interrelated, such as ecology and hydrology. As such, the interrelationship of potential effects has been considered through the design evolution phase between two or more topic areas, and in accordance with Part 2 of Schedule 4 of the EIA Regulations and addressed in Chapters 7-20.

Cumulative Effects

6.3.22 As required by the EIA Regulations, it is also important to consider the possible effects that the Proposed Development may have in combination with existing, consented, or other developments. Likely cumulative effects have been defined as the likely effects that the Proposed Development may have in combination with other developments which are at application stage, consented, under construction or operational (i.e. the incremental effects resulting from the Proposed Development if all other developments are assumed to be constructed/operated).

6.3.23 The specific developments which have been included within the cumulative impact assessment and the rationale for their inclusion is explained within Chapter 19 Cumulative Impacts.

EIA Regulations – Regulation 5 and Schedule 4

6.3.24 Regulation 5 of the EIA Regulations lists a number of matters which, together, constitute the minimum contents and standards to be met by an Environmental Impact Assessment Report before it can be considered compliant with the EIA Regulations. These matters include, under Regulation 5 2(b), a description of the likely significant effects on the environment. Table 6.1 below lists these factors and broadly where they are addressed with the EIA report.

Table 6.1 Regulation 5 and Schedule 4 Factors for Consideration

Factor to be Considered	Where in the EIA Report?
Construction Impacts	Chapters 7 - 20
Use of natural resources (land, soil, water)	Chapter 9 Biodiversity Chapter 10 Flood Risk Chapter 11 Drainage & Hydrology Chapter 12 Ground Conditions
Emission of pollutants (noise, vibration, disposal/recovery of waste)	Chapter 8 Biodiversity Chapter 11 Drainage & Hydrology Chapter 12 Ground Conditions Chapter 13 Traffic & Transport Chapter 14 Noise & Vibration Chapter 15 Air Quality
Risk to human health	Chapter 17 Human Health
Cumulation of effects with other projects	Chapters 19 Cumulative Impacts
Impact on climate	Chapter 18 Sustainability & Climate Change
Technologies used	Chapter 4 Description of the Proposed Development Chapter 18 Sustainability & Climate Change

Mitigation and Enhancement

6.3.25 The EIA Regulations state that an EIA Report should include ‘a description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.’ These measures have been termed ‘mitigation’ measures for the purposes of the EIA Report.

6.3.26 The EIA has identified where there are likely to be any significant effects and, where necessary, identified opportunities to mitigate these effects, see Chapter 20 Schedule of Mitigation. Making a judgement on the likely effectiveness of the mitigation measures proposed, the predicted effects are then documented within this EIA Report as ‘residual effects’.

6.3.27 It is important to note a number of measures are not considered ‘mitigation’ as such but rather an integral part of the design/construction process and have been taken into account prior to assessing the likely effects of the Proposed Development. In addition, and where appropriate, opportunities for enhancement have been included, for example, with regard to improved public access to the natural assets located within the Site, such as, Craigforth Crag. Where relevant, these good practice measures are described in the topic chapters and in Chapter 3: Alternative and Design Evolution.

Monitoring

6.3.28 The EIA Report sets out details of any post-consent monitoring which is proposed. This includes, where appropriate, proposals to measure the effectiveness of the identified mitigation measures.

Data Gaps and Uncertainty in Assessment

6.3.29 Part 6 of Schedule 4 of the EIA Regulations requires that the EIA Report provide “*details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved*”.

6.3.30 Whilst any assessment limitations are discussed in Chapters 7-20, it is considered that this EIA Report contains adequate information to enable Stirling Council to review and form a judgement on the likely significant environmental effects of the Proposed Development.

Preparation of the EIA Report

6.3.31 Regulation 5(2) of the EIA Regulations provides a list of the minimum information that must be contained in an EIA Report, including:

Table 6.2 Regulation 5(2) Information

Regulation 5(2)	Chapter Reference
(a) a description of the development comprising information on the site, design, size and other relevant features of the development	Chapters 2 - 4
(b) a description of the likely significant effects of the development on the environment	Chapters 7-20
(c) a description of the features of the development and any measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment	Chapters 7-20
(d) a description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment	Chapter 3
(e) a non-technical summary of the information referred to in sub-paragraphs (a) to (d)	Stand-Alone Document
(f) any other information specified in schedule 4 relevant to the specific characteristics of the development and to the environmental features likely to be affected.	See Table 6.1

6.3.32 It is considered that this information has been sufficiently provided in this EIA Report. A non-technical summary is provided as a stand-alone document submitted alongside the EIA Report.

6.3.33 A statement of competency, setting out the qualifications and experience of chapter authors and Savills is provided in Chapter 1: Introduction.

7 Landscape and Visual Amenity

7.1 Introduction

7.1.1 This Chapter presents the findings of a landscape and visual impact assessment (LVIA) undertaken for the Proposed Development. The purpose of the LVIA is to identify and describe potential significant effects which may occur as a result of the Proposed Development to views obtained by those living and working in, and visiting the area, and the wider landscape resource.

7.1.2 The assessment has been undertaken by ASH design + assessment Ltd, Chartered Landscape Architects (ASH).

Landscape and Visual Effects

7.1.3 Although closely related, landscape and visual effects differ, and are considered separately in this LVIA for clarity and robustness.

Landscape Effects

7.1.4 The character of the landscape relates to the natural processes and human activities that have been at work over time to shape the land to its present form. Factors contributing to landscape character include topography, vegetation cover, sense of space or enclosure and past and present land use. Landscape character and resources are considered to have an importance in their own right and are valued for their intrinsic qualities.

7.1.5 Landscape effects may occur when elements of the landscape which contribute to its key characteristics are changed.

Visual Effects

7.1.6 Visual amenity relates to the way in which people visually experience the surrounding landscape.

7.1.7 Visual effects may occur through the introduction into established views of new features which modify the existing structure, scale and composition of the view. Visual effects may also occur where existing features in the view are removed or altered.

Scope of Assessment

7.1.8 The LVIA considers all aspects of both the North Site (Proposed Development (Detailed Application)); and the Masterplan Site (Proposed Development (PPiP Masterplan)), during the construction phase and during operation. It gives consideration to potential effects on the character of the landscape and also the visual amenity of those present within the landscape.

7.1.9 Where operational effects are considered, these are assessed at two periods:

- The first year following completion; and
- Ten years post completion, to allow reinstatement and any proposed mitigation measures to establish.

Zone of Theoretical Visibility (ZTV)

7.1.10 As an aid to establishing the scope for the LVIA, ZTVs have been produced for the Proposed Development. The ZTV is a computer generated diagram which uses a terrain model to indicate areas from which the Proposed Development would be theoretically visible. ZTVs have been generated using ESRI ArcGIS software based on a terrain modelled using Ordnance Survey (OS) T5 DTM data and have been run from points representing the heights of proposed buildings.

7.1.11 The three ZTVs which have been produced for the Proposed Development are as follows:

- Figure 7.2: ZTV North Site;
- Figure 7.3: ZTV Central Site; and
- Figure 7.4: ZTV Southern Site.

7.1.12 ZTVs have been generated from the tallest components of each element of the Proposed Development as shown on Figure 7.2 ZTV North Site, Figure 7.3: ZTV Central Site and 7.4: ZTV Southern Site. Where a range of potential heights are currently proposed the maximum heights are assumed, using the precautionary principle. Therefore, for the purposes of the ZTV, the following heights have been assumed:

- North Site; HQ Building - 4 storeys;
- Central Site; Commercial and Leisure; Hotel Building - 7 storeys; Restaurants / Leisure – 2 storeys;
- Central Apartments; 6 storeys; and
- Southern Site; Housing and Apartments; 3 storeys.

7.1.13 Whilst ZTV is a useful tool for establishing potential visibility it is not indicative of a visual effect in itself which is dependent on the relationship of potentially visible features within the existing view and landscape setting. The ZTVs show a bare ground situation and do not take account of existing visual barriers such as woodland or buildings.

Study Area

7.1.14 A study area of 2.5 km has been used for this LVIA; the exception to this is where the boundary has been extended for the visual assessment to include the Wallace Monument, after feedback on the extent of the study area was received from Stirling Council. The extent of the study area has been informed through analysis of ZTVs for the Proposed Development and initial site survey. The study area comprises the area within which it is considered any significant landscape and visual effects would be likely to be experienced.

Consultation

7.1.15 A request for a Scoping Opinion for the Proposed Development was submitted to Stirling Council in February 2020. The Scoping Opinion, received on 23rd April 2020 contained the following advice of specific regard to the subject areas of Landscape and Visual Amenity.

Table 7.1 Consultation Summary

Consultee	Issue Raised	Action
Stirling Council(SC)	Agreed that a LVIA would be required as part of the EIA process, and that it be prepared and undertaken in accordance with the 3rd Edition of the Guidelines for Landscape and Visual Impact Assessment (2013) (“GLVIA”).	LVIA carried out in line with GLVIA3.

	<p>Disagreed with a 2km study area for the assessment, citing the low lying and visible nature of the site, relatively open nature of its immediate Carse context, and the potential for views from the fringes of Stirling and Bridge of Allan to the east/north east and from Cambusbarron to the south. Also requested that the Wallace Monument be considered.</p> <p>Further email received from SC on 27th May regarding the importance of including all potential significant effects.</p>	<p>After further investigation, ASH suggested a study area of 2.5km would be appropriate for the Landscape Assessment. However, the visual assessment was extended to include the Wallace Monument after additional feedback from SC.</p> <p>The study area was considered sufficient to include properties around the edges of Stirling and Bridge of Allan and Cambusbarron where potential views would be obtained and rural properties with potential views to the west.</p> <p>Highlighted the purpose of the LVIA, to identify and describe only significant, not all, effects. Although theoretical visibility would exist beyond this distance, site visits confirmed that this Study Area was sufficient to accommodate all potential significant effects.</p>
	<p>Recommended that the range and location of viewpoints would be agreed in consultation with SC and Scottish Natural Heritage (SNH).</p>	<p>The visual assessment is a more detailed receptor-based assessment rather than focused on a limited number of viewpoints. It looks at the potential visual effect on all potential visual receptors within the Study Area, including residential areas, recreational locations and routes (including public roads and paths).</p> <p>There is some crossover with the Cultural Heritage assessment for some receptor locations, notably the Wallace Monument and Stirling Castle, but the visual assessment assesses the amenity of the view, not the effect on the Monument or its setting.</p>

		SNH and Historic Environment Scotland (HES) were consulted (SNH Operations Officer Stirling, Forth and HES Case Officer), by copy of the correspondence with the Planning Authority.
	It was noted that there was a requirement for the inclusion of cumulative assessment within the LVIA.	This requirement was enlarged by a subsequent correspondence from the Planning Authority and is addressed below under the appropriate section.
SNH /HES	SNH and HES were consulted by sending SNH Operations Officer Stirling, Forth and HES Case Officer a copy of the correspondence with the Planning Authority. However, no concerns were raised by SNH in their Scoping response in relation to the LVIA methodology.	No further action required.

7.1.16 At the time of writing, no further correspondence relating to the LVIA had been received from any of the consultees and the foregoing responses were therefore used as the basis for the finalised scope of the study.

7.2 Assessment method

Assessment Guidance

7.2.1 The LVIA has been prepared with reference to the Guidelines for Landscape and Visual Impact Assessment (Third Edition), 2013, published by the Landscape Institute and the Institute of Environmental Management and Assessment (GLVIA3).

Professional Judgement

7.2.2 GLVIA3 places a strong emphasis on the importance of professional judgement in identifying and designing the significance of landscape and visual effects. As part of this assessment, professional judgement has been used in combination with structured methods and criteria to evaluate value, sensitivity, magnitude, and significance of effect. The assessment has been undertaken and verified by two Landscape Professionals (Chartered Landscape Architects) to provide a robust and consistent approach.

Key Stages of Assessment

7.2.3 The GLVIA methodology involves an appreciation of the existing landscape and visual resource and the ability of its key components to accept potential change. An understanding of the proposed changes which could occur and the degree to which they could alter these key components is required. The assessment considers the potential for changes to result in significant effects and considers the potential to mitigate these effects. There are five key stages to the assessment:

- establishment of the baseline;

- appreciation of the development proposed;
- identification of key landscape and visual receptors;
- identification of potential effects and mitigation measures; and
- assessment of effect significance.

Establishment of the Baseline

7.2.4 Establishment of the baseline conditions has been undertaken through combination of desk study and site appraisal. The following specific tasks have been undertaken:

- Review of the Stirling Local Development Plan (2018).
- Review of the Stirling Local Development Plan (2014), legacy non-statutory. Supplementary Guidance: SG27 – Protecting Special Landscapes; and SG28: Landscape Character Assessments.
- Review of the Stirling Local Development Plan Draft Supplementary Guidance: Biodiversity and Landscape (2019).
- Review Landscape Character Types and descriptions from the Scottish Natural Heritage (SNH) National Landscape Character Assessment.
- Field Survey review of SNH Landscape Character Types and suggestions for modifications as necessary.
- Review of other desk sources including Ordnance Survey (OS) mapping and aerial photography to identify potential receptors.
- Field Survey and appraisal of individual landscape and visual receptors in terms of their contribution to and relationship with the baseline situation.

7.2.5 Establishment of the baseline includes the consideration of the baseline landscape value. The relative value of the landscape is an important consideration in informing later judgement of the significance of effects. Landscape value concerns the perceived importance of the landscape when considered as a whole, and within the context of the study area and is established through consideration of the following factors:

- presence of landscape designations, other inventory or registered landscapes / landscape features or identified planning constraints;
- the scenic quality of the landscape;
- perceptual aspects, such as wildness or tranquillity;
- conservation interests such as cultural heritage features or associations, or if the landscape supports notable habitats or species;
- recreational value; and
- rarity, either in the national or local context, or if it is considered to be a particularly important example of a specific landscape type.

7.2.6 It should be noted that absence of a designation does not necessarily mean that a landscape or component is not highly valued, as factors such as accessibility and local scarcity can render areas of nationally unremarkable quality highly valuable as a local resource.

7.2.7 Criteria for the allocation of perceived landscape value are outlined in Table 7.2 below:

Table 7.2 Landscape Value Criteria

Landscape Value	Criteria
High	<ul style="list-style-type: none"> • The landscape is closely associated with features of international or national importance which are rare within the wider context;

Landscape Value	Criteria
	<ul style="list-style-type: none"> • The landscape is of high scenic quality and forms a key part of an important designated landscape or planning constraint; and/or • The landscape is an example of a scarce resource within the local context and is of considerable local importance for its, scenic quality, recreational opportunities or cultural heritage associations.
Medium	<ul style="list-style-type: none"> • The landscape is associated with features of national or regional importance which are relatively common within the wider context; • The landscape forms part of a designated landscape or is associated with other features of importance but is not rare or distinctive within the local context; and/or • The landscape is one of a number within the local context appreciated for its scenic quality, recreational opportunities or cultural heritage associations.
Low	<ul style="list-style-type: none"> • The landscape characteristics are common within the local and regional context and the landscape is not associated with any particular features or attributes considered to be important; and/or • The landscape is of poor scenic quality and is not appreciated for any recreational or cultural associations.

Appreciation of the Development Proposed

7.2.8 Appreciation of the Proposed Development involves the accumulation of a thorough knowledge of the proposal, its nature, scale and location within the baseline landscape, and any peripheral or ancillary features proposed. Analysis of the proposed activities and changes which would take place leads to an understanding of the potential effects that may occur to the landscape and visual resource.

Identification of Key Landscape and Visual Receptors

7.2.9 The identification of landscape and visual receptors is the first step in the analysis of the potential for significant effects to occur. Landscape and visual receptors can be described as follows:

- **Landscape receptors** comprise key characteristics or individual features which contribute to the value of the landscape and have the potential to be affected by the Proposed Development. Landscape receptors are identified through analysis of baseline characteristics when considered in relation to the impacts which might result from a development of the type proposed.
- **Visual receptors** comprise individuals experiencing views from locations such as buildings, recognised routes and popular viewpoints used by the public. Potential visual receptors are identified through analysis of desk resources, mapping and field survey, as described under ‘Establishment of the Baseline’ above.

Identification of Potential Effects and Mitigation Measures

7.2.10 The second step in the assessment process involves the identification of potential effects which may occur as a result of the interaction the Proposed Development with the identified landscape and visual receptors.

- 7.2.11 The assessment takes into account direct effects upon existing views, landscape elements, features and key characteristics and also indirect effects which may occur secondarily to changes affecting another landscape component or area. The identification of potential effects is a two-fold process, giving consideration to how these effects may arise from aspects of the Proposed Development and how they may be accommodated by the existing baseline features. Where it is established that potential effects could be limited by mitigation measures, these are also given consideration.
- 7.2.12 Potential effects are evaluated through the allocation of criteria for sensitivity and magnitude of change.
- 7.2.13 Sensitivity considers the nature of the landscape or view and its ability to accommodate development of the type proposed without compromising its key characteristics and components. There are two aspects which are considered when establishing the landscape or visual sensitivity:
- **Value:** the baseline value of the landscape as detailed in Table 7.2 and the contributory value of individual landscape receptors to the landscape as a whole; or, the value of the overall view and particularly, the affected part of the view, to the viewer.
 - **Susceptibility to change:** the ability of the landscape receptors or existing visual composition to accommodate development of the type proposed without changing the intrinsic qualities of the landscape or view.
- 7.2.14 It is important to note that the judgement of visual sensitivity is considered in relation to an understanding of both the existing view and the development proposed and therefore the perceived value of the potential area of change as a part of the view as a whole contributes to the sensitivity evaluation.
- 7.2.15 Criteria for sensitivity are presented in Table 7.3 below:

Table 7.3 Landscape and Visual Sensitivity Criteria

Sensitivity Rating	Landscape Sensitivity	Visual Sensitivity
High	A highly valued landscape of particularly distinctive character susceptible to relatively small changes of the type proposed.	Views from: <ul style="list-style-type: none"> • dwellings and publicly accessible buildings where the changed aspect is an important element in the view and there are no detracting features present; and • recreational routes and locations where the changed aspect is an important element in the view and there are no detracting features present.
Medium	A reasonably valued landscape with a composition and characteristics tolerant of some degree of change of the type proposed.	Views from: <ul style="list-style-type: none"> • dwellings and publicly accessible buildings where the changed aspect is a less important element in the view and / or where some detracting features are present;

Sensitivity Rating	Landscape Sensitivity	Visual Sensitivity
		<ul style="list-style-type: none"> recreational routes and locations where the changed aspect is a less important element in the view and / or where some detracting features are present; roads and transport routes where the changed aspect is an important element in the view and there are no detracting features present; and workplaces where the changed aspect is an important element of the view and there are no detracting features present.
Low	A relatively unimportant landscape which is potentially tolerant of a large degree of change of the type proposed.	<p>Views from:</p> <ul style="list-style-type: none"> dwelling and publicly accessible buildings where the changed aspect is an unimportant element in the view and / or numerous detracting features are present; recreational routes and locations where the changed aspect is an unimportant element in the view and / or where numerous detracting features are present; roads and transport routes where the changed aspect is a less important element in the view and / or where some detracting features are present; and workplaces where the changed aspect is a less important element in the view and / or where some detracting features are present.

7.2.16 Magnitude of change concerns the degree to which the Proposed Development would alter the existing characteristics of the landscape or view. The appraisal of magnitude involves consideration of the nature and scale of the change which would occur and also the duration and potential reversibility of the effect. Three ratings are considered for Magnitude: during construction, the first year following completion and 10 years post-completion.

7.2.17 Criteria for Magnitude of Change are detailed in Table 7.4.

Table 7.4 Landscape and Visual Magnitude of Change Criteria

Magnitude Rating	Landscape	Visual
High	Notable change in landscape characteristics over an extensive area ranging to a very intensive change over a more limited area.	Where the Proposed Development would result in a very noticeable change in the existing view.

Magnitude Rating	Landscape	Visual
Medium	Perceptible change in landscape characteristics over an extensive area ranging to notable change in a localised area.	Where the Proposed Development would result in a noticeable change in the existing view.
Low	Virtually imperceptible change in landscape characteristics over an extensive area or perceptible change in a localised area.	Where the Proposed Development would result in a perceptible change in the existing view.
Negligible	No discernible change in any landscape characteristics or components.	No discernible change in any landscape characteristics or components.

Assessment of Effect Significance

7.2.18 Evaluation of the predicted significance of effect has been carried out through the analysis of the anticipated magnitude of change in relation to the landscape or visual sensitivity, taking into account any proposed mitigation measures, and is established using professional judgement. Three ratings are considered for Effects Significance: during construction; the first year following completion; and 10 years post-completion. The significance of effect for landscape and visual elements is considered as follows:

- **Landscape Effects:** The assessment takes into account identified effects upon existing landscape receptors and assesses the extent to which these would be lost or modified in the context of their importance in determining the existing baseline character.
- **Visual Effects:** The assessment takes into account likely changes to the visual composition, including the extent to which new features would distract or screen existing elements in the view or disrupt the scale, structure or focus of the existing view.

7.2.19 Effect significance has been evaluated using the following criteria:

Table 7.5 Landscape and Visual Effect Significance Criteria

Effect Significance	Landscape Effects	Visual Effects
Major	The Proposed Development is at considerable variance with the landform, scale and pattern of the landscape and would be a dominant feature, resulting in considerable reduction in scenic quality and large-scale change to the intrinsic landscape character of the area.	The Proposed Development would become a prominent and very detracting feature and would result in a very noticeable deterioration to an existing highly valued and well composed view.
Moderate	The Proposed Development is out of scale with the landscape, or inconsistent with the local pattern and landform and may be locally dominant and / or result in a noticeable reduction in scenic quality and a degree of change to the intrinsic landscape character of the area.	The Proposed Development would introduce some detracting features to an existing highly valued and well composed view or would be prominent within a pleasing or less well composed view, resulting in a noticeable deterioration of the view.

Effect Significance	Landscape Effects	Visual Effects
Minor	The Proposed Development does not quite fit with the scale, landform or local pattern of the landscape and may be locally intrusive but would result in an inappreciable reduction in scenic quality or change to the intrinsic landscape character of the area.	The Proposed Development would form a perceptible but not detracting feature within a pleasing or valued view or would be a more prominent feature within a poorly composed view of limited value, resulting in a small deterioration to the existing view.
Negligible	The Proposed Development sits well within the scale, landform and pattern of the landscape and would not result in any discernible reduction in scenic quality or change to the intrinsic landscape character of the area.	The Proposed Development would form a barely perceptible feature within the existing view and would not result in any discernible deterioration to the view.

7.2.20 The above criteria and levels of effect represent points on a continuum. Where required, interim ratings, such as Minor-Moderate, have been used to indicate the anticipated level of effect. For the purposes of this assessment, effects with a rating of Moderate or above are considered to be significant in terms of the EIA regulations.

7.3 North Site (The Proposed Development (Detailed Application)) Assessment

Assumptions and Limitations

7.3.1 The assessment of the Proposed Development (Detailed Application) is subject to the following limitations and assumptions:

- The limitations of the ZTV, as outlined above in 7.1.13.
- The assessment of visual effects has been undertaken from the nearest public road, footpath or open space to each property and assumptions have been made about the types of rooms and about the types and importance of views obtained from these rooms.
- Visual receptor locations which on the site survey were considered highly unlikely to receive significant effects due to distance and/or foreground screening by trees/buildings were scoped out of the assessment.
- The longer-term assessment of operational effects is considered after 10 years post completion, when it is assumed that any mitigation or other planting will have successfully established but may not yet have fully matured.

Baseline conditions

7.3.2 The baseline described in this Section is relevant for both the North Site (the Proposed Development (Detailed Application)) Assessment and the Masterplan Site (the Proposed Development (PPiP Masterplan)) Assessment.

Landscape and Visual Context

7.3.3 The Site is set on the urban fringes on the western side of Stirling, within the Forth Valley. The Site covers areas of low-lying ground and riverside, centred around a wooded, rocky crag (Craig Forth) up to 60 m in height, with the North Site located to the north-west of this crag. To the north of the Crag, the Site is characterised by a low density development of varying office buildings and car parking, set in mature landscaped grounds featuring the old Craigforth House, a listed building, amenity grassland areas with scattered mature trees, some of which are

veteran specimens associated with the old Craigforth House. To the south and west of the crag, the Site is characterised by the open, flat fields of the Forth floodplain, or Carse as it is known.

7.3.4 Within this setting, the context of the North Site comprises one two-storey building called Forth House (to be retained); an area of car parking separated by strips of semi-mature planted woodland and a small area of rough grassland to the west.

7.3.5 The wider Carse landscape comprises a broadly flat expanse of valley floor accommodating a looping, meandering river, with surrounding hills and distant mountains providing a panoramic backdrop. The valley floor is punctuated in places by small, steep rocky crags which includes Craig Forth (within the Site), and nearby crags to the west which accommodate the historic features of Stirling Castle and the Wallace Monument. To the east of the Site, the landscape is dominated by the developed outskirts of Stirling, composed of low density, business and commercial areas, housing estates and a large motorway junction of the M9. To the west the landscape is characterised by flat, open fields, delineated by hedges, and stands and belts of mature deciduous woodland, with scattered farmsteads and cottages.

Landscape Designations

7.3.6 The Site does not fall within any national or local landscape designations. However, the Southern Hills Local Landscape Area (LLA), identified by Stirling Council¹ is located within the study area around 1.65 km to the south of the Masterplan Site and 2.5 km to the south of the North Site. The purpose of LLAs is identified in the Stirling Local Development Plan as, *“to safeguard and enhance the character and quality of landscapes, promote understanding and awareness of their distinctive character and special qualities, and safeguard and promote important settings for outdoor recreation and tourism locally.”*

Southern Hills LLA

7.3.7 The Southern Hills LLA covers an expansive area of hills, valleys and upland fringes set to the south of the Carse of Stirling which provide an important backdrop and setting to the lowland areas, towns and villages. These include the Campsie Fells, Gargunnoch and Touch Hills. The LLA is described in the citation included in the 2014 Supplementary Guidance: SG27 – Protecting Special Landscapes, which divides this extensive LLA into a number of sections. The section which falls within the Study Area for the Proposed Development is:

- The farmed and wooded slopes on the eastern fringe of the Touch Hills.

7.3.8 The Supplementary Guidance describes this area as follows: “The hill-mass becomes less united in the east, with the rock banding becoming fragmented as the Touch Hills drop down towards the Forth Valley, forming a rolling and diverse hill fringe area, extending from Gillies Hill, Lewis Hill and Loch Coulter towards Stirling and the M80. Relatively well settled and accessible, served with minor roads, tracks and paths especially at lower levels. Popular recreation area for local people”.

7.3.9 Key characteristics of the East Touch Fringe area are described as follows:

- *“Local character and views closely related to elevation, aspect and historic patterns of land use. Rough grazing on higher and poorer ground gives way to improved pasture and arable at lower levels. Traditional estates and policies have a strong influence in some areas and there are high levels of woodland and tree cover.”*
- *“Complex visual characteristics and relationships. Traversing the rolling slopes and passing through or around woodlands views open and close. External views of the*

¹ Protecting Special Landscapes; Stirling Council Local Development Plan October 2018

farmed and wooded slopes from the north and east form an important backdrop to Stirling Old Town and Castle but also contain some 'dead ground', where land form and tree cover conceal areas from view, creating 'secret' enclaves. Views from the hill plateau to the west reveal the unexpectedly rugged edges of Lewis Hill and Sauchie Craigs rising above North Third Reservoir. Relatively well-settled landscape and containing some fine historic houses. Dispersed farmsteads and houses with small groups of houses sheltered on lower slopes. The north-east part of this landscape forms a key element in the setting of Cambusbarron."

7.3.10 Special Qualities of the East Touch Fringe area of the LLA are identified as follows.

- Prosperous, well-tended and human-scale landscapes with a strong historic tradition of settlement.
- Rich diversity of tree cover, which combined with rolling landform create pockets of sheltered land with a sense of seclusion.

Landscape Character

Scotland's Landscape Character Types

7.3.11 Between 1994 and 1999, Scottish Natural Heritage (SNH) commissioned a series of 30 regional Landscape Character Assessment (LCA) studies. Each study typically covered a local authority area. Since the studies were produced there have been significant advances in digital technology; additional complementary datasets produced; and changes in development patterns and pressures.

7.3.12 Due to the outdated nature of these 1990's SNH LCAs a number of local authorities unilaterally produced their own updated LCAs including SC, in 2014².

7.3.13 However, in 2019, also in response to these changes and to ensure consistency in approach across Scotland, SNH reviewed Scotland's 1990s LCAs at the level of Landscape Character Type (LCT), which is defined as an area of consistent and recognisable landscape character. Building on the original LCA studies, a single Scotland-wide dataset was created which can be viewed online within the Scottish Landscape Character Types Map and Descriptions³.

7.3.14 Although a review of the 2014 Stirling Local Development Plan Draft Supplementary Guidance: Biodiversity and Landscape was carried out in 2019 this was, at the time of writing this chapter, not ratified by Stirling Council. Consequently, since the 2019 SNH Landscape Character Type national map and associated Landscape Character Type Descriptions now effectively supersede the 1990s landscape character descriptions and mapping and by implication, other interim LCAs produced by councils, in the words of SNH, their LCTs "... *should be used for new development proposals, plans and strategies...*"

7.3.15 As can be seen from Figure 7.1: SNH Landscape Character Types, the Study Area for the Proposed Development falls within three of these SNH LCTs:

- LCT150 – Lowland Hill Fringes – Central;
- LCT153 – Carselands; and
- LCT 0 – Urban: Residential & Commercial.

² Review of the Stirling Local Development Plan (2014), legacy non-statutory Supplementary Guidance: SG27 – Protecting Special Landscapes; and SG28: Landscape Character Assessments

³ Scottish Natural Heritage. (2019). Scottish Landscape Character Types Map and Descriptions. Available at: <https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions>

7.3.16 The Urban LCT is not allocated an LCT number or description. However, for the purposes of this study within the 2.5km study area it has been described as LCT 0 and assessed as “Peripheral Residential and Commercial”. As can be seen in Figure 7.1, for the purposes of this study, and to bring it up to date with the current situation, it has been suggested that this LCT be extended to include:

- the A84 corridor between the Raploch and the Auction Mart (including Dobbies Garden Centre, the Prudential site and the new housing/ business area to the west of Forth Valley College); and
- the Bridge of Allan/Cornton corridor.

7.3.17 Whilst it is acknowledged that a very small portion of LCT152 “Lowland River Valleys-Central” and LCT149 “Lowland Hills-Central” fall within the extreme North and South-west of the study area respectively, the landscape effects of both the Proposed Development (Detailed Application) and the Proposed Development (PPiP Masterplan) on these LCTs were considered unlikely to be significant due to distance and they were therefore scoped-out.

7.3.18 The Landscape Character Areas (LCAs) highlighted in 7.3.15 are illustrated on Figure 7.1 and described in Table 7.6 to Table 7.8 below.

Table 7.6 LCT 150 - Lowland Hill Fringes-Central: Baseline Description



Above: East Touch Fringe from Carse of Stirling looking South

<p>Description</p>	<p>This part of the LCT is referred to as the East Touch Fringe, after the dispersed rural estate settlement from which it takes its name. The dolerite outcrop of Gillies Hill denotes the edge of a broad swathe of strongly rolling, occasional hummocky farmland, which forms a transition in height and form from west to east between the Touch hillslopes and the wide flat valley of the Forth Estuary. Mixed and broadleaf woodlands and curving lines of shelterbelts, tree clumps and roadside and avenue trees which characterise the policy landscapes dispersed across the hill slopes create a notably well-wooded character. A textural mix of clipped beech, hawthorn and holly hedgerows, low stone walls and post-and-wire fences define the field boundaries of the lower ground and the estate landscapes. The transitional character of the East Touch Fringe area is accentuated by the infiltration of urban and industrial elements towards the eastern edge. Views of the adjacent dense settlement, and the restraining influence of major transport corridors such as the M9, power lines and views of the tops of wind turbines, are more evident to the east.</p>
<p>Key Characteristics</p>	<ul style="list-style-type: none"> • Undulating, rolling topography rising to larger scale hill landforms. • Gradation of topography creates transitional landscape linking the open hills of more pronounced relief and the neighbouring settled valley landscapes. • Diverse landcover of arable and open improved and unimproved pastureland, interlocks with woodland and forestry, with some estate landscapes with frequent beech hedgerows and shelterbelts. • High proportion of woodland cover including mixed shelterbelts and broadleaf tree clumps. • Scattered residential development and small settlements on slopes, with recent expansion in some areas. • Minor roads. • Concentration of small water bodies, reservoirs, and small watercourses. • Strong interrelationship between stepped escarpment and lower foot slopes in Gargunnoch/Fintry and East Touch Fringe. • Estate and designed landscapes give distinctive character to East Touch Fringe area. • Hill fringes offer important panoramic views to neighbouring hills, valleys and straths, as well as large settlements such as Stirling. • A sense of remoteness and isolation in some areas despite proximity to settlement and relatively limited geographic extent.
<p>Landscape Value</p>	<p>This landscape falls mostly within the designated Southern Hills LLA and forms a locally valued edge to the Carse of Stirling to the south. It forms an important transition between the urban edges of Stirling and the outlying settlement of Cambusbarron to the East and the dispersed estate settlement of Touch to the West, to the more remote and largely unsettled Touch Hills to the South. Landscape Value is considered to be Medium-High</p>

Table 7.7 LCT 153 - Carselands: Baseline Description



Above: The Carse of Stirling from Cambusbarron looking North with Craigforth in mid-ground

<p>Description</p>	<p>The broad, open floodplains of the Carselands are intersected by the often meandering rivers and their tributaries, which are often inconspicuous when viewed from ground level. Across the fields of the floodplains smaller watercourses are often channelled into drainage ditches contrasting with the sinuous meanders of the rivers. The steep and abrupt slopes of the Gargunnock and Touch Hills and the Ochils form a dramatic backdrop to the low lying Carselands.</p> <p>The low rolling farmland and faint horizon line of hills and mountains to the north, and the closely encroaching craggy mass of the Gargunnock and Touch Hills to the south, confine the wide extent of the flatlands of the Carse of Forth to the west of Stirling, which are punctuated to the east by the volcanic crags of Stirling Castle, Abbey Craig (with the Wallace Monument) and Craigforth (site location) rising abruptly from the plain which is backed to the north east (outwith the study area) by the blunt edge of the Ochils.</p> <p>The fertile soils of the Carselands support a network of large, rectilinear, mostly arable fields of barley, oats, and Timothy grass, as well as grazing land, divided by post-and-wire fences or occasional sparse, broken hedgerow lines, and occasionally drainage ditches. The valley floor although open in character is nevertheless punctuated by dispersed copses, hedgerow trees, occasional shelterbelts and scrub along watercourses and ditches.</p>
<p>Key Characteristics</p>	<ul style="list-style-type: none"> • Flat, open, large scale Carselands of predominantly open agricultural landcover forming the floor and former floodplains of the River Forth. • Important as landscape setting of Stirling, Stirling Castle and the Touch and Gargunnock Hills. • Absence of major settlement across the Carselands, restricted to villages on the peripheral slopes and scattered farmsteads along the valley floor.

	<ul style="list-style-type: none"> • Periodic extensive flooding continues to influence land use. • Trunk roads run in parallel to the northern and southern perimeters of the Carselands. • Recent expansion of settlement boundaries at edge of carse making new development very visible. • Agricultural buildings on open carseland. • Open views across carse accentuated by consequent dramatic contrast with the adjacent escarpments of the Ochils and Gargunnoch and Touch Hills and crag-and-tail features of Craigforth, Abbey Craig and Castle Craig. • Commercial development of office buildings in adjoining Urban LCT on the north side of Craigforth (including The North Site) has important indirect influence on character of immediately adjoining part of this LCT.
<p>Landscape Value</p>	<p>This landscape does not fall within any area designated for its landscape importance and is dissected by major transport infrastructure. It is nevertheless valued locally as an important foil to Stirling Castle and the Wallace Monument as they rise dramatically from the carse and it also provides a setting for the hills which define its extent to the north and south.</p> <p>Landscape Value is therefore considered to be Medium.</p>

Table 7.8 LCT 0 – Urban; Peripheral Residential and Commercial: Baseline Description



Above: A84 corridor with Forth Valley College and new housing development in foreground and Craigforth Prudential site in background; from Cornton, looking West.

<p>Description</p>	<p>The parts of this LCT indivisible with the Proposed Development (Detailed Application) and Proposed Development (PPiP Masterplan) constitute the western peripheral areas of the City of Stirling including two nationally recognised landscape features; Stirling Castle and its historic surrounds, and about a kilometre outwith the study area, the Wallace Monument. Residential development comprises a large proportion of this LCT and ranges from extensive social housing at the Raploch, through new or relatively new housing estates on the edge of Raploch and Cornton, to the edges of the attractive conjoined settlements of Cambusbarron to the south (an old textile village) and Bridge of Allan to the North-east. There is also extensive commercial development, primarily in a broad corridor stretching from the Back 'o Hill Industrial Estate in the Raploch to the East, through the Castle Business Park, the Forth Valley College, the new Kildean Business Park, Dobbies Garden Centre, the Prudential site at Craigforth (within the Development Site) and finally to the West, on the A84, the Stirling Agricultural Centre.</p>
<p>Key Characteristics</p>	<ul style="list-style-type: none"> • Skyline dominated by Stirling Castle and its adjoining historic buildings and features such as the Kings Knot on its steep sided crag rising above the carse. • Another important feature to the North (outwith the study area) is the Wallace Monument on Abbey Craig. • Although there is no development immediately at the foot of the castle to the West, elsewhere urban commercial and residential spread is very evident especially in the east-west A84 corridor. • The conjoined settlements of Cambusbarron to the South and Bridge of Allan to the North constitute satellites of Stirling with historic characters of their own. • Large scale post-war social housing in the Raploch and Cornton.
<p>Landscape Value</p>	<p>This landscape does not fall within any area designated for its landscape importance but is closely associated with features of national and regional cultural heritage and landscape interest. On the other hand, there are other housing and commercial features which are relatively common in the local area and/or scenically unremarkable. Landscape Value is therefore considered to be Medium overall.</p>

Visual Receptors

7.3.19 Visual receptors' locations included in the assessment are identified in Figure 7.5 and fully described in Appendix 7.1.

7.3.20 The visual receptors identified can be subdivided into two separate categories:

- those obtaining views from building locations; and
- those obtaining views from routes.

Views from Buildings

7.3.21 The main building receptor locations within the study area are as follows:

- Mainly elevated residences on the North-western edge of Camusbarron.
- Stirling Castle and environs.
- The Raploch residential area.
- Residences and commercial properties adjoining the A84 corridor to the West of the

Raploch.

- The Cornton / extreme South western edge of Bridge of Allan residential areas.
- Isolated agricultural properties near Touch and along the A811 corridor.
- Isolated agricultural properties on the Carse of Stirling to the South and West.
- Isolated agricultural properties on the Carse of Lecropt to the North.

Views from Routes

7.3.22 Routes considered in the assessment comprise a mix of public roads and other transport routes and recreational routes.

7.3.23 The main route receptor locations within the study area are as follows:

- A811 trunk-road.
- A84 trunk-road.
- M9 motorway.
- Touch Road, Cambusbarron.
- Chalmerston Road; unclassified road, Carse of Stirling.
- Unclassified Road; Carse of Lecropt.
- Core paths around Cambusbarron area.
- Core paths near A84 corridor and alongside M9.

7.3.24 The Edinburgh-Perth railway line and B823 pass through the extreme north east of the study area. However, due to distance and in many places foreground screening from buildings it is considered unlikely that any significant effects would accrue to receptors on these routes and these locations have therefore been scoped out of the study.

Changes likely to occur over time in the absence of developing the project

7.3.25 In the absence of the current development proposal and with the assumption that on-going activities taking place would be likely to continue it is anticipated that the landscape and visual baseline would be likely to remain similar to that currently in existence. It is beyond the scope of the LVIA to anticipate any other development which may occur for which planning permission has not already been granted.

Potential effects

Landscape Effects

7.3.26 The extent to which the Proposed Development (Detailed Application) would affect the existing landscape varies depending on the individual components of the project and the ability of the existing landscape to accommodate these various components. This Section provides an assessment of the effects of the Proposed Development (Detailed Application) on the LCTs within the Study Area, which then feeds into an assessment of effects on the Special Qualities and integrity of the Southern Hills LLA.

Landscape Character

7.3.27 The following section provides an assessment of the effects that the Proposed Development (Detailed Application) would have on the LCTs during construction and also in the longer term during the operational phase, in accordance with the effects criteria outlined in the methodology described in Section 7.2.

Table 7.9 LCT 150 - Lowland Hill Fringes-Central: Assessment of Effects

Landscape Receptors	<ul style="list-style-type: none"> • Undulating, rolling topography rising to larger scale hill landforms.
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	<ul style="list-style-type: none"> • Transitional landscape linking the open hills and the neighbouring settled valley landscapes. • Diverse landcover of arable and open improved and unimproved pastureland. • Woodland cover including mixed shelterbelts and broadleaf tree clumps. • Scattered residential development and small settlements on slopes. • Minor roads. • Small water bodies, reservoirs and small watercourses. • Estate landscapes. • Hill fringes. • A sense of remoteness and isolation in some areas.
Landscape Sensitivity	This is a medium-high valued landscape with low-medium susceptibility to change of the type proposed. Sensitivity is considered to be Medium
Potential Effects	<ul style="list-style-type: none"> • Very limited indirect effects due to intervisibility with Proposed Development (Detailed Application) being constrained by Craigforth in mid-ground
Magnitude of Change	Due to distance and limited intervisibility, magnitude of change is anticipated to be Negligible during construction and following completion and remaining Negligible after 10 years as growth of mitigating tree planting will have limited effect due to distance and foreground screening by Craigforth.
Effects Significance	The landscape effect is anticipated to be Negligible during construction and following completion and remaining Negligible after 10 years as growth of mitigating tree planting will have limited effect from this LCT due to distance and foreground screening by Craigforth (not significant).

Table 7.10 LCT 153 - Carselands: Assessment of Effects

Landscape Receptors	<ul style="list-style-type: none"> • Flat, open, large scale Carselands of predominantly open agricultural landcover forming the floor and former floodplains of the River Forth. • Landscape setting of Stirling, Stirling Castle and the Touch and Gargunnoch Hills. • Scattered farmsteads along the valley floor. • Trunk roads run in parallel to the northern and southern perimeters of the Carselands. • Recent expansion of settlement boundaries at edge of carse. • Agricultural buildings on open carseland. • Open views across carse accentuated by consequent dramatic contrast with the adjacent escarpments of the adjacent hills and crag-and-tail features of Craigforth, Abbey Craig and Castle Craig. • Commercial development of office buildings in adjoining Urban LCT on the north side of Craigforth (including The North Site) has important indirect influence on character of immediately adjoining part of this LCT.
Landscape Sensitivity	This is a medium valued landscape with medium susceptibility to change of the type proposed. Sensitivity is considered to be Medium .

Potential Effects	<ul style="list-style-type: none"> Limited localised indirect effects owing to existing mature tree belts and groups alongside A84, River Forth and M9 corridor. Indirect effects to south limited by Craigforth and associated mature tree planting.
Magnitude of Change	Magnitude of change is anticipated to be Medium during construction and reducing to Low-Medium following completion and further reducing to Low after 10 years with maturing of mitigation tree planting.
Effects Significance	The landscape effect is anticipated to be Moderate Adverse during construction, reducing to Minor- Moderate Adverse following completion and further reducing to Minor Adverse after 10 years with maturing of mitigation tree planting (not significant).

Table 7.11 LCT 0 – Urban; Peripheral Residential and Commercial: Assessment of Effects

Landscape Receptors	<ul style="list-style-type: none"> Skyline dominated by Stirling Castle on its crag rising above the carse. Wallace Monument on Abbey Craig (outwith the study area). Urban commercial and residential spread especially in the East - West A84 corridor. The settlements of Cambusbarron to the South and Bridge of Allan to the North with historic characters of their own. Post-war social housing in the Raploch and Cornton.
Landscape Sensitivity	This is a medium valued landscape with low susceptibility to change of the type proposed. Sensitivity is considered to be Low-Medium .
Potential Effects	<ul style="list-style-type: none"> This is the LCT within which the Proposed Development (Detailed Application) is located. There would therefore be direct effects during both construction and operation, associated with the erection of the new Office HQ building upon what is currently a car parking area. Although there would be a limited amount of localised tree removal associated with this, there would also be a substantial amount of new tree planting to mitigate any loss and to soften and screen the Proposed Development as it matures. There would also be indirect effects on the character of the neighbouring parts of the LCT although since these already contain a number of existing commercial buildings this would reduce both the sensitivity to further such development and the magnitude of the change.
Magnitude of Change	Magnitude of change is therefore anticipated to be Medium during construction, reducing to Low-Medium following completion and further reducing to Low after 10 years, with maturing of mitigation tree planting.
Effects Significance	The landscape effect is anticipated to be Moderate Adverse during construction, reducing to Minor-Moderate Adverse following completion and further reducing to Minor Adverse after 10 years with maturing of mitigation tree planting (not significant).

Southern Hills Local Landscape Area

7.3.28 The landscape effects of the Proposed Development (Detailed Application) on the LLA would be identical to those predicted for LCT 150 - Lowland Hill Fringes-Central i.e., Negligible during construction and following completion and remaining Negligible after 10 years, as growth of mitigating tree planting will have limited effect from this LCT. This, like the overall assessment, is due to distance and foreground screening by Craigforth. This would not therefore lead to any adverse effects on the LLAs Special Qualities as described above in paragraph 8.3.10; nor would it have any effect upon the integrity of the LLA.

Summary of Landscape Effects; Proposed Development (Detailed Application)

7.3.29 Anticipated landscape effects arising from the Proposed Development (Detailed Application) are summarised in Table 7.12 below. For the purposes of this assessment, those effects with a Moderate rating or greater should be considered to be significant. As can be seen from the table, although LCTs 153; Carselands and 0; Urban; Peripheral Residential and Commercial would receive Moderate and therefore significant effects during the construction period, these would reduce to Minor-Moderate during year one of operation, reducing to Minor after 10 years with the maturing mitigation planting (i.e. negligible residual effects). Both LCT 150; Lowland Hill Fringes – Central and the Southern Hills LLA would experience Negligible (non-significant) effects both during construction and operation.

Table 7.12 Summary of Landscape Effects: Proposed Development (Detailed Application)

LCT / LLA	Effect During Construction						Effect During Operation (Year 1)						Effect During Operation (Year 10)					
	Not Significant			Significant			Not Significant			Significant			Not Significant			Significant		
	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
150; Lowland Hill Fringes – Central	X						X						X					
153; Carselands				X				X						X				
0; Urban; Peripheral Residential and Commercial				X				X						X				
Southern Hills LLA	X						X						X					

Visual Effects

7.3.30 This Section gives a description of predicted effects arising from the Proposed Development (Detailed Application) on visual receptors identified within the Study Area. Individual receptor references relate to locations indicated on Figure 7.5 and described in Appendix 7.1 which also

provides further information the nature of the predicted effect.

Summary of Effects on Visual Amenity; Proposed Development (Detailed Application)

7.3.31 Anticipated visual effects are summarised in Table 7.13 below. For the purposes of this assessment, those effects with a Moderate rating or greater should be considered to be significant.

7.3.32 As can be seen from the table, there is one residential receptor location that would remain with significant adverse effects after ten years, albeit at a moderate level; Hill of Drip, a farmhouse on an elevated knoll that overlooks the A84 and River Forth - and the North Site – not far from the Stirling Agricultural centre. Although existing foreground trees would partly screen views of the Office HQ building from this location, reflected in the magnitude rating, its elevation means that the proposed tree planting would do little to mitigate effects in this instance. Elsewhere however, including from nearby receptor locations such as Dobbies Garden Centre, the A84 bus pull-in opposite the Dobbies entrance, the Kildean Business Park site and environs, core paths, Chalmerston Road and the M9 off-ramp, residual effects are predicted to be less than significant, ranging from Negligible to Minor-Moderate adverse. This is due to a combination of the existing context of commercial buildings in this area (which reduces both sensitivity to, and magnitude of, the proposed changes) combined with existing mature tree belts and proposed tree planting which would screen all but the upper floors of the building from these locations.

Table 7.13 Summary of Visual Effects; Proposed Development (Detailed Application)

Visual Receptor Location Groups	Effect During Construction						Effect During Operation (Year 1)						Effect During Operation (Year 10)					
	Not Significant			Significant			Not Significant			Significant			Not Significant			Significant		
	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
Residences	9	16	3	1	0	0	9	16	3	1	0	0	9	16	3	1	0	0
Roads	3	3	1	0	1	0	3	3	1	1	0	0	3	3	2	0	0	0
Footpaths	4	2	0	0	0	0	4	2	0	0	0	0	4	2	0	0	0	0

Additional mitigation

7.3.33 Figure 7.6 shows both existing trees to be retained and those proposed on the North Site. As can be seen, extensive new tree planting is proposed along the A84 corridor and within the car park areas. Once mature this would have the effect of screening car park areas and softening the edges and lower floors of the new HQ building especially when experienced from the A84 corridor.

Residual effects

7.3.34 The mitigation measures proposed are considered integral to the design of the Proposed Development (Detailed Application) and therefore the assessment of operational effects assumes that these mitigation measures would be implemented. The operational effects identified after ten years should therefore be considered as residual effects.

Cumulative effects

7.3.35 Cumulative Effects are discussed in Chapter 19.

7.4 Masterplan Assessment (The Proposed Development (PPiP Masterplan))

Assumption and Limitations

7.4.1 All the assumptions and limitations discussed under the Proposed Development (Detailed Application) assessment (paragraph 7.3.1 above) apply equally to this assessment.

7.4.2 It should be noted that this assessment of the Proposed Development (PPiP Masterplan) includes the North Site which is already assessed as a stand-alone study in Section 7.3 above.

7.4.3 It should also be noted that in assessing the central Site, demolition of the existing two, three and four-storey office buildings have been considered in the construction period and have been assumed to have been removed during the operational period. In respect of the latter, in this part of the site, whilst not replacing like-for-like, when assessing effects upon completion and during operation, the receptor sensitivity to the development type and magnitude of change would both be less than if this were a development upon a greenfield site.

Baseline conditions

7.4.4 The baseline for the Proposed Development (PPiP Masterplan) is described in Section 7.3: North Site (Office HQ) Assessment (paragraphs 7.3.2 –7.3.25).

Potential effects

Landscape Effects

7.4.5 The extent to which the Proposed Development (PPiP Masterplan) would affect the existing landscape varies depending on the individual components of the Proposed Development (PPiP Masterplan) and the ability of the existing landscape to accommodate them. This section provides an assessment of the effects of the Proposed Development (PPiP Masterplan) on the LCTs within the Study Area, which then feeds into an assessment of effects on the Special Qualities and integrity of the Southern Hills LLA.

Landscape Character

7.4.6 The following section provides an assessment of the effects that the Proposed Development (PPiP Masterplan) would have on the LCTs during construction and also in the longer term during the operational phase, in accordance with the effects criteria outlined in the methodology above.

Table 7.14 LCT 150 - Lowland Hill Fringes-Central: Assessment of Effects

Landscape Receptors	<ul style="list-style-type: none"> • Undulating, rolling topography rising to larger scale hill landforms. • Transitional landscape linking the open hills and the neighbouring settled valley landscapes. • Diverse landcover of arable and open improved and unimproved pastureland. • Woodland cover including mixed shelterbelts and broadleaf tree clumps. • Scattered residential development and small settlements on slopes. • Minor roads. • Small water bodies, reservoirs, and small watercourses. • Estate landscapes.
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	<ul style="list-style-type: none"> • Hill fringes. • A sense of remoteness and isolation in some areas.
Landscape Sensitivity	This is a medium-high valued landscape with low-medium susceptibility to change of the type proposed. Sensitivity is considered to be Medium
Potential Effects	<ul style="list-style-type: none"> • Limited indirect effects due to intervisibility with North and Central Sites being constrained by Craigforth in mid-ground; with a large part of the LCT being intervisible only with the top of the hotel tower. • There is a wider, but fragmented and not complete, intervisibility with the South apartments and housing.
Magnitude of Change	Due to distance and reduced or fragmented intervisibility, magnitude of change is anticipated to be Low during construction and following completion and reducing to Negligible after 10 years as the growth of mitigating tree planting on the South Site will reduce the effects arising from this closest area. Elsewhere planting will have limited effect due to distance and foreground screening by Craigforth.
Effects Significance	The landscape effect is anticipated to be Minor Adverse during construction and following completion and reducing to Negligible after 10 years as the growth of mitigating tree planting on the South Site will reduce the adverse effects arising from this closest area; (not significant).

Table 7.15 LCT 153 - Carselands: Assessment of Effects

Landscape Receptors	<ul style="list-style-type: none"> • Flat, open, large scale Carselands of predominantly open agricultural landcover forming the floor and former floodplains of the River Forth • Landscape setting of Stirling, Stirling Castle and the Touch and Gargunnoch Hills. • Scattered farmsteads along the valley floor. • Trunk roads run in parallel to the northern and southern perimeters of the Carselands. • Recent expansion of settlement boundaries at edge of carse. • Agricultural buildings on open carseland. • Open views across carse accentuated by consequent dramatic contrast with the adjacent escarpments of the adjacent hills and crag-and-tail features of Craigforth, Abbey Craig and Castle Craig. • Commercial development of office buildings in adjoining Urban LCT on the north side of Craigforth (including The North Site) has important indirect influence on character of immediately adjoining part of this LCT.
Landscape Sensitivity	This is a medium valued landscape with medium susceptibility to change of the type proposed. Sensitivity is considered to be Medium .
Potential Effects	<ul style="list-style-type: none"> • This is the LCT within which the Central Site and the South Site are situated. • Limited localised indirect effects from North Site in adjacent LCT and Central Site owing to existing mature tree belts and groups alongside A84, River Forth and M9 corridor.

	<ul style="list-style-type: none"> • Direct effects from Central Site on north Craigforth area. • Indirect effects from North Site and Central Site to south reduced by Craigforth and associated existing mature tree planting. • However, localised direct and wider indirect effects on the character of the LCT arising primarily from South Site across most of the west and south-west of the LCT; a currently undeveloped open area of rural characteristics.
Magnitude of Change	Due to the relative openness of the carse to the West and South-west of the South site and lack of screening initially, magnitude of change to the LCT is anticipated to be High during construction, reducing to Medium following completion and Low-Medium after 10 years with maturing of peripheral mitigation tree planting.
Effects Significance	Overall, the landscape effect on this LCT is anticipated to be Moderate-Major Adverse during construction, reducing to Moderate Adverse following completion and further reducing to Minor-Moderate Adverse after 10 years with maturing of peripheral mitigation tree planting (not significant).

Table 7.16 LCT 0 – Urban; Peripheral Residential and Commercial: Assessment of Effects

Landscape Receptors	<ul style="list-style-type: none"> • Skyline dominated by Stirling Castle on its crag rising above the carse. • Wallace Monument on Abbey Craig (outwith the study area). • Urban commercial and residential spread especially in the East - West A84 corridor. • The settlements of Cambusbarron to the South and Bridge of Allan to the North with historic characters of their own. • Post-war social housing in the Raploch and Cornton.
Landscape Sensitivity	This is a medium valued landscape with low susceptibility to change of the type proposed. Sensitivity is considered to be Low-Medium .
Potential Effects	<ul style="list-style-type: none"> • This is the LCT within which the North Site is located. The Central Site abuts it in the adjacent LCT as described above. There would therefore be direct effects on the North Site during both construction and operation, associated with the erection of the new Prudential HQ building upon what is currently a car parking area. Although there would be a limited amount of localised tree removal associated with this, there would also be a substantial amount of new tree planting to mitigate any loss and to soften and screen the Proposed Development (PPiP Masterplan) as it matures. • There would also be indirect effects on the character of the neighbouring parts of the LCT from the North Site although since these already contain a number of existing commercial buildings this would reduce both the sensitivity to further such development and the magnitude of the change.

	<ul style="list-style-type: none"> The Central and South Sites would result in indirect effects upon this LCT albeit at a greater distance and it would be of a more limited and fragmented nature owing to a greater degree of tree screening close to the Central Site and topographic and building screening to the South-west.
Magnitude of Change	Magnitude of change is therefore anticipated to be Medium during construction, reducing to Low-Medium following completion and further reducing to Low after 10 years, with maturing of mitigation tree planting.
Effects Significance	The landscape effect is anticipated to be Moderate during construction, reducing to Minor-Moderate following completion and further reducing to Minor after 10 years with maturing of mitigation tree planting (not significant).

Southern Hills Local Landscape Area

7.4.7 The landscape effects of the Site on the LLA would be identical to those predicted for LCT 150 - Lowland Hill Fringes-Central i.e., Minor Adverse during construction and following completion and reducing to Negligible after 10 years as the growth of mitigating tree planting on the South Site will reduce the adverse effects arising from this closest area; (not significant). This would not therefore lead to any effects on the LLAs Special Qualities; nor would it have any effect on the integrity of the LLA.

Summary of Landscape Effects; Proposed Development (PPiP Masterplan)

7.4.8 Anticipated landscape effects arising from the Masterplan Site are summarised in Table 7.17 below. For the purposes of this assessment, those effects with a Moderate rating or greater should be considered to be significant.

7.4.9 As can be seen from the table, although LCTs 153; Carseland and 0; Urban; Peripheral Residential and Commercial would receive Moderate-Major and Moderate respectively (and therefore significant) effects during the construction period, these would reduce to Moderate and Minor-Moderate respectively during year one of operation, reducing ultimately to Minor-moderate and Minor respectively after 10 years with the maturing mitigation planting; in other words, non-significant residual effects.

7.4.10 Both LCT 150; Lowland Hill Fringes – Central and the Southern Hills LLA would experience Minor and Negligible (non-significant) effects during construction and operation respectively.

Table 7.17 Summary of Landscape Effects; Proposed Development (PPiP Masterplan)

LCT	Effect During Construction			Effect During Operation (Year 1)			Effect During Operation (Year 10)					
	Not Significant		Significant	Not Significant		Significant	Not Significant		Significant			
	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major

150; Lowland Hill Fringes – Central		X						X					X					
153; Carselands					X					X				X				
0; Urban; Peripheral Residential and Commercial					X				X					X				
Southern Hills LLA		X						X					X					

Visual Effects

7.4.11 This Section gives a description of predicted effects on visual receptors identified within the Study Area. Individual receptor references relate to locations indicated on Figure 7.5 and described in Appendix 7.2 which also provides further information the nature of the predicted effect.

Summary of Effects on Visual Amenity; Proposed Development (PPiP Masterplan)

7.4.12 Anticipated visual effects are summarised in Table 7.18 below. For the purposes of this assessment, those effects with a Moderate rating or greater should be considered to be significant.

7.4.13 As can be seen from the table, there are six receptor locations that would remain with significant adverse effects after ten years, at a Moderate or Moderate to Major level. These are isolated farmhouses and a minor road located on the Carse of Stirling with unobstructed views of all elements of the South Site proposals, which would lie within an open area south west of Craigforth hill currently undeveloped and rural in nature. These comprise Kaimes farm, which lies immediately adjacent to the south Site and North Kersebonny which lies a little way to the south. In addition, on the carse on the opposite side of the River Forth, Cowden Farm and Cottage, Baad Farm and Chalmerston Road would also receive significant effects. Although mitigated with peripheral tree planting, the residual adverse visual effects on receptors at these locations would nevertheless remain significant.

7.4.14 There is one residential receptor that would remain with significant adverse effects after ten years arising from the North Site development albeit at a moderate level; this is Hill of Drip, a farmhouse on an elevated knoll that overlooks the A84 and River Forth - and the north Site – not far from the Stirling Agricultural centre. Although existing foreground trees would partly screen views of the HQ building from this location, reflected in the magnitude rating, its elevation means that the proposed tree planting would do little to mitigate effects in this instance. Elsewhere however, including from nearby receptor locations such as Dobbies Garden Centre, the A84 bus pull-in opposite the Dobbies entrance, the Kildean Business Park site and environs, core paths, Chalmerston Road and the M9 off-ramp, residual effects are predicted to be less than significant, ranging from Negligible to Minor-Moderate adverse. This is due to a combination of the existing context of commercial buildings in this area (which reduces both sensitivity to, and magnitude of, the proposed changes) combined with existing mature tree belts and proposed tree planting which would screen all but the upper floors of the building from these locations.

7.4.15 Although some potentially significant effects on transient receptors would initially arise from the

Central Site development on the M9 Junction 10 northbound offramp, these would be mitigated both in terms of sensitivity to change of the type proposed and the magnitude of change by the presence of the existing two, three and four storey office buildings on the site which are to be demolished to make way for the new facilities, which would include a six or seven storey hotel building. Retention of the existing mature peripheral tree screening, the topographic screening afforded by Craigforth and extensive mature tree planting along both sides of the motorway corridor further ensure that residual visual effects arising from this element of the masterplan after year ten would not be significant.

7.4.16 It should further be noted that no significant effects arising from the Proposed Development (PPiP Masterplan) would accrue to either Stirling Castle and environs or to the Wallace Monument.

Table 7.18 Summary of Visual Effects; Proposed Development (PPiP Masterplan)

Visual Receptor Location Groups	Effect During Construction						Effect During Operation (Year 1)						Effect During Operation (Year 10)					
	Not Significant			Significant			Not Significant			Significant			Not Significant			Significant		
	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
Residences	5	15	3	1	3	2	5	15	3	1	3	2	5	16	2	4	2	0
Roads	0	3	2	0	3	0	0	3	2	2	1	0	0	5	2	1	0	0
Footpaths	0	6	0	0	0	0	0	6	0	0	0	0	0	6	0	0	0	0

Additional mitigation

7.4.17 Figure 7.7 shows both existing trees to be retained and those proposed on the Masterplan Site. As can be seen, extensive new tree planting is proposed at the following locations.

- North Site; tree planting along the A84 corridor and within the car park areas. Once mature this would have the effect of screening car park areas and softening the edges of the new HQ building especially when experienced from the A84 corridor. In addition, an existing area of rough grass to the west as far as the River Forth would be transformed into an informal parkland setting with native trees and shrubs. Existing mature and semi-mature trees would be retained and protected as much as possible.
- Central Site; along the River Forth corridor, M9 corridor and within car park areas. Once mature these would screen and soften the edges of this part of the Proposed Development (PPiP Masterplan) and tie them into the existing Craigforth structure planting. Existing mature and semi-mature trees would be retained and protected as much as possible.
- South Site; along the River Forth corridor; peripheral tree planting; and a large area of native woodland planting to the south. Once mature, these would screen and soften the edges of this part of the Proposed Development (PPiP Masterplan) and tie them into the existing Craigforth structure planting.

Residual effects

7.4.18 The mitigation measures proposed are considered integral to the design of the Proposed

Development (PPiP Masterplan) and therefore the assessment of operational effects assumes that these mitigation measures would be implemented. The operational effects identified after ten years should therefore be considered as residual effects.

Cumulative effects

7.4.19 Cumulative Effects are discussed in Chapter 19.

7.5 Summary

Proposed Development (Detailed Application)

Landscape Character

7.5.1 Although LCTs 153; Carselands and 0; Urban; Peripheral Residential and Commercial will receive significant effects during the construction period, these will reduce during year one of operation and ultimately, after ten years with the maturing mitigation planting, to non-significant levels.

7.5.2 Both LCT 150; Lowland Hill Fringes – Central and the Southern Hills LLA would experience Negligible and therefore non-significant effects both during construction and operation.

Visual Amenity

7.5.3 There is one residential receptor location that would remain with significant adverse effects after ten years arising from the North Site development albeit at a moderate level; a farmhouse on an elevated knoll that overlooks the A84 and River Forth - and the North Site – not far from the Stirling Agricultural centre. Elsewhere, including from nearby receptor locations, residual effects are predicted to be less than significant, ranging from Negligible to Minor-Moderate adverse. This is due to a combination of the existing context of commercial buildings in this area combined with existing mature tree belts and proposed tree planting which would generally screen all but the upper floors of the building.

Statement of Significance

7.5.4 Based upon the findings of the LVIA above, the overall effect of the North Site Proposed Development (Detailed Application) on the Landscape and Visual resource of the study area is not considered to be significant.

Proposed Development (PPiP Masterplan)

Landscape Character

7.5.5 Although LCTs 153; Carseland and 0; Urban; Peripheral Residential and Commercial will receive significant effects during the construction period, these will reduce during year one of operation, and ultimately after ten years with the maturing mitigation planting, non-significant residual effects will result. Both LCT 150; Lowland Hill Fringes – Central and the Southern Hills LLA would experience non-significant landscape effects during construction and operation.

Visual Amenity

7.5.6 There are six residential receptor locations with residual significant adverse effects. These are all isolated farmhouses and a minor road located on the Carse of Stirling with close, unobstructed views of all elements of the South Site proposals, which would lie within an open area south west of Craigforth hill currently undeveloped and rural in nature. Although mitigated with peripheral tree planting, the adverse visual effects on receptors at these locations would nevertheless remain significant.

7.5.7 There is one residential receptor location that would also remain with significant adverse effects

after ten years arising from the North Site development and this has been summarised above.

- 7.5.8 Although some potentially significant effects on transient receptors would initially arise from the Central Site development on the M9 northbound offramp, these would be mitigated by the presence of the existing office buildings on the site which are to be demolished to make way for the new facilities. Retention of the existing mature peripheral tree screening, the topographic screening afforded by Craigforth and extensive mature existing tree planting along both sides of the motorway corridor further ensure that residual visual effects arising from this element of the masterplan after year ten would not be significant.
- 7.5.9 It should be noted that no significant effects arising from the Proposed Development (PPiP Masterplan) would accrue to either Stirling Castle and environs or to the Wallace Monument.

Statement of Significance

- 7.5.10 Based upon the findings of the LVIA above, the overall effect of the Proposed Development (PPiP Masterplan) on the Landscape and Visual resource of the study area is not considered to be significant.

7.6 References

- Guidelines for Landscape and Visual Impact Assessment (Third Edition), 2013, published by the Landscape Institute and the Institute of Environmental Management and Assessment (GLVIA3)
- Landscape Character Types and descriptions; Scottish Natural Heritage (SNH) National Landscape Character Assessment
- Stirling Local Development Plan (2018);
- Stirling Local Development Plan (2014), legacy non-statutory Supplementary Guidance: SG27 – Protecting Special Landscapes; and SG28: Landscape Character Assessments;
- Stirling Local Development Plan Draft Supplementary Guidance: Biodiversity and Landscape (2019);
- Landscape Character Types and descriptions from the Scottish Natural Heritage (SNH) National Landscape Character Assessment

7.7 Assessor Information

- 7.7.1 The EIA Report has been prepared under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations'). Regulation 5 (5)(b) requires that an outline of relevant expertise or qualifications of contributors accompanies an assessment. The relevant information for the team is provided below for each of the EIA Report chapters.
- 7.7.2 The LVIA has been undertaken by ASH design + assessment Ltd, Chartered Landscape Architects, in accordance with best practice guidance, set out within GLVIA3 (Landscape Institute (LI) / Institute of Environmental Management and Assessment (IEMA), 2013). ASH is a registered practice with the LI, the Chartered body for professional landscape architects, with over 20 years' experience in undertaking LVIA. The assessment has been undertaken and verified by two Landscape Professionals (chartered members of the LI) for robustness.

8 Cultural Heritage

8.1 Introduction

- 8.1.1 This chapter provides an assessment of the potential effects of the Proposed Development on archaeology and cultural heritage. The chapter describes the results of a desk-based assessment and field surveys undertaken by CFA Archaeology Ltd (CFA), and draws on comments provided by Historic Environment Scotland (HES) and Stirling Council in their Scoping Opinions.
- 8.1.2 The assessment separately considers the potential direct effects on assets within the Site Boundary (Proposed Development (PPiP Masterplan)) and direct effects arising during construction of the North Site (Proposed Development (Detailed Application)).
- 8.1.3 Potential effects of the Proposed Development on the settings of heritage assets in the wider landscape (Outer Study Areas) are also assessed for both the North Site (Detailed Application) and for the PPiP Masterplan.
- 8.1.4 The specific objectives of the chapter are to:
- Identify the cultural heritage baseline within the Proposed Development;
 - Assess the archaeological potential of the Proposed Development;
 - Consider the potential effects of the Proposed Development upon the baseline cultural heritage resource; and,
 - Propose measures, where appropriate, to mitigate any predicted adverse effects.
- 8.1.5 This chapter is supported by the following figures and technical appendices:
- Figure 8.1: Cultural Heritage: North Site (Proposed Development (Detailed Application));
 - Figure 8.2: Cultural Heritage: Outer Study Area - North Site ZTV;
 - Figure 8.3: Cultural Heritage: Masterplan Site Boundary (PPiP Masterplan);
 - Figure 8.4: Cultural Heritage: Outer Study Area - PPiP Masterplan ZTV; and,
 - Appendix 8.1: Gazetteer of Heritage Assets within and in the vicinity of the Site Boundary (Figures 8.1 and 8.3).

8.2 Legislation, Planning and Guidelines

- 8.2.1 Relevant legislation and guidance documents have been reviewed and considered as part of the cultural heritage assessment. Chapter 5 (Planning Policy) sets out the planning policy framework that is relevant to the EIA.

Legislation

- 8.2.2 The scope of the assessment has been informed by the following legislation:
- The Ancient Monuments and Archaeological Areas Act 1979¹;
 - Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997²;
 - Town and Country Planning (Development Management Procedure) (Scotland)

¹ UK Government (1979) 'Ancient Monuments and Archaeological Areas Act'. HMSO. London. available at: http://www.legislation.gov.uk/ukpga/1979/46/pdfs/ukpga_19790046_en.pdf

² UK Government (1997) 'Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 (as amended by Town and Country Planning (Historic Environment Scotland) Amendment Regulations 2015)'. HMSO. London. available at: http://www.legislation.gov.uk/ukpga/1997/9/pdfs/ukpga_19970009_en.pdf

Regulations 2013³;

- Historic Environment Scotland Act 2014⁴; and
- Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

Planning Policy

8.2.3 Of relevance to the cultural heritage assessment presented within this chapter, regard has been had to the following policies:

- National Planning Framework for Scotland 3 (NPF3)⁵;
- Scottish Planning Policy (SPP)⁶ (Paragraphs 135-151);
- Historic Environment Policy for Scotland (HEPS)⁷;
- Planning Advice Note 1/2013 (PAN 1): Environmental Impact Assessment⁸;
- Planning Advice Note 2/2011 (PAN 2): Planning and Archaeology⁹; and,
- Stirling Council Local Development Plan 2018¹⁰ (SCLPD).

8.2.4 Relevant policy in the Stirling Local Development Plan are:

- Policy 7.1: Archaeology and Historic Building Recording (designated and undesignated buildings/sites);
- Policy 7.2: Development within and outwith Conservation Areas;
- Policy 7.3: Development affecting Listed Buildings;
- Policy 7.4: Development in Gardens/Curtilages within Conservation Areas and around Listed Buildings;
- Policy 7.7: Energy Efficiency and Micro-Renewables within Listed Buildings and Conservation Areas; and,
- Policy 7.8: Development affecting Battlefields, Gardens and Designed Landscapes.

Guidance

8.2.5 Recognition has been taken of the following best practice guidelines/guidance:

- Environmental Impact Assessment Handbook (Scottish Natural Heritage (SNH) & Historic Environment Scotland (HES), 2018) ¹¹;
- Designation Policy and Selection Guidance (HES, 2019)¹²;

³ Scottish Government (2013) 'Town and Country Planning (Development Management Procedure) (Scotland) Regulations'. Edinburgh. available at: <http://www.legislation.gov.uk/ssi/2013/155/contents/made>

⁴ Scottish Government (2014) 'Historic Environment Scotland Act'. Edinburgh. available at: http://www.legislation.gov.uk/asp/2014/19/pdfs/asp_20140019_en.pdf

⁵ Scottish Government (2014) 'National Planning Framework for Scotland 3 (NPF3)'. Scottish Government. Edinburgh. available at: <http://www.gov.scot/Publications/2014/06/3539>

⁶ Scottish Government (2014) 'Scottish Planning Policy'. Scottish Government. Edinburgh. available at: <http://www.gov.scot/Resource/0045/00453827.pdf>

⁷ HES (2019a) 'Historic Environment Policy for Scotland'. Historic Environment Scotland. Edinburgh. Available at: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=1bcfa7b1-28fb-4d4b-b1e6-aa2500f942e7>

⁸ Scottish Government (2013) 'Planning Advice Note 1/2013: Environmental Impact Assessment'. Scottish Government. Edinburgh. available at: <http://www.gov.scot/resource/0043/00432581.pdf>

⁹ Scottish Government (2011) 'Planning Advice Note 2/2011: Planning and Archaeology'. Scottish Government. Edinburgh. available at: <http://www.gov.scot/Resource/Doc/355385/0120020.pdf>

¹⁰ Stirling Council (2018) 'Stirling Council Local Development Plan 2018'. Stirling Council. Stirling

¹¹ SNH & HES (2018) 'Environmental Impact Assessment Handbook'. Scottish Natural Heritage & Historic Environment Scotland. Edinburgh. Available at <https://www.nature.scot/sites/default/files/2018-05/Publication%202018%20-%20Environmental%20Impact%20Assessment%20Handbook%20V5.pdf>

¹² HES (2019) 'Designation Policy and Selection Guidance'. Historic Environment Scotland. Edinburgh. Available at: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=8d8bbaeb-ce5a-46c1-a558-aa2500ff7d3b>

- Managing Change in the Historic Environment: Setting (HES, 2016)¹³;
- Standard and Guidance for the Historic Environment Desk-Based Assessment (Chartered Institute for Archaeologists, 2014¹⁴; and
- Stirling Council Local Development Plan - Supplementary Guidance (2019): Historic Environment (Energy Efficiency and Micro Renewables; and Historic Building Recording)¹⁵.

8.3 Assessment method

Study Areas

8.3.1 Three study areas have been used for the assessment:

- The North Site (Proposed Development (Detailed Application)) (Figure 8.1): an area in the northern part of the Site, subject to separate planning application, forms the study area for the identification of heritage assets that could receive direct effects arising from construction of Phase 1 of the Proposed Development (Detailed Application).
- The Masterplan (PPiP) Site Boundary (Figure 8.3): forms the study area for the identification of heritage assets that could receive direct effects arising from the construction of the Proposed Development (PPiP Masterplan).
- Outer Study Areas (Figures 8.2 and 8.4): a 1 km study area extending from each of the Proposed Development site boundaries forms the study area for the identification of heritage assets whose settings may be affected by the Proposed Development. Selected designated heritage assets beyond the Outer Study Areas, which consultees (HES and Stirling Council) specifically asked to be assessed, are included where these fall within the Proposed Development Zone of Theoretical Visibility (ZTV). Only those assets that are referenced in the text are labelled on the figures.

Desk Based Study

8.3.2 The following sources of information were consulted as part of the desk-based assessment:

- Historic Environment Scotland Spatial Data Warehouse¹⁶: provided up-to-date data on the locations and extents of Scheduled Monuments, Listed Buildings, Conservation Areas, Inventory status Garden and Designed Landscapes and Inventory status Historic Battlefields within the Outer Study Area;
- Stirling Council (Historic Environment Records (HER)): provided a digital database extract in GIS for all assets within the Site Boundary;
- The National Record of the Historic Environment (NRHE) database (Canmore)¹⁷: consulted for any information additional to that contained in the HER;
- Relevant bibliographic references, referenced in HER and/or Canmore entries, were consulted to provide background and historic information;

¹³ HES (2016) 'Managing Change in the Historic Environment: Setting'. Historic Environment Scotland. Edinburgh. Available at <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549>

¹⁴ CfA (2014) 'Standard and Guidance for the Historic Environment Desk-Based Assessment' (updated 2017). Chartered Institute for Archaeologists. Reading. Available at [available at: http://www.archaeologists.net/sites/default/files/CodesofConduct.pdf](http://www.archaeologists.net/sites/default/files/CodesofConduct.pdf)

¹⁵ Stirling Council (2019) 'Local Development Plan Supplementary Guidance (2019): Historic Environment (Energy Efficiency and Micro Renewables; and Historic Building Recording)'. Stirling Council. Stirling.

¹⁶ Historic Environment Scotland (2020) Spatial Data Warehouse. Available at: <http://portal.historicenvironment.scot/spatialdownloads> Accessed April 2020

¹⁷ Historic Environment Scotland (2020) The National Record of the Historic Environment database (Canmore). available at: <http://pastmap.org.uk/> Accessed July 2019 and April 2020

- Map Library of the National Library of Scotland: for Ordnance Survey maps and other historical map resources;
- The National Records of Scotland: for estate maps and records; and,
- Historic Land-Use Assessment Data for Scotland (HLAMap)¹⁸: for information on the historic land use character of the site and the surrounding area.

Field surveys

8.3.3 A walk-over field survey within the Masterplan (PPiP) Site Boundary was undertaken on 12th August 2019 in order to:

- Locate and record the character and current condition all visible cultural heritage assets that could be affected by the Proposed Development. This includes both assets identified during the desk-based assessment and any previously unrecognised that were encountered during the survey; and,
- Identify areas with the potential to contain currently unrecorded buried archaeological remains, considering factors such as topography, geomorphology, and current ground conditions.

8.3.4 The baseline character and assessed relative sensitivity of the heritage assets identified within the Inner Study Area (Masterplan (PPiP and North Site (Proposed Development (Detailed Application))) through desk-based assessment and field survey are set out in Technical Appendix 8.1.

8.3.5 Field visits were undertaken to heritage assets in the Outer Study Area on 12th August 2019 in order to assess their baseline settings. The baseline setting of each relevant receptor or related group of receptors has been characterised on a case-by-case basis, based upon its properties and location, and considers the factors set out in 'Managing Change' guidance (HES, 2016)¹⁹.

Consultation

8.3.6 In undertaking the assessment, consideration has been given to the scoping responses provided by HES and Stirling Council as relevant to the Cultural Heritage assessment.

Table 8.1 Consultation Responses

¹⁸ Historic Environment Scotland (2020) Historic Land-Use Assessment Data for Scotland (HLAMap). available at: <http://hlamap.org.uk/> Accessed April 2020

¹⁹ HES (2016) 'Managing Change in the Historic Environment: Setting'. Historic Environment Scotland. Edinburgh

Consultee & Date	Issue Raised	Response
Stirling Council (20/04/2020) Screening Opinion	Advised that the development site is located within the view of Stirling Castle and as such any Proposed Development would have an effect on the view to and from the Castle	Noted. The potential effect on the setting of Stirling Castle is addressed in the assessment (Sections 8.4 and 8.5).
	Advised that the effects of the Proposed Development are unlikely to be significant, subject to the necessary archaeological survey work.	Noted. Appropriate mitigation measures have been discussed with Stirling Council Archaeologist through post-scoping consultation (see below).
HES (05/12/2019) Scoping Response	Recommend that particular attention is paid to the potential for effects on the following heritage assets: <ul style="list-style-type: none"> • Old Drip Bridge over River Forth (LB 6725); • Stirling Castle (SM 90921); and, • Stirling, Royal Garden including King's Knot (SM 90288). 	Noted. The potential effects on the settings of these assets are addressed in the assessment (Sections 8.4 and 8.5).
	Recommended that ZTV analysis is used to identify any additional heritage assets for assessment. Advised that it is not clear why the outer study area proposed has been limited to 1 km and recommended that the EIA should include further analysis demonstrating that significant effects are unlikely beyond that distance.	Noted. The identification of heritage assets for consideration in the assessment is informed by the ZTV (Figures 8.2 and 8.4). Assets beyond 1 km have been included where there is considered to be potential for adverse effects on their setting: <ul style="list-style-type: none"> • Stirling Castle (SM 90921); • Stirling, Royal Garden including King's Knot (SM 90288); and, • The Wallace Monument (LB 41118).
	Advised that, where the potential for adverse effects is identified, visualisations should be produced to allow robust assessment and help refine any mitigation.	Noted. These can be provided if required.

	<p>Advised that the introduction of new development in this location would have the potential to erode the character of Category A Listed Old Drip Bridge and its setting of predominantly open green spaces.</p> <p>Recommended that consideration is given to mitigating the effects described above through the design process.</p>	<p>Noted.</p> <p>The design of the North Site and the PPIP Masterplan developments have taken the setting of Drip Bridge Conservation Area and Category A Listed Old Drip Bridge into account.</p> <p>The open space riverside setting has been retained and will be enhanced through landscaping.</p>
	<p>Advised that the introduction of development in this location would have the potential to affect the setting of Stirling Castle (SM 90921) and Stirling, Royal Garden including King's Knot (SM 90288).</p> <p>Recommended that the EIA should include a detailed assessment of effects on the setting of these heritage assets, and that consideration is given to assessing any effects on views looking towards Stirling Castle with the development in the same view.</p>	<p>Noted.</p> <p>The potential effect on the settings of these assets are addressed in the assessment (Sections 8.4 and 8.5).</p>
<p>Stirling Council (23/04/2020) Scoping Opinion</p>	<p>Advised that retention of historic buildings within the development site is essential.</p>	<p>Noted.</p> <p>Craigforth House and associated structures will be retained and enhanced as part of the proposed PPIP Masterplan.</p>
	<p>In terms of the wider effect on the built and cultural heritage, it is considered that the Proposed Development has the potential to have significant effects.</p>	<p>Noted.</p> <p>An assessment of the effect of the Proposed Development on the settings of designated heritage assets in the wider landscape has informed the design of the Proposed Development and effects are assessed in Sections 8.4 and 8.5.</p>

<p>Stirling Council Conservation Officer (23/04/2020) Scoping opinion</p>	<p>Advised that an application for listed building consent would be required in respect of any proposals to redevelop Craigforth House.</p>	<p>Noted. An application for listed building consent will form part of the PPIP Masterplan application.</p>
	<p>Noted that any built structures pre-dating 1948, within the curtilage of Craigforth House are effectively listed Category B. Any effects on these buildings and features may require listed building consent.</p>	<p>Noted. All built structures associated with Craigforth House, and within its curtilage, will be protected and, where possible, enhanced as part of the PPIP Masterplan (Section 8.5).</p>
	<p>Remnant landscape features within the designed landscape of Craigforth House should be identified and mapped as non-designated assets and effects assessed.</p>	<p>Noted. Field survey has been carried out and features within the Craigforth woodland, associated with the GDL, recorded and mapped (Figure 8.3). These are included in the baseline assessment (Section 8.5 and Appendix 8.1).</p>
	<p>The character of the setting of Drip Bridge Conservation Area requires to be considered.</p>	<p>Noted. The design of the North Site and the PPIP Masterplan developments have taken the setting of Drip Bridge Conservation Area and Category A listed Old Drip Bridge into account. The open space riverside setting has been retained and will be enhanced through landscaping</p>
	<p>The assessment should include non-designated heritage assets including remnant landscape features and associated trees and planting. These are important to understanding and informing decision affecting potential loss or change.</p>	<p>Noted. Field survey has been carried out and features within the Craigforth woodland, associated with the GDL, recorded and mapped (Figure 8.3). These are included in the baseline assessment (Section 8.5 and Appendix 8.1).</p>

	Stirling Town and Royal Park Conservation Area to be included for assessment of effects on its setting.	Noted. The effect on Stirling Town and Royal Park Conservation Area is included in the assessment (Sections 8.4 and 8.5).
	Supplementary Guidance (SG) on conservation character appraisals should be used to inform assessment of effects on their settings.	Noted. The SG has been consulted and used to inform the assessment in Sections 8.4 and 8.5.
Stirling Council Archaeologist (23/04/2020) Scoping opinion	The proposed approach outline in the scoping report is thorough and competent in respect of archaeology.	Noted.
Stirling Council Archaeologist (30/03/2020) consultation	Content that the approach to the EIA was acceptable.	Noted.
	Advised that metal detecting survey and 5% trial trench evaluation of development phases in greenfield areas would be required as the 1st phase of any mitigation requirement.	Noted. Mitigation measures are presented in the relevant sections in the assessment below (paragraphs 8.4.53 to 8.4.64 and paragraphs 8.5.67 to 8.5.77). Detailed scope of works to be agreed through planning conditions.
HES post-scoping consultation (04/06/2020)	Recommended that consideration is given to potential effects on the setting of the Wallace Monument (Category A listed building, LB 41118)	Noted. The effect on the setting of the Wallace Monument is included in Sections 8.4 and 8.5.

Criteria for the Assessment of Effects

8.3.7 The effects of the Proposed Development on heritage assets have been assessed on the basis of their type (direct effects, effects on setting and cumulative effects) and nature (adverse or beneficial). The assessment takes into account the value/sensitivity of the heritage asset and its setting and the magnitude of the predicted effect.

- Adverse effects are those that detract from or reduce cultural significance or special interest of heritage assets.
- Beneficial effects are those that preserve, enhance, or better reveal the cultural significance or special interest of heritage assets.

8.3.8 The assessment of significance of effects has been undertaken using two key criteria: the sensitivity of the cultural heritage asset and the magnitude of the predicted effect, which measures the degree of change to the baseline condition of an asset resulting from the Proposed Development.

Criteria for Assessing the Sensitivity of Heritage Assets

8.3.9 Cultural heritage assets are given weight through the designation process. Designation ensures that sites and places are recognised by law through the planning system and other regulatory processes. The level of protection and how a site or place is managed varies depending on the type of designation and its laws and policies (HES, 2019)²⁰.

8.3.10 Table 8.2 summarises the relative sensitivity of those heritage assets relevant to the Proposed Development (excluding, in this instance, World Heritage Sites and Marine Resources).

Table 8.2 Sensitivity of Heritage Asset

Sensitivity of Asset	Definition / Criteria
High	Assets valued at an international or national level, including: Scheduled Monuments Category A Listed Buildings Inventory Gardens and Designed Landscapes Inventory Historic Battlefields Non-designated assets that meet the relevant criteria for designation
Moderate	Assets valued at a regional level, including: Archaeological sites and areas that have regional value (contributing to the aims of regional research frameworks) Non-Inventory Designed Landscapes (NIDL) (where these are identified in Local Authority records) Category B Listed Buildings Conservation Areas
Low	Assets valued at a local level, including: Archaeological sites that have local heritage value Category C listed buildings Unlisted historic buildings and townscapes with local (vernacular) characteristics
Negligible	Assets of little or no intrinsic heritage value, including: Artefact find-spots (where the artefacts are no longer in situ and where their provenance is uncertain) Poorly preserved examples of particular types of features (e.g. quarries and gravel pits, dilapidated sheepfolds, etc)

Criteria for Assessing the Magnitude of Effect

8.3.11 Criteria for assessing the magnitude of effect (adverse or beneficial) are presented in Table 8.3.

²⁰ HES (2019c) 'Designation Policy and Selection Guidance'. Historic Environment Scotland. Edinburgh.

Table 8.3 Magnitude of Effect

Magnitude of Effect	Description	
	Adverse	Beneficial
High	<p>Changes to the fabric or setting of a heritage asset resulting in the complete or near complete loss of the asset's cultural significance.</p> <p>Changes that substantially detract from how a heritage asset is understood, appreciated and experienced.</p>	<p>Preservation of a heritage asset in situ where it would otherwise be completely or almost completely lost.</p> <p>Changes that appreciably enhance the cultural significance of a heritage asset and how it is understood, appreciated and experienced.</p>
Medium	<p>Changes to those elements of the fabric or setting of a heritage asset that contribute to its cultural significance such that this quality is appreciably altered.</p> <p>Changes that appreciably detract from how a heritage asset is understood, appreciated, and experienced.</p>	<p>Changes to important elements of a heritage asset's fabric or setting, resulting in its cultural significance being preserved (where this would otherwise be lost) or restored.</p> <p>Changes that improve the way in which the heritage asset is understood, appreciated, and experienced.</p>
Low	<p>Changes to those elements of the fabric or setting of a heritage asset that contribute to its cultural significance such that this quality is slightly altered.</p> <p>Changes that slightly detract from how a heritage asset is understood, appreciated and experienced.</p>	<p>Changes that result in elements of a heritage asset's fabric or setting detracting from its cultural significance being removed.</p> <p>Changes that result in a slight improvement in the way a heritage asset is understood, appreciated and experienced.</p>
Negligible	<p>Changes to fabric or setting of a heritage asset that leave its cultural significance unchanged and do not affect how it is understood, appreciated and experienced.</p>	

Assessing Effects on Setting

8.3.12 Historic Environment Scotland guidance, 'Managing Change in the Historic Environment: Setting' (HES, 2016)²¹, notes that:

"Setting can be important to the way in which historic structures or places are understood, appreciated and experienced. It can often be integral to a historic asset's cultural significance."

"Setting often extends beyond the property boundary or 'curtilage' of an individual historic asset into a broader landscape context".

8.3.13 The guidance also advises that:

"If proposed development is likely to affect the setting of a key historic asset, an objective written assessment should be prepared by the applicant to inform the decision-making process. The conclusions should take into account the significance of the asset and its setting and attempt to quantify the extent of any impact. The methodology and level of information should be tailored to the circumstances of each case".

8.3.14 The guidance recommends that there are three stages in assessing the effect of a development

²¹ HES (2016) 'Managing Change in the Historic Environment: Setting'. Historic Environment Scotland. Edinburgh.

on the setting of a historic asset or place:

- Stage 1: identify the historic assets that might be affected by the proposed development;
- Stage 2: define and analyse the setting by establishing how the surroundings contribute to the ways in which the historic asset or place is understood, appreciated and experienced; and
- Stage 3: evaluate the potential impact of the proposed changes on the setting, and the extent to which any negative impacts can be mitigated.

Criteria for Assessing Significance

8.3.15 The sensitivity of the asset (Table 8.2) and the magnitude of the predicted effect (Table 8.3) are used to inform an assessment of the significance of the effect (direct effect or effect on setting), summarised using the formula set out in the matrix in Table 8.4. Where two outcomes are possible through application of the matrix, professional judgement supported by reasoned justification, has been employed to determine the level of significance.

Table 7.1 Significance of Effects Matrix

Magnitude of Effect	Sensitivity of Asset			
	High	Medium	Low	Negligible
High	major	major / moderate	moderate / minor	minor
Medium	major / moderate	moderate	minor	minor / negligible
Low	moderate / minor	minor	minor / negligible	minor / negligible
Negligible	minor	minor / negligible	minor / negligible	negligible

8.3.16 Major and moderate effects are considered to be 'significant' in the context of the 'Town and Country Planning (Environmental Impact Assessment) Regulations 2017'²² (the EIA Regulations). Minor and negligible effects are considered to be 'not significant'.

8.4 North Site (Detailed Application) Assessment (Figures 8.1 and 8.2)

Assumption and Limitations

- 8.4.1 The desk-based assessment draws on the records in the HER, provided in a digital GIS dataset acquired in July 2019. It is assumed that those records were complete and up to date at the time of acquisition.
- 8.4.2 Designated heritage assets in the Outer Study Area (Figure 8.2) have been identified from the HES database²³ downloaded from the HES website in April 2020. That data is assumed to have been current and up to date at the time of acquisition.
- 8.4.3 The baseline assessment draws on the results of the desk-based assessments and field surveys carried out and sufficiently characterises the cultural heritage across the North Site (Figure 8.1).

²² Scottish Government (2017) The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, Edinburgh, available at: http://www.legislation.gov.uk/ssi/2017/102/pdfs/ssi_20170102_en.pdf

²³ Historic Environment Scotland (2020) Spatial Data Warehouse (<http://portal.historicenvironment.scot/spatialdownloads>) Accessed April 2020

Baseline conditions

- 8.4.4 There are no known remains of the prehistoric period within or in the immediate vicinity of the North Site.
- 8.4.5 A Roman road (30), possibly following the course of the modern A84 trunk road from Drip Bridge to Bochart, is thought to have crossed the River Forth via a ford (24) near Drip Bridge. However, the line of the Roman Road between Stirling and Dunblane is not known and field investigations have so far proven negative; no trace of this road has been confirmed to date. In all likelihood, any remains of a Roman Road are likely to underlie the current A84. Any surviving remains of a Roman Road in this area would be a heritage asset of value at the regional level and of moderate sensitivity.
- 8.4.6 The fording point at Drip Bridge (24) is thought to be the site of an important medieval ford on the road from Stirling to Doune (McKean, 1985²⁴). A ford is clearly indicated here in the late 16th century, being described in texts by the mapmaker Timothy Pont as 'Druyip foord'. In 1715, a ferry (2) is known to have operated over the River Forth here (Mair, 1990²⁵) and is depicted as such on Roy's 'Military Survey of Scotland' map (1747-55)²⁶. The ford and later ferry have some historical interest and are assessed as being of value at the local level and of low sensitivity.
- 8.4.7 Drip Old Bridge (1) was constructed by public subscription around 1773 as a replacement for the former ferry (2) and the earlier fording place (24). The bridge is no longer used for vehicular traffic. It is a Category A Listed Building (LB 6725), a heritage asset of value at the national level and of high sensitivity.
- 8.4.8 On the banks of the River Forth, just to the south of Drip Bridge a possible boat naust (16), recorded in the HER as being a surface depression 0.5 m deep, about 3 m wide and around 5 m long, is thought to have been located on the east bank of the River Forth. The possible naust (a shelter or housing for a boat) may be related to the former ferry known to have existed at this location and it is accordingly assessed as potentially being a heritage asset of value at a local level and of low sensitivity.
- 8.4.9 A possible track (20) along the east side of the River Forth is also recorded in the HER south of Drip Bridge. It may have some association with the former ferry but is of little or no heritage importance and is accordingly assessed as being a heritage asset of little or no intrinsic heritage value and of negligible sensitivity.
- 8.4.10 The North Site lies within the wider floodplain of the Forth valley (Carse of Stirling); an area characterised by now drained wetlands that would have been an attractive environment in prehistoric and medieval times as hunting grounds and for settlement.
- 8.4.11 HLAmap²⁷ records that the North Site is partially made up of rectilinear fields and farming and partly as industrial or commercial land. The HLAmap assessment is supported by historical map evidence, which shows that in the mid-19th century the North Site was composed of two large fields. In more recent times, the eastern half of the North Site has been in use as car parking and office accommodation and the western half is currently unmanaged open ground.
- 8.4.12 The undeveloped land of the North Site, west of the current offices and car parking, has some potential for the survival of buried remains of any period; from the prehistoric to the present day

²⁴ McKean C (1985): Stirling & the Trossachs, An illustrated architectural guide, Rutland Press, Edinburgh

²⁵ Mair C (1990): Stirling The Royal Burgh, John Donald Publishers Ltd: Edinburgh p 130

²⁶ Roy, W (1747-1755) 'A Military Survey of Scotland'. British Library, London.

²⁷ Historic Environment Scotland (2020) Historic Land-Use Assessment Data for Scotland (HLAmap) (<http://hlamap.org.uk/>) Accessed April 2020

with some higher potential for the presence of remains of Roman or medieval date associated with the historical use of the Drip Bridge location as a crossing point (former ford and later ferry) on the River Forth.

Changes likely to occur over time in the absence of developing the Proposed Development (Detailed Application)

- 8.4.13 If the North Site was not to proceed, there would likely be no change to the baseline condition of the various heritage assets that presently survive in that area. The current commercial occupation and car-parking would likely continue unless and until alternative proposals for use are brought forward. The setting of Drip Old Bridge would remain as it currently is with unused open ground along the east side of the River Forth between the bridge and Craigforth Hill. The future of Craigforth House would remain uncertain and subject to change dependent on future use and management of the property.
- 8.4.14 The setting of heritage assets in the wider landscape would remain as they currently are, subject to later development proposals giving rise to separate effects on their settings.

Potential effects

Direct effects

- 8.4.15 Any ground-breaking activities required during development of the North Site (such as those required for construction of buildings, roads and footpaths, car parking, installation of services and utilities, etc) have the potential to disturb or destroy heritage assets. Other construction activities, such as vehicle movements, soil and overburden storage and landscaping, also have the potential to cause direct, permanent, and irreversible effects on heritage assets.
- 8.4.16 The North Site (Proposed Development (Detailed Application)) layout has been designed to avoid effects on the known heritage assets in that area and to respect the settings of designated heritage assets.
- 8.4.17 There are no currently known heritage assets that will be directly affected by Proposed Development (Detailed Application).
- 8.4.18 It is possible that undiscovered, buried remains survive in the previously undeveloped ground to the west of the existing car parking area and development of that area could, in the absence of appropriate mitigation, have direct adverse effects on any remains in that area.

Setting effects

- 8.4.19 The presence of the Proposed Development (Detailed Application) could result in adverse effects on the setting of cultural heritage assets within the Outer Study Area and within the wider landscape. Potential effects on the settings of heritage assets would, however, diminish with increasing distance from the Proposed Development and beyond 1 km, the Proposed Development would, in most cases, not appreciably alter aspects of the setting of the heritage assets that contribute to their cultural significance, nor would it appreciably alter how a heritage asset is understood, appreciated and experienced.
- 8.4.20 Based on the advice in the Scoping Opinions from HES and Stirling Council (Table 8.1), the assessment below considers the potential effect of the Proposed Development on seven heritage assets:
- Craigforth House LB 15294) and non-designated designed landscape;
 - Stirling Castle (SM 90291);
 - Stirling, Royal Garden including King's Knot (SM 90288);

- Old Drip Bridge over River Forth (LB 6725);
- Drip Bridge Conservation Area (including listed buildings within the conservation area);
- Stirling Town and Royal Park Conservation Area; and
- The Wallace Monument (LB 41118).

8.4.21 The assessment has been carried out with reference to the layout and scale of the Proposed Development (Detailed Application) and the locations of cultural heritage assets shown on Figures 8.1 and 8.2. The criteria detailed in Tables 8.2 and 8.3 have been used to assess the nature and magnitude of the effects which are set out in Table 8.4 Craigforth House (LB 15294) and non-designated designed landscape

8.4.22 Craigforth House is 17th or early 18th century in date and stands on the north-east side of Craigforth Hill. Its front façade is oriented to face the north-east and, in its original form, it commanded an extensive prospect over the Forth valley towards Bridge of Allan and to the Ochil Hills. The House is shown on Roy's 'Military Survey of Scotland' map (1747-55)²⁸ enclosed within a woodland setting with a designed vista, comprised of an avenue of trees aligned to the north-east, directing a view from the House to the confluence of the River Allan with the River Forth. It currently lies within, and is part of, the Prudential Offices campus and the vista to the north-east is partially, but not significantly, obscured by trees within the campus and along the M9 corridor. The House can be seen from the M9, when travelling south.

8.4.23 The ZTV (Figure 8.2) shows that the topography of Craigforth Hill partially obstructs visibility to the north-west from the House. The current woodland surrounding the House and on Craigforth Hill, and the layout of buildings to the north of the House, also obstruct the view to the north-west from the House.

8.4.24 The proposed new office building would be an addition to the existing office building in the North Site (Lomond House), which would be retained and, as a consequence of the screening provided by the woodland on Craigforth Hill, there would be no visibility of the proposed new building on the North Site.

8.4.25 The introduction of the Proposed Development (Detailed Application) would represent a barely detectable change in surroundings of Craigforth House and its enclosed setting on the north-east side of Craigforth Hill would not be altered as a result of the Proposed Development. The historically important vista to the north-east from the House would not be affected by the Proposed Development (Detailed Application).

8.4.26 Overall, the Proposed Development (Detailed Application) would have a negligible magnitude effect on the setting of Craigforth House, assessed as being of **negligible** significance: not significant in EIA terms.

Stirling Castle (SM 90921)

8.4.27 Stirling Castle was one of the most important royal castles of medieval and early modern Scotland. Occupying a volcanic outcrop, it commands extensive panoramic views over the Forth Valley, with important views westwards that include Craigforth Hill. The Inventory description²⁹ describes how the "*views to the west and south-west of the castle were an essential element in the amenity of its occupants from at least the 1540's ... In the foreground of these views was land set aside for a royal hunting forest ... while there were formal gardens immediately below the walls ... the distant views are closed off by the Touch Hills ... and by the*

²⁸ Roy, W (1747-1755) 'A Military Survey of Scotland'. British Library. London.

²⁹ <http://portal.historicenvironment.scot/designation/SM90291>

southern Highlands and Menteith".

8.4.28 The ZTV (Figure 8.2) shows that the Proposed Development (Detailed Application) would be visible from the ramparts of Stirling Castle, along its west side. The proposed new North Site office building would be 2 km to the north-west of the Castle ramparts, at its nearest point, and seen beyond modern residential housing (Raploch Estate) and commercial development (Castle Business Park) in the foreground of the view and the M9 motorway in the middle distance.

- When travelling west to east along the A84, the view of Stirling Castle is presently obscured by tree planting along the A84 at its junction with the M9, including that within the large island enclosing the northbound slip road. That island woodland includes remnant plant of shelterbelt woodland that is part of the historic Craigforth House Garden and Designed Landscape (GDL). From this western approach to Stirling, views of Stirling Castle would not be adversely affected by the proposed new office building.
- Views of Stirling Castle from the Drip Bridge Conservation Area, at the west end of the Category A Listed Old Drip Bridge, from where the Castle can be currently seen above and beyond, are currently partly obscured by, the trees and woodland around the A84/M9 interchange. This viewpoint is an important aspect of the setting of Stirling Castle as the Conservation Area and the listed bridge, mark a historic crossing of the River Forth on the western approach to Stirling. From this historic crossing point, sight of Stirling Castle would be further obscured from view by the proposed new office building.
- Views of the Castle in other approaches to Stirling, such as those from the M9 motorway when travelling north to south or south to north, would be unaffected by the Proposed Development (Detailed Application).

8.4.29 The introduction of the Proposed Development (Detailed Application) would represent a barely detectable change in the wider landscape surroundings when viewed from Stirling Castle and would affect very few views of the Castle from the surrounding landscape. The Proposed Development (Detailed Application) would, however, have an adverse effect on one small but important aspect of the Castle's setting: the view from Drip Bridge. Although this historically important viewpoint would be adversely affected, the cultural significance and special qualities of the Castle would not be adversely affected. It would remain possible for any visitor to understand and appreciate the setting of Stirling Castle.

8.4.30 Overall, the Proposed Development (Detailed Application) would have a negligible magnitude effect on the setting of Stirling Castle, assessed as being of **minor** significance: not significant in EIA terms.

Stirling Royal Garden including King's Knot (SM 90288)

8.4.31 The Royal Gardens, including the King's Knot, comprises the surviving physical remains of part of the royal gardens at the foot of Stirling Castle, and is the most extensive and best-preserved example of a royal garden of the renaissance period in Scotland. The Inventory description³⁰ describes how the Kings Knot "*was designed to be viewed from Stirling Castle ... [and that] ... the main view from the King's Knot is of the Castle to its north-east, and the view is open to the north and west. To the south-east, housing development has extended to the boundary of the park*".

8.4.32 The ZTV (Figure 8.2) shows that the Proposed Development (Detailed Application) would be

³⁰ <http://portal.historicenvironment.scot/designation/SM90291>

theoretically visible from within the Royal Garden and King's Knot, around 1.9 km to the north-west at its nearest point. In practice, tree planting around the edges of the open space of the Royal Garden and King's Knot would screen out views of the Proposed Development (Detailed Application). Views of the Royal Garden and King's Knot from Stirling Castle and from the lower lying approaches to the parkland from the north, west and south would be unaffected by the Proposed Development (Detailed Application). Views up from the open space to the ramparts of Stirling Castle would also be unaffected. Enjoyment of the open space Royal Garden and King's Knot would not be affected by the Proposed Development (Detailed Application).

- 8.4.33 The introduction of the Proposed Development (Detailed Application) would represent a barely detectable change to the wider landscape surroundings of Royal Garden and King's Knot, and the cultural significance and special qualities of the garden would not be adversely affected. It would remain possible for any visitor to understand, appreciate and experience the gardens and their setting.
- 8.4.34 Overall, the Proposed Development (Detailed Application) would have a negligible magnitude effect on the setting of Stirling Castle, Royal Garden and King's Knot, assessed as being of **minor** significance: not significant in EIA terms.

Drip Old Bridge over River Forth (LB 6725)

- 8.4.35 Drip Old Bridge crosses east to west over the River Forth, immediately to the north-west of the North Site. Currently used only as a pedestrian bridge it occupies a low-lying riverside location with open views to the south-east along the riverbank towards Craigforth Hill. The old bridge lies directly to the south of a modern bridge that carries the modern A84 over the river and connects the small hamlet, and Conservation Area, of Drip Bridge with the A84 and access to Stirling to the east. Important aspects of the setting of Drip Old Bridge include views to the west across open fields to Hill of Drip, a low rise of ground now occupied by a farmstead, and to Drip Moss and the Touch Hills beyond. The view eastwards over the bridge is also an important aspect of its setting, as it lies on the approach to Stirling from the west and marks a historically important crossing of the River Forth. Stirling Castle can be seen, currently partly obscured by trees and woodland around the A84/M9 interchange from the west end of the bridge.
- 8.4.36 The Proposed Development (Detailed Application) has been designed to provide a meaningful and respectful stand-off buffer between the bridge and the proposed new office building, and to provide a landscaped riverside frontage, enhancing the current largely derelict character of the open space along the riverbank.
- 8.4.37 The ZTV (Figure 8.2) shows that the Proposed Development (Detailed Application) would be visible from the bridge and the proposed new office building would be around 200 m to the east of the east end of the bridge.
- 8.4.38 The introduction of the Proposed Development (Detailed Application) would represent a slight but noticeable change to the setting of Drip Bridge. The proposed new office building would occupy a position where it would obscure views of Stirling Castle, a view that is a small but important aspect of the setting of the bridge. On the other hand, the view to the south and east along the River Forth and across the open ground to Craigforth Hill would not be adversely affected and the current riverside setting of open ground would be retained as part of the Proposed Development (Detailed Application), and enhanced as part of the wider PPIp Masterplan development.
- 8.4.39 Overall, considering the retention of the current open riverside setting, the Proposed

Development (Detailed Application) would have a low magnitude adverse effect on the setting of Drip Old Bridge, assessed as being of **minor** significance: not significant in EIA terms.

Drip Bridge Conservation Area (including listed buildings (LB 8149, LB 8148 and LB 6725))

- 8.4.40 Drip Bridge Conservation Area Character Appraisal³¹ describes its character as comprising the historic Drip Old Bridge crossing the River Forth and a small grouping of buildings which were the original Inn, Tollhouse and Smithy. The area has historic significance for a number of interrelated reasons, all of which contribute to its character and appearance. Its heritage value principally derives from its character as a small hamlet of traditional buildings on the west side of the 18th century Drip Old Bridge and a historic crossing point on the Forth River, at the historic boundary between Stirlingshire and Perthshire.
- 8.4.41 The boundaries of the Conservation Area are drawn along the southern edge of the A84 and take in a small part of the North Site to the east and south-east of the Category A Listed Drip Old Bridge (LB 6725). The Character Appraisal (p13) describes how Drip Bridge occupies an attractive setting on the River Forth at the edge of Drip Moss, with the prominent crag of Craigforth Hill jutting out into the Carse across the river to the south-east. The Old Drip Bridge forms a major historic landmark across the River Forth, a natural green space which forms the eastern edge to the cluster of houses, all on the west bank of the river. The major route of the A84 now bypasses the hamlet. Key factors of its setting include: distant views north-east to the Ochil hills; open views south-east across the River Forth to the natural landmark and wooded outcrop of Craigforth Hill (also prominent on the western approach to the hamlet); its association with Drip Old Bridge, which forms a prominent landmark for, and eastern boundary to, the settlement; and views to Hill of Drip on raised ground to the south-west across open fields.
- 8.4.42 The ZTV (Figure 8.2) shows that the Proposed Development (Detailed Application) would be visible from the Conservation Area and the proposed new office building would be around 200 m to the east of the east end of the Conservation Area, marked by Drip Old Bridge.
- 8.4.43 The introduction of the Proposed Development (Detailed Application) would represent a slight but noticeable change to the setting of the Conservation Area. The proposed new office building would occupy a position where it would obscure views of Stirling Castle, a view that is a small but important aspect of the setting of the Conservation Area as marking a historic crossing of the River Forth on the approach to Stirling from the west. On the other hand, the view to the south and east along the River Forth and across open ground to Craigforth Hill would not be adversely affected and the current riverside setting of open ground would be retained as part of the Proposed Development (Detailed Application), and enhanced as part of the wider PPIP Masterplan development.
- 8.4.44 Overall, considering the retention of the current open riverside setting, the Proposed Development (Detailed Application) would have a low magnitude adverse effect on the setting of Drip Bridge Conservation Area, assessed as being of **minor** significance: not significant in EIA terms.

Stirling Town and Royal Park Conservation Area

- 8.4.45 The Stirling Town Conservation Area is made up of three character areas, largely derived from their respective periods of construction: the Old Town Sector (Stirling Castle and Top of the Town) and area loosely focused around Broad Street; the Commercial Sector (Foot of the Town), which wraps around the foot to the original historic burgh; and the Town House Sector

³¹ Stirling Council (2014) 'Local Development Plan Supplementary Guidance (2014) SG07: Conservation Area Character Appraisal: Drip Bridge'. Stirling Council. Stirling.

(Out of the Town), mainly early to mid-19th century expansion to the east of the Royal Burgh³². The Conservation Area Appraisal describes five key factors which interact to form the special setting of the Conservation Area: Topography; Skyline and Roofscape; Approach; Landmarks; Street Pattern; and Activity and Movement. The Conservation Area includes both Stirling Castle (SM 90921) and Stirling Royal Garden including King's Knot (SM 90288) described and discussed above.

- 8.4.46 The Character Appraisal (p 27) describes how the local topography was crucial to the origin of Stirling and remains one of its most outstanding characteristics. The Castle Rock is one of three significant volcanic outcrops or crags in the area (Abbey Craig and Craigforth Hill being the others); each rising dramatically above the flat carse lands of the River Forth. Castle Crag and the associated Old Town skyline are prominent features and are visible from considerable distance, including the principle road approaches to the city from all directions.
- 8.4.47 The ZTV (Figure 8.2) shows that the Proposed Development (Detailed Application) would be visible from the Conservation Area and the proposed new office building would be around 1.9 km to the north-west of the Conservation Area at its closest point and 2 km from Stirling Castle Crag, seen beyond a modern high-rise housing development (Raploch Estate) in the foreground of the view and the M9 motorway in the middle distance. The proposed new office building would be an addition to the existing office building in the North Site, which would be retained. Except from the elevated parts, on Castle Crag and the Old Town, the Proposed Development (Detailed Application) would not be noticeably visible from the majority of the Conservation Area. On approaches to the Conservation Area from all but the western approach, the Proposed Development (Detailed Application) would not adversely affect views of the important features of the Conservation Area and would have no adverse effect on its historic character. As noted above (paragraph 8.4.43), when approaching Stirling from the west, views of Castle Crag and the Old Town from the A84 and from Drip Bridge would be obscured by the proposed new office block on the approach to the crossing of the River Forth at Drip Bridge. East of the bridge the view of Castle Crag and the Old Town become obscured by trees and woodland at the A84/M9 interchange. East of the interchange, the Proposed Development (Detailed Application) would have no adverse effect on the view of the Castle Crag and the Old Town.
- 8.4.48 The introduction of the Proposed Development (Detailed Application) would represent a slight but detectable change to the setting of the Conservation Area. The proposed new office building would occupy a position where it would obscure views of Castle Crag and the Old Town from a historic crossing of the River Forth on the approach to Stirling from the west. Views from the Conservation Area and views on approach to the town from other directions would not be affected.
- 8.4.49 Overall, the Proposed Development (Detailed Application) would have a negligible magnitude effect on the setting of Stirling Town and Royal Park Conservation Area, assessed as being of **minor** significance: not significant in EIA terms.

Wallace Monument (LB 41118)

- 8.4.50 The monument is a tall crown tower of 4 high barrel-vaulted chambers with adjoining single-storey building that occupies a prominent hilltop position on Abbey Craig, 2.5 km to the north-east of Stirling Castle (Figure 8.4). It is a promoted visitor attraction and a prominent public viewpoint from which there are extensive views all round, including to the Ochil Hills to the

³² Stirling Council (2014) 'Local Development Plan Supplementary Guidance (2014) SG07: Conservation Area Character Appraisal: Stirling Town and Royal Park'. Stirling Council. Stirling.

north-east and Stirling Town and the Carse of Stirling to the south-west and the Touch Hills beyond. Craigforth Hill is a prominent wood covered hill in the wider landscape view over Stirling and the Carse.

- 8.4.51 The Proposed Development (Detailed Application) would be visible from the monument, 3.6 km to the west south-west, alongside Craigforth Hill, beyond and in the same view as the built-up northern suburbs of Stirling. It would be seen as a minor addition to the built environment and would not intrude on views towards Stirling Castle. Views in other directions from the monument and views of the monument from the surrounding landscape would not be affected by the Proposed Development (Detailed Application) and it would not intrude on views of the monument when travelling towards Stirling along the A84. The Proposed Development (Detailed Application) would not intrude on views of the monument from the Drip Bridge Conservation Area.
- 8.4.52 Overall, the Proposed Development (Detailed Application) would have a negligible magnitude effect on the setting of The Wallace Monument, assessed as being of **minor** significance: not significant in EIA terms.

Additional mitigation

- 8.4.53 The emphasis in PAN2/2011: Planning and Archaeology³³ is for the preservation of important remains in situ where practicable and by record where preservation is not possible. The mitigation measures presented below take account of this planning guidance and recognition of the requirements of the 'Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017'³⁴. It is expected that a phased approach to mitigation would be adopted, with an initial archaeological evaluation of previously undisturbed, undeveloped ground followed by further mitigation where necessary.
- 8.4.54 The mitigation works presented in the following paragraphs will take place prior to, or, where appropriate, during, construction of the Proposed Development (Detailed Application). All works will be conducted by a professional archaeological organisation, and the scope of works will be detailed in one or more Written Scheme(s) of Investigation (WSI) developed in consultation with (and subject to the agreement of) Stirling Council's Archaeology Advisor. The WSI(s) will make provision for appropriate post-excavation analysis and dissemination of the results of the mitigation works, as well as for archiving of the project materials and records where necessary.

Metal detecting

- 8.4.55 Through scoping, the Council Archaeologist has requested that a metal detecting survey be carried out.
- 8.4.56 If required by Stirling Council as part of a planning condition for the North Site, the scope of any required metal detecting survey will be agreed with the Stirling Council Archaeologist on behalf of the Council in advance of development works commencing.
- 8.4.57 Should the Proposed Development (Detailed Application) receive consent, any required programme of metal detecting will be carried out once the vegetation cover has been removed from the Proposed Development site, but prior to any soil removal.

Archaeological investigations (trial trenching)

- 8.4.58 Through scoping, the Council Archaeologist has requested that a 5% sample trial trenching

³³ Scottish Government (2011) 'Planning Advice Note 2/2011: Planning and Archaeology' Scottish Government. Edinburgh

³⁴ Scottish Government (2017) The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, Edinburgh.

evaluation be carried out.

- 8.4.59 If required by Stirling Council as part of a planning condition for the North Site, the scope of any required trial trenching will be agreed with Council Archaeologist on behalf of the Council in advance of development works commencing.
- 8.4.60 Trial trenching may be required in the undeveloped ground to the west of the existing car parking area, west of the proposed new office building (Figure 8.1).
- 8.4.61 Should the proposed North Site development receive consent, any required programme of trial trenching will be carried out prior to any development work commencing on the site.

Watching briefs and excavation

- 8.4.62 Following on from the archaeological trial trenching and metal detecting survey, it may be necessary to carry out further mitigation work; either through set piece excavations in areas where trial trenching has shown that there are buried archaeological remains present.
- 8.4.63 Any requirement for watching briefs during the construction phase for the North Site, will be agreed in consultation with the Stirling Council Archaeologist after the initial evaluation phase. It is envisaged that the scope of any watching brief or set piece excavation mitigation will be carried out in advance of, or during the course of, construction works as appropriate.
- 8.4.64 If significant discoveries are made during any archaeological excavations or watching briefs and preservation in situ of any sites or features identified is not possible, provision will be made for the excavation, where necessary, of any archaeological remains. This provision will include the consequent production of written reports on the findings, with post-excavation analyses and publication of the results of the work, where appropriate.

Residual effects

Construction effects

- 8.4.65 For heritage assets within the North Site, completion of the programme of archaeological mitigation works set out above (paragraphs 8.4.53 to 8.4.64) would reduce and offset the loss of any archaeological remains that may occur as a result of the construction of the Proposed Development (Detailed Application). Taking the proposed mitigation into account, any residual effect on cultural heritage arising from construction of the Proposed Development (Detailed Application) would be of no more than **minor** significance, **not significant** in EIA terms.

Setting effects

- 8.4.66 During the operational lifetime of the North Site development, residual effects on the settings of the heritage assets within the Inner and Outer Study Areas would be the same as the predicated effects. Six residual adverse effects of **minor** significance are predicted that would last the lifetime of the Proposed Development (Detailed Application).

8.5 Masterplan Site (Proposed Development (PPiP Masterplan)) Assessment (Figures 8.3 and 8.4)

Assumption and Limitations

- 8.5.1 The desk-based assessment draws on the records in the HER, provided in a digital GIS dataset acquired in July 2019. It is assumed that those records were complete and up to date at the time of acquisition.
- 8.5.2 Designated heritage assets within the PPiP Masterplan Outer Study Area have been identified

from the HES database downloaded from the HES website (HES, 2020)³⁵ in April 2020. That data is assumed to have been current and up to date at the time of acquisition.

- 8.5.3 The baseline assessment draws on the results of the desk-based assessments and field surveys carried out and sufficiently characterises the cultural heritage across the site.

Baseline conditions

- 8.5.4 There are no known remains of the prehistoric period within the Site Boundary.
- 8.5.5 A Roman road (30), possibly following the course of the modern A84 trunk road from Drip Bridge to Bochartle, is thought to have crossed the River Forth via a ford (24) near Drip Bridge. However, the line of the Roman Road between Stirling and Dunblane is not known and field investigations have so far proven negative; no trace of this road has been confirmed to date. In all likelihood, any remains of a Roman Road are likely to underlie the current A84. Any surviving remains of a Roman Road in this area would be a heritage asset of value at the regional level and of moderate sensitivity.
- 8.5.6 The fording point at OldDrip Bridge (24) is thought to be the site of an important medieval ford on the road from Stirling to Doune (McKean, 1985³⁶). A ford is clearly indicated here in the late 16th century, being described in texts by the mapmaker Timothy Pont as 'Druyip foord'. In 1715, a ferry (2) is known to have operated over the River Forth here (Mair, 1990³⁷: 130) and is depicted as such on Roy's 'Military Survey of Scotland' map (1747-55)³⁸. The ford and later ferry have some historical interest and are assessed as being of value at the local level and of low sensitivity.
- 8.5.7 Drip Old Bridge (1) was constructed by public subscription around 1773 as a replacement for the former ferry (2) and the earlier fording place (24). The bridge is no longer used for vehicular traffic. It is a Category A Listed Building (LB 6725), a heritage asset of value at the national level and of high sensitivity.
- 8.5.8 Craigforth House (3) stands on the north-east side of Craigforth Hill and would originally have commanded extensive views to the north-east, over the Carse of Stirling to the Ochil Hills. Of late 17th century origin, the current building has been much altered, including extensive renovation in 1930, after a fire destroyed its interior, and, in the 1970s, when it was converted into offices. It is now occupied and in use as a nursery. The House is a Category B Listed Building (LB 15294), a heritage asset valued at a regional level and of moderate sensitivity. Craigforth House is not part of the Proposed Development (PPiP Masterplan) and any future redevelopment will be subject to future applications for detailed planning and listed building consent.
- 8.5.9 An icehouse (6), which would have served Craigforth House, survives intact and is well preserved, surrounded by modern buildings. As a surviving ancillary structure with a close association to the historic occupation of Craigforth house, it is assessed as being of value at a local level and of low sensitivity.
- 8.5.10 Other ancillary buildings, which were formerly associated with the occupation of Craigforth House, including possible stables and kennels (28) and a cottage or lodge (29), shown on an

³⁵ Historic Environment Scotland (2020) Spatial Data Warehouse (<http://portal.historicenvironment.scot/spatialdownloads>) Accessed April 2020

³⁶ McKean C (1985): Stirling & the Trossachs, An illustrated architectural guide, Rutland Press, Edinburgh

³⁷ Mair C (1990). 'Stirling The Royal Burgh'. John Donald Publishers Ltd. Edinburgh. p 130.

³⁸ Roy, W (1747-55) 'A Military Survey of Scotland'. British Library. London.

1834 estate map³⁹ and on 19th century Ordnance Survey maps (1865⁴⁰ & 1899⁴¹) have all been destroyed during development of the current Prudential offices and construction of the M9 motorway interchange. Although it is unlikely that any undisturbed buried remains survive, the possibility cannot be ruled out entirely. Any remains that may survive could add to our understanding of day-to-day management and activities of Craigforth House. Accordingly, the sites of these former buildings are assessed as potentially being heritage assets of value at a local level and of low sensitivity.

- 8.5.11 Craigforth House formerly sat at the centre of a small designed landscape (25), the 18th-century layout of which is depicted on Roy's map (1747-55)⁴². By the 19th century, the layout shown on Roy's map was somewhat altered, as evidenced on the 1834 estate map⁴³; although the general layout around the main house can still be seen to include elements of the pattern of the earlier arrangement. The 19th-century layout has been much altered by the 20th-century development on and around the Proposed Development site, including construction of both the M9 interchange island and the Prudential office complex. Craigforth Hill remains largely intact and unaltered and the pattern of fields to the east of Kaims Farm (27) is also much as it was in the early 19th century. The central and northern parts of the Proposed Development site are, however, considerably altered; but, even here, elements of the former designed landscape can be picked out on modern aerial photography, including some historic tree alignments.
- 8.5.12 Some features of the designed landscape survive within the woodland on the Crag. These include walks and paths (13) and a pond and cistern (10 and 11) with associated water management ditches (9). A possible park or woodland bank (7) survives on the western side of the Craigforth Hill running from north to south along and near the cliff edge. A cairn (17), built in the 1930s, describes the plantation of several trees in the area. An ornamental garden feature (33) is located below Craigforth House, but it is not clear if it is an original feature or part of the re-landscaping of the estate after the construction of the Prudential offices.
- 8.5.13 As it has been considerably altered, but still retains some original elements, the former designed landscape and the surviving features are assessed as a heritage asset of value at the local level and of low sensitivity.
- 8.5.14 In the garden area behind Craigforth House is a terrace where parch marks have revealed a square feature which may be the foundations of a summer house or gazebo (21) while other parch marks (22) may be evidence of other elements of the former garden design and layout. Any remains that may survive as buried features in the garden area could add to our understanding of the layout and character of the formal gardens at Craigforth House. Accordingly, these features are assessed as potentially being heritage assets of value at a local level and of low sensitivity.
- 8.5.15 Kaims Farm (27), lies on the south-western edge of the Site. The L-shaped farmhouse is shown on an 1834 estate map⁴⁴ and on the 1st edition Ordnance Survey map (1865)⁴⁵ with two additional buildings to the north and south. The arable fields in the southern part of the Site are part of this farm holding and appear unaltered in extent and layout from when they were first depicted on the 1834 estate map⁴⁶. As part of the historic landscape, the farm is a heritage

³⁹ Unattributed (1834). Plan of the Estate of Craigforth, the property of James H Callander, Esq, M P'.

⁴⁰ Ordnance Survey (1865) 'Stirlingshire, Sheet X'. six inches to one mile.

⁴¹ Ordnance Survey (1899) 'Stirlingshire, Sheet X'. six inches to one mile.

⁴² Roy, W (1747-55) 'A Military Survey of Scotland'. British Library. London.

⁴³ Unattributed (1834). Plan of the Estate of Craigforth, the property of James H Callander, Esq, M P'.

⁴⁴ Unattributed (1834). Plan of the Estate of Craigforth, the property of James H Callander, Esq, M P'.

⁴⁵ Ordnance Survey (1865) 'Stirlingshire, Sheet X'. six inches to one mile.

⁴⁶ Unattributed (1834). Plan of the Estate of Craigforth, the property of James H Callander, Esq, M P'.

asset of value at a local level and of low sensitivity.

- 8.5.16 An area of rig and furrow (12) is located within the forestry on the western side of the Crag, close to the cultivated fields of Kaims Farm. It is possible that these remains relate to earlier farming practices on the farm; as such they are assessed to be of value at a local level and of low sensitivity.
- 8.5.17 Old Inn Cottage (31) and Drip Bridge Toll House (32) lie within the small Drip Bridge Conservation Area, at the west end of Drip Old Bridge (1). The Inn is of 18th century date whilst the Toll House is dated 1820. A small settlement at Drip Bridge is marked on Roy's map (1747-55)⁴⁷; mostly on the west bank of the Forth but with two buildings on the east side. The settlement presumably serviced the ferry that existed at that date. These two buildings are both Category C Listed and are heritage assets of value at a local level and of low sensitivity.
- 8.5.18 Part of an armorial panel (4) and a collection of medieval pottery (5) were found during the construction of the modern offices and associated car parks. The whereabouts of the armorial panel are unknown, and the medieval pottery is most likely derived from field manuring. Neither find-spot has any particular heritage value and they are assessed as being of negligible sensitivity.
- 8.5.19 A mound (8), of unknown date or function, is located to the east of Craigforth House within an area of forestry on the edge of the crag. Several large fragments of concrete, stone and clinker can be seen protruding from the mound suggesting, as is indicated in the HER, that it is a modern feature associated with the construction of the offices. It has no heritage value and is assessed as being of negligible sensitivity.
- 8.5.20 Two former quarries (14 and 15) are located on the western side of the Crag. They are likely to have been associated with construction of Craigforth House, or other structures within the designed landscape; as such, each of these surviving elements is assessed as being of value at a local level and of low sensitivity.
- 8.5.21 On the banks of the River Forth, just to the south of Drip Bridge a possible boat naust (16), recorded in the HER as being a surface depression 0.5 m deep, about 3 m wide and around 5 m long, is thought to have been located on the east bank of the River Forth. The possible naust (a shelter or housing for a boat) may be related to the former ferry known to have existed at this location and it is accordingly assessed as potentially being a heritage asset of value at a local level and of low sensitivity.
- 8.5.22 A small sub-circular feature (23), of unknown date and function, appearing as a distinct parch mark on aerial photography, is recorded in the HER as having been identified in arable fields in the southern part of the Site. There are no other details in the HER and the exact location, nature, date, and function of the feature are presently unknown. As such it is considered as being a heritage asset of 'unknown' value and 'unknown' sensitivity.
- 8.5.23 A footbridge (26) is depicted on the 1901 Ordnance Survey map⁴⁸ crossing the unnamed burn that defines part of the southern boundary of the Proposed Development site. It is also shown, but not labelled on later editions (1922⁴⁹, 1947⁵⁰ and 1951⁵¹). It is of little or no heritage value and is assessed as being of negligible sensitivity.

⁴⁷ Roy, W (1747-55) 'A Military Survey of Scotland'. British Library. London.

⁴⁸ Ordnance Survey (1901) 'Perth and Clackmannan Sheet CXXXVIII.NE'. six inches to one mile.

⁴⁹ Ordnance Survey (1922) 'Stirlingshire Sheet nXVII.NW'. six inches to one mile.

⁵⁰ Ordnance Survey (1947) 'Stirlingshire Sheet nXI.SW'. six inches to one mile

⁵¹ Ordnance Survey (1951) 'Stirlingshire Sheet nXI.SW'. six inches to one mile.

- 8.5.24 The abandoned remains of a modern brick-built building (34) are located at the summit of the Crag. It is evidently of modern date but of unknown function; it is assessed as being of no heritage value and of negligible sensitivity.

Changes likely to occur over time in the absence of developing the Proposed Development (PPiP Masterplan)

- 8.5.25 If the PPiP Masterplan development was not to proceed, there would likely be no change to the baseline condition of the various heritage assets that presently survive. The current commercial occupation and car-parking of the central area would likely continue unless and until alternative proposals for use are brought forward. The current farming land-use of the southern area would likely continue, and only natural erosion plough attrition would be likely to affect any buried remains that are present. The future of Craigforth House would remain uncertain and subject to change dependent on future use and management of the property.
- 8.5.26 The setting of heritage assets in the wider landscape would remain as they currently are, subject to later development proposals giving rise to separate effects on their settings.

Potential effects

Direct effects

- 8.5.27 Any ground-breaking activities required during development of the Proposed Development (PPiP Masterplan) (such as those required for construction of buildings, roads and footpaths, car parking, installation of services and utilities, etc) have the potential to disturb or destroy heritage assets. Other construction activities, such as vehicle movements, soil and overburden storage and landscaping, also have the potential to cause direct, permanent and irreversible effects on heritage assets.
- 8.5.28 The Proposed Development (PPiP Masterplan) layout (Figure 8.3) has been designed to avoid effects on the known heritage assets and to respect the settings of designated heritage assets.
- 8.5.29 There are two currently known heritage assets that will be directly affected by the Proposed Development (PPiP Masterplan):

- Category B Listed Craigforth House (3), a heritage asset of medium sensitivity, has been identified to provide hotel accommodation as part of the PPiP Masterplan, together with construction of an apartment block in the former garden area at the rear (south-west) of the House (Figure 8.3). Notwithstanding, any redevelopment of Craigforth House will be subject to future detailed planning and listed building consent. The original House, gutted by fire in 1930, has been completely restored. The shell of the building survived the fire, and some care was taken in rebuilding to preserve the old external appearance of the house, the wall surfaces and window surrounds having been renewed where necessary in cement (NRHE entry). The interior was entirely renewed in the 1960s and adapted for use as office accommodation, although two original transverse partitions suggest that, before the rearrangement, the house contained three principal apartments on both ground and first floors (ibid). The proposed redevelopment of the House, and change of use proposed, would be carried out in such a way as to preserve and enhance the historical integrity of the House and would therefore have a beneficial effect of high magnitude (Table 8.3). It should be noted that any redevelopment of Craigforth House will be subject to future detailed planning and listed building consent. Whilst the proposed redevelopment would not restore the original character of the House it would nevertheless be a positive effect assessed as being of **moderate** significance: significant in EIA terms.

- Parch marks (21 and 22), seen on aerial photographs and possibly representing buried remains of a summer house (gazebo) and elements of the former garden design and layout, would be directly affected by redevelopment of Craigforth House and construction of the proposed new apartment building. Redevelopment on the site of the former formal gardens area would be likely to truncate the integrity of any buried evidence of the garden layout that may survive. The effect would be of medium magnitude (Table 8.3) on historic archaeological features of low sensitivity and would, in the absence of appropriate mitigation, result in an adverse direct effect assessed as being of **moderate** significance: significant in EIA terms.

8.5.30 Two other heritage assets: The icehouse (6), which survives intact surrounded by modern buildings; and an ornamental garden feature (33) would be retained and will not be affected by the Proposed Development (PPiP Masterplan). Craigforth House Stables and Kennels (28) no longer survive, having been lost during development of the current Prudential offices.

8.5.31 In addition to the identified effects on known heritage assets described above, it is possible that undiscovered, buried remains survive in previously undeveloped ground within the Site and construction activities in those areas could, in the absence of mitigation, have direct adverse effects on any remains that may be present. The locations most likely to contain preserved buried remains are the immediate surroundings of Craigforth House, where features of the former designed landscape and gardens may survive, and the open farmland around the south end of Craigforth Hill where the absence of previous development means that there is a higher probability that any buried archaeological deposits or features (such as the cropmark site (23)) could survive.

8.5.32 It is not possible to be certain as to the level of sensitivity of any buried remains that may be present within the Site Boundary as there is currently insufficient baseline information relating to the presence or absence of any buried remains, or their nature and character, or their state of preservation. It is most likely that any remains that may survive are likely to be of medium or low sensitivity and that any direct effect is likely to be adverse (resulting in damage to or loss of archaeological evidence) and of medium or high magnitude. As a result, it is assessed that, on the balance of probability, in the absence of appropriate mitigation, the effect on any buried archaeological remains present would be of **moderate** significance: significant in EIA terms.

8.5.33 Adoption and implementation of the proposed mitigation, set out below (paragraphs 8.5.67 to 8.5.77), would result in the recovery of archaeological information if any remains, or artefacts, are encountered during the construction works. Any archaeological remains, deposits or artefacts encountered would be recorded and subject to an appropriate level of investigation, excavation and post-excavation analysis and reporting, resulting in preservation by record and enhancement of archaeological knowledge. As such, the significance of the effect of the loss of the archaeological resource would be reduced and offset. Taking the mitigation into account the effect on any archaeological remains found during the course of construction works would be of **minor** significance: not significant in EIA terms.

Setting effects

8.5.34 The presence of the Proposed Development (PPiP Masterplan) could result in adverse effects on the setting of cultural heritage assets within the Outer Study Area, and within the wider landscape. Potential effects on the settings of heritage assets would however diminish with increasing distance from the Proposed Development (PPiP Masterplan) and beyond 1 km, the Proposed Development (PPiP Masterplan) would, in most cases, not appreciably alter aspects of the setting of the heritage assets that contribute to their cultural significance, nor would it

appreciably alter how a heritage asset is understood, appreciated and experienced.

8.5.35 Based on the advice in the Scoping Opinions from HES and Stirling Council (Table 8.1), the assessment below considers the potential effect of the Proposed Development (PPiP Masterplan) on seven designated heritage assets:

- Craigforth House (LB 15294) and non-designated designed landscape;
- Stirling Castle (SM 90291);
- Stirling, Royal Garden including King's Knot (SM 90288);
- Drip Old Bridge over River Forth (LB 6725);
- Drip Bridge Conservation Area (including listed buildings within the conservation area);
- Stirling Town and Royal Park Conservation Area; and
- The Wallace Monument (LB 41118).

8.5.36 The assessment has been carried out with reference to the layout and scale of the Proposed Development (PPiP Masterplan) and the locations of cultural heritage assets shown on Figures 8.3 and 8.4. The criteria detailed in Tables 8.2 and 8.3 have been used to assess the nature and magnitude of the effects which are set out in Table 8.4. Craigforth House (LB 15294) and non-designated designed landscape

8.5.37 Craigforth House is 17th or early 18th century in date and stands on the north-east side of Craigforth Hill. Its front façade is oriented to face the north-east, and, in its original form, it commanded an extensive prospect over the Forth valley towards Bridge of Allan and to the Ochil Hills. The House is shown on Roy's 'Military Survey of Scotland' map (1747-55)⁵² enclosed within a woodland setting with a designed vista, comprised of an avenue of trees aligned to the north-east, directing a view from the House to the confluence of the River Allan with the River Forth. It currently lies within, and is part of, the Prudential Offices campus and the vista to the north-east is now partially obscured by trees and the current office buildings that lie to the north of the House.

8.5.38 The ZTV (Figure 8.4) shows that the proposed central area apartments and leisure facilities would be visible from Craigforth House. However, the Proposed Development (PPiP Masterplan) has been designed to restore the historical designed vista to the north-east from the House (Figure 8.3), thereby enhancing a historically important aspect of the setting of the House. This is also likely to enhance the view of Craigforth House when viewed from the north-east, when travelling south along the M9 for example. The design intention has been to incorporate the historic building into the Illustrative Masterplan and demonstrate how it could enhance its setting in the future. Notwithstanding, any redevelopment of Craigforth House will be subject to future detailed planning and listed building consent.

8.5.39 The introduction of the Proposed Development (PPiP Masterplan) would represent a noticeable change to the current setting. Although the proposal would replace a suite of office buildings with others of a commercial character, the restoration of an original and historically important aspect of its setting would have a beneficial effect on the cultural significance of the House. It is intended that the historic building be a focal point within the development and improve the way in which visitors would understand, appreciate and experience Craigforth House and its setting. The historically important woodland on Craigforth Hill would also be retained along with other surviving components of the designed landscape setting of the House, such as the Ice House (6).

⁵² Roy, W (1747-55) 'A Military Survey of Scotland'. British Library. London.

8.5.40 Overall, the Proposed Development (PPiP Masterplan) would have a medium magnitude beneficial effect on the setting of Craigforth House, assessed as being of **moderate** significance: significant in EIA terms.

Stirling Castle (SM 90921)

8.5.41 Stirling Castle was one of the most important royal castles of medieval and early modern Scotland. Occupying a volcanic outcrop, it commands extensive panoramic views over the Forth Valley, with important views westwards that include Craigforth hill the Proposed Development site. The Inventory description⁵³ describes how the “*views to the west and south-west of the castle were an essential element in the amenity of its occupants from at least the 1540’s ... In the foreground of these views was land set aside for a royal hunting forest ... while there were formal gardens immediately below the walls ... the distant views are closed off by the Touch Hills ... and by the southern Highlands and Menteith*”.

8.5.42 The ZTV (Figure 8.4) shows that the Proposed Development (PPiP Masterplan) would be visible from the ramparts of Stirling Castle, along its west side. The Proposed Development (PPiP Masterplan) would be 2 km to the north-west of the Castle ramparts, at its nearest point, and seen beyond a modern high-rise housing development (Raploch Estate) in the foreground of the view and the M9 motorway in the middle distance.

- When travelling west to east along the A84, the view of Stirling Castle is presently obscure by tree planting along the A84 at its junction with the M9, including that within the large island enclosing the northbound slip road. That island woodland includes remnant plant of shelterbelt woodland that is part of the historic Craigforth House GDL. From this western approach to Stirling, views of Stirling Castle would not be adversely affected by the Proposed Development (PPiP Masterplan).
- Views of Stirling Castle from the Drip Bridge Conservation Area, at the west end of the Category A Listed Drip Bridge, from where the Castle can be currently seen above and beyond, are currently partly obscured by, the trees and woodland around the A84/M9 interchange. This viewpoint is an important aspect of the setting of Stirling Castle as the Conservation Area and the listed bridge, mark a historic crossing of the River Forth on the western approach to Stirling. From this historic crossing point, sight of Stirling Castle would be further obscured from view by the proposed new office block.
- Views of the Castle in other approaches to Stirling, such as those from the M9 motorway when travelling north to south or south to north, would be unaffected by the Proposed Development (PPiP Masterplan).

8.5.43 The introduction of the Proposed Development (PPiP Masterplan) would represent a barely detectable change in the wider landscape surroundings when viewed from Stirling Castle and would affect very few views of the Castle from the surrounding landscape. The Proposed Development (PPiP Masterplan) would, however, have an adverse effect on one small but important aspect of the Castle’s setting: the view from Drip Bridge. Although this historically important viewpoint would be adversely affected, the cultural significance and special qualities of the Castle would not be adversely affected. It would remain possible for any visitor to understand and appreciate the setting of Stirling Castle.

8.5.44 Overall, the Proposed Development (PPiP Masterplan) would have a negligible magnitude effect on the setting of Stirling Castle, assessed as being of **minor** significance: not significant in EIA terms.

⁵³ <http://portal.historicenvironment.scot/designation/SM90291>

Stirling Royal Garden including King's Knot (SM 90288)

- 8.5.45 The Royal Gardens, including the King's Knot, comprises the surviving physical remains of part of the royal gardens at the foot of Stirling Castle, and is the most extensive and best-preserved example of a royal garden of the renaissance period in Scotland. The Inventory description⁵⁴ describes how the Kings Knot "*was designed to be viewed from Stirling Castle ... [and that] ... the main view from the King's Knot is of the Castle to its north-east, and the view is open to the north and west. To the south-east, housing development has extended to the boundary of the park*".
- 8.5.46 The ZTV (Figure 8.4) shows that the Proposed Development (PPiP Masterplan) would be theoretically visible from within the Royal Garden and King's Knot, around 1.9 km to the north-west at its nearest point. In practice, tree planting around the edges of the open space of the Royal Garden and King's Knot would screen out views of the Proposed Development (PPiP Masterplan). Views of the Royal Garden and King's Knot from Stirling Castle and from the lower lying approaches to the parkland from the north, west and south would be unaffected by the Proposed Development (PPiP Masterplan). Views up from the open space to the ramparts of Stirling Castle would also be unaffected. Enjoyment of the open space Royal Garden and King's Knot would not be affected by the Proposed Development (PPiP Masterplan).
- 8.5.47 The introduction of the Proposed Development (PPiP Masterplan) would represent a barely detectable change to the wider landscape surroundings of Royal Garden and King's Knot, and the cultural significance and special qualities of the garden would not be adversely affected. It would remain possible for any visitor to understand, appreciate and experience the gardens and their setting.
- 8.5.48 Overall, the Proposed Development (PPiP Masterplan) would have a negligible magnitude effect on the setting of Stirling Castle, Royal Garden and King's Knot, assessed as being of **minor** significance: not significant in EIA terms.

Drip Old Bridge over River Forth (LB 6725)

- 8.5.49 Drip Old Bridge crosses east to west over the River Forth, immediately to the north-west of the Site. Currently used only as a pedestrian bridge it occupies a low-lying riverside location with open views to the south-east along the riverbank towards Craigforth Hill. It lies directly to the south of a modern bridge that carries the modern A84 over the river and connects the small hamlet, and Conservation Area, of Drip Bridge with the A84 and access to Stirling to the east. Important aspects of the setting of Drip Old Bridge include views to the west across open fields to Hill of Drip, a low rise of ground now occupied by a farmstead, and to Drip Moss and the Touch Hills beyond. The view eastwards over the bridge is also an important aspect of its setting, as it lies on the approach to Stirling from the west and marks a historically important crossing of the River Forth. Stirling Castle can be seen, currently partly obscured by trees and woodland around the A84/M9 interchange from the west end of the bridge.
- 8.5.50 The Proposed Development (PPiP Masterplan) has been designed to provide a meaningful and respectful stand-off buffer between Drip Old Bridge and the proposed new office building, and to provide a landscaped riverside frontage, enhancing the current largely derelict character of the open space along the riverbank.
- 8.5.51 The ZTV (Figure 8.4) shows that the Proposed Development (PPiP Masterplan) would be visible from Drip Old Bridge and the proposed new office building in the North Site would be around 200m to the east of the east end of the bridge.

⁵⁴ <http://portal.historicenvironment.scot/designation/SM90288>

- 8.5.52 The introduction of the Proposed Development (PPiP Masterplan) would represent a slight but noticeable change to the setting of Drip Bridge. The proposed new office building in the North Site would occupy a position where it would obscure views of Stirling Castle, a view that is a small but important aspect of the setting of the bridge. On the other hand, the view to the south and east along the River Forth and across the open ground to Craigforth Hill would not be adversely affected and the current riverside setting of open ground would be retained and enhanced as part of the Proposed Development (PPiP Masterplan).
- 8.5.53 Overall, considering the retention of the current open riverside setting, the Proposed Development (PPiP Masterplan) would have a low magnitude adverse effect on the setting of Drip Old Bridge, assessed as being of **minor** significance: not significant in EIA terms.

Drip Bridge Conservation Area (including listed buildings (LB 8149, LB 8148 and LB 6725))

- 8.5.54 Drip Bridge Conservation Area Character Appraisal⁵⁵ describes its character as comprising the historic Drip Old Bridge crossing the River Forth and a small grouping of buildings which were the original Inn, Tollhouse and Smithy. The area has historic significance for a number of interrelated reasons, all of which contribute to its character and appearance. Its heritage value principally derives from its character as a small hamlet of traditional buildings on the west side of the 18th century Drip Old Bridge and a historic crossing point on the Forth River, at the historic boundary between Stirlingshire and Perthshire.
- 8.5.55 The boundaries of the Conservation Area are drawn along the southern edge of the A84 and take in a small part of the North Site to the east and south-east of the Category A Listed Drip Old Bridge (LB6725). The Character Appraisal (p 13) describes how Drip Bridge occupies an attractive setting on the River Forth at the edge of Drip Moss, with the prominent crag of Craigforth Hill jutting out into the Carse across the river to the south-east. The Drip Old Bridge forms a major historic landmark across the River Forth, a natural green space which forms the eastern edge to the cluster of houses, all on the west bank of the river. The major route of the A84 now bypasses the hamlet. Key factors of its setting include: distant views north-east to the Ochil Hills; open views south-east across the River Forth to the natural landmark and wooded outcrop of Craigforth Hill (also prominent on the western approach to the hamlet); its association with Drip Old Bridge, which forms a prominent landmark for, and eastern boundary to, the settlement; and views to Hill of Drip on raised ground to the south-west across open fields.
- 8.5.56 The ZTV (Figure 8.4) shows that the Proposed Development (PPiP Masterplan) would be visible from the Conservation Area and the proposed new office building in the North Site would be around 200 m to the east of the east end of the Conservation Area, marked by Drip Old Bridge.
- 8.5.57 The introduction of the Proposed Development (PPiP Masterplan) would represent a slight but noticeable change to the setting of the Conservation Area. The proposed new office building in the North Site would occupy a position where it would obscure views of Stirling Castle, a view that is a small but important aspect of the setting of the Conservation Area as marking a historic crossing of the River Forth on the approach to Stirling from the west. On the other hand, the view to the south and east along the River Forth and across open ground to Craigforth Hill would not be adversely affected and the current riverside setting of open ground would be retained and enhanced as part of the Proposed Development (PPiP Masterplan).
- 8.5.58 Overall, considering the retention of the current open riverside setting, the Proposed

⁵⁵ Stirling Council (2014) 'Local Development Plan Supplementary Guidance (2014) SG07: Conservation Area Character Appraisal: Drip Bridge'. Stirling Council. Stirling.

Development (PPiP Masterplan) would have a low magnitude adverse effect on the setting of Drip Bridge Conservation Area, assessed as being of **minor** significance: not significant in EIA terms.

Stirling Town and Royal Park Conservation Area

- 8.5.59 The Stirling Town Conservation Area is made up of three character areas, largely derived from their respective periods of construction: the Old Town Sector (Stirling Castle and Top of the Town) and area loosely focused around Broad Street; the Commercial Sector (Foot of the Town), which wraps around the foot to the original historic burgh; and the Town House Sector (Out of the Town), mainly early to mid-19th century expansion to the east of the Royal Burgh⁵⁶. The Conservation Area Appraisal describes five key factors which interact to form the special setting of the Conservation Area: Topography; Skyline and Roofscape; Approach; Landmarks; Street Pattern; and Activity and Movement. The Conservation Area includes both Stirling Castle (SM 90921) and Stirling Royal Garden including King's Knot (SM 90288) described and discussed above.
- 8.5.60 The Character Appraisal (p 27) describes how the local topography was crucial to the origin of Stirling and remains one of its most outstanding characteristics. The Castle Rock is one of three significant volcanic outcrops or crags in the area (Abbey Craig and Craigforth Hill being the others); each rising dramatically above the flat carse lands of the River Forth. Castle Crag and the associated Old Town skyline are prominent features and are visible from considerable distance, including the principle road approaches to the city from all directions.
- 8.5.61 The ZTV (Figure 8.4) shows that the Proposed Development (PPiP Masterplan) would be visible from the Conservation Area and the proposed new office building in the North Site would be around 1.9 km to the north-west of the Conservation Area at its closets point and 2 km from Stirling Castle Crag, seen beyond a modern high-rise housing development (Raploch Estate) in the foreground of the view and the M9 motorway in the middle distance. Except from the elevated parts, on Castle Crag and the Old Town, the Proposed Development (PPiP Masterplan) would not be noticeably visible from the majority of the Conservation Area. On approaches to the Conservation Area from all but the western approach, the Proposed Development (PPiP Masterplan) would not adversely affect views of the important features of the Conservation Area and would have no adverse effect on its historic character. As noted above (paragraph 8.5.49), when approaching Stirling from the west views of Castle Crag and the Old Town from the A84 and from Drip Old Bridge would be obscured by the proposed new office block on the approach to the crossing of the River Forth at Drip Old Bridge. East of the bridge the view of Castle Crag and the Old Town become obscured by trees and woodland at the A84/M9 interchange. East of the interchange, the Proposed Development (PPiP Masterplan) would no adverse effect on the view of the Castle Crag and the Old Town.
- 8.5.62 The introduction of the Proposed Development (PPiP Masterplan) would represent a slight but detectable change to the setting of the Conservation Area. The proposed new office building in the North Site would occupy a position where it would obscure views of Castle Crag and the Old Town from a historic crossing of the River Forth on the approach to Stirling from the west. Views from the Conservation Area and views on approach to the town from other directions would not be affected.
- 8.5.63 Overall, the Proposed Development (PPiP Masterplan) would have a negligible magnitude effect on the setting of Stirling Town and Royal Park Conservation Area, assessed as being of

⁵⁶ Stirling Council (2014) 'Local Development Plan Supplementary Guidance (2014) SG07: Conservation Area Character Appraisal: Stirling Town and Royal Park'. Stirling Council. Stirling.

minor significance: not significant in EIA terms.

Wallace Monument (LB 41118)

- 8.5.64 The monument is a tall crown tower of 4 high barrel-vaulted chambers with adjoining single-storey building that occupies a prominent hilltop position on Abbey Craig, 2.5 km to the north-east of Stirling Castle (Figure 8.4). It is a promoted visitor attraction and a prominent public viewpoint from which there are extensive views all round, including to the Ochil Hills to the north-east and Stirling Town and the Carse of Stirling to the south-west and the Touch Hills beyond. Craigforth Hill is a prominent wood covered hill in the wider landscape of view over Stirling and the Carse.
- 8.5.65 The Proposed Development (PPiP Masterplan) would be visible from the monument, 3.5 km to the west south-west, alongside Craigforth Hill, beyond and in the same view as the built-up northern suburbs of Stirling. It would be seen as a minor addition to the built environment and would not intrude on views towards Stirling Castle. Views in other directions from the monument and views of the monument from the surrounding landscape would not be affected by the Proposed Development (PPiP Masterplan) and it would not intrude on views of the monument when travelling towards Stirling along the A84. The Proposed Development (PPiP Masterplan) would not intrude on views of the monument from the Drip Bridge Conservation Area.
- 8.5.66 Overall, the Proposed Development (PPiP Masterplan) would have a negligible magnitude effect on the setting of The Wallace Monument, assessed as being of **minor** significance: not significant in EIA terms.

Additional mitigation

- 8.5.67 The emphasis in PAN2/2011: Planning and Archaeology⁵⁷ is for the preservation of important remains in situ where practicable and by record where preservation is not possible. The mitigation measures presented below take account of this planning guidance and recognition of the requirements of the 'Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011'⁵⁸. It is expected that a phased approach to mitigation will be adopted, with an initial archaeological evaluation of previously undisturbed, undeveloped ground followed by further mitigation where necessary.
- 8.5.68 The mitigation works presented in the following paragraphs will take place prior to, or, where appropriate, during, construction of the Proposed Development. All works will be conducted by a professional archaeological organisation, and the scope of works will be detailed in one or more Written Scheme(s) of Investigation (WSI) developed in consultation with (and subject to the agreement of) Stirling Council's Archaeology Advisor. The WSI(s) will make provision for appropriate post-excavation analysis and dissemination of the results of the mitigation works, as well as for archiving of the project materials and records where necessary.

Metal detecting

- 8.5.69 Through scoping, the Council Archaeologist has requested that a metal detecting survey be carried out.
- 8.5.70 If required by Stirling Council as part of a planning condition for the Masterplan development, the scope of any required metal detecting survey will be agreed with the Stirling Council Archaeologist on behalf of the Council in advance of development works commencing.

⁵⁷ Scottish Government (2011) 'Planning Advice Note 2/2011: Planning and Archaeology' Scottish Government. Edinburgh.

⁵⁸ Scottish Government (2017) The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, Edinburgh.

8.5.71 Should the proposed Masterplan development receive consent, any required programme of metal detecting will be carried out once the vegetation cover has been removed from the Proposed Development site, but prior to any soil removal.

Archaeological investigations (trial trenching)

8.5.72 Through scoping, the Council Archaeologist has requested that a 5% sample trial trenching evaluation be carried out.

8.5.73 If required by Stirling Council, as part of a planning condition for the Masterplan development, the scope of any required trial trenching will be agreed with Council Archaeologist on behalf of the Council in advance of development works commencing.

8.5.74 Locations where trial trenching may be required include:

- The open ground to the south-west of Craigforth House, where parch marks visible on historic aerial photographs have indicated the presence of possible historic garden features (21 and 22); and,
- The undeveloped farmland to the south and west of Craigforth Hill, where there is potential for buried archaeological remains as evidenced in possible cropmarks (23) parch marks visible on historic aerial photographs.

Watching briefs and excavation

8.5.75 Following on from the archaeological trial trenching and metal detecting survey, it may be necessary to carry out further mitigation work; either through set piece excavations in areas where trial trenching has shown that there are buried archaeological remains present.

8.5.76 Any requirement for watching briefs during the construction phase for the Proposed Development (PPiP Masterplan), will be agreed in consultation with the Stirling Council Archaeologist after the initial evaluation phase. It is envisaged that the scope of any watching brief or set piece excavation mitigation will be carried out in advance of, or during the course of, construction works as appropriate.

8.5.77 If significant discoveries are made during any archaeological excavations or watching briefs and preservation in situ of any sites or features identified is not possible, provision will be made for the excavation, where necessary, of any archaeological remains. This provision will include the consequent production of written reports on the findings, with post-excavation analyses and publication of the results of the work, where appropriate.

8.5.78 Given any future redevelopment of Craigforth House will be subject to detailed planning and listed building consent, it is considered that these planning processes will be able to ensure any effects of Craigforth House are suitably mitigated allowing its setting to be preserved and enhanced.

Residual effects

Construction effects

8.5.79 For heritage assets within the Site Boundary, completion of the programme of archaeological mitigation works set out above (paragraphs 8.5.67 to 8.5.77) would reduce and offset the loss of any archaeological remains that may occur as a result of the construction of the Proposed Development (PPiP Masterplan). Taking the proposed mitigation into account, any residual effect on cultural heritage arising from construction of the Proposed Development (PPiP Masterplan) would be of no more than **minor** significance, **not significant** in EIA terms.

Setting effects

8.5.80 During the operational lifetime of the Proposed Development (PPiP Masterplan), residual effects on the settings of the heritage assets within the Inner and Outer Study Areas would be the same as the predicated effects. One residual beneficial effect of **moderate** significance is predicted: on the setting of Craigforth House. Six residual adverse effects of **minor** significance are predicted that would last the lifetime of the Proposed Development (PPiP Masterplan).

8.6 Summary

8.6.1 A desk-based assessment and reconnaissance field survey has been carried out and has led to the identification of 34 heritage assets within and in the immediate vicinity of the Site Boundary. These include the Category B Listed Craigforth House and other features of the associated, non-designated, designed landscape. Category A Listed Drip Bridge and the Drip Bridge Conservation Area lie just outside the Site Boundary.

8.6.2 The assessment has considered the potential for direct effects on the cultural heritage resource, both within the North Site (Detailed Application) and in the wider Site Boundary (PPiP Masterplan). Potential for direct adverse effects on buried archaeological remains has been identified within the North Site (Detailed Application) and direct effects on Craigforth House and buried archaeological remains in the wider Site Boundary (PPiP Masterplan). Mitigation measures are proposed that would, through a programme of archaeological investigations, recording and reporting, offset and reduce the potential significant effects arising from construction. A moderate significance beneficial effect has been identified for Craigforth House, which would be redeveloped and repurposed to provide hotel accommodation. Notwithstanding, the redevelopment of Craigforth House will be subject to future detailed planning and listed building consent.

8.6.3 Minor significance adverse effects have been identified, in relation to the settings of six designated heritage assets in the wider landscape: two Scheduled Monuments (Stirling Castle (SM 90291), and Stirling Royal Garden including King's Knot (SM 90288)); two Listed Buildings (Category A Listed Drip Bridge (LB 6725) and The Wallace Monument (LB 41118)); and two Conservation Areas (Drip Bridge Conservation Area and Stirling Town and Royal Park Conservation Area).

8.6.4 No potential for significant cumulative effects has been identified.

8.7 Assessor information

8.7.1 The EIA Report has been prepared under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations'). EIA Regulation 5 (5) (b) requires that an outline of relevant expertise or qualifications of contributors accompanies an assessment. The relevant information for the team is provided below for each of the EIA Report chapters.

8.7.2 The Cultural Heritage assessment has been carried out by George Mudie MA (Hons) FSA Scot MCIfA, of CFA Archaeology Ltd (CFA) based in Musselburgh, East Lothian, a Registered Organisation (RO) of the Chartered Institute for Archaeologists (CIfA). Mr Mudie is Principal Consultant with CFA and is a Member of the Chartered Institute for Archaeologists (MCIfA). He has over 18 years full-time experience of producing Environmental Impact Assessments (EIAs) for a wide range of industrial and commercial developments across the UK.

9 Biodiversity

9.1 Introduction

- 9.1.1 This chapter presents the findings of an Ecology Assessment carried out for the mixed-use Proposed Development at Craigforth Campus, Stirling. It brings together the findings of a desk study and phase 1 preliminary ecological survey and bat roost potential survey, carried out in May 2019.
- 9.1.2 The report should be read in conjunction with the Preliminary Ecology Appraisal Report (Appendix 9.1), the Ecological Management Plan (Appendix 9.2) and Habitats Risk Assessment (Appendix 9.3).

Site Location and Description

- 9.1.3 The site is centred on grid reference NS 77404 95107 and covers an area approximately 54 hectares. The M9 Motorway forms much of the eastern site boundary. The A84 carriageway and the River Forth is to the north extent of the Site. The River Forth also runs along the western boundary. Arable farmland lies to the south of the Site. There is a 50m buffer zone around the proposed application site, and this was also surveyed.
- 9.1.4 The Proposed Development surrounds the actual Craigforth Crag (which itself covers circa 15 hectares) and comprises an office led, mixed use development including hotel, leisure, retail, healthcare and residential with new access, servicing, parking, open space, and associated infrastructure. This is made up of the following:
- **North Sub-Area (8.2 ha):** This is separated from the wider site by a narrow vehicular and pedestrian route and borders the A84 to the north.
 - **North Site (2.4 ha):** A detailed planning application is being made for new office buildings and parking areas comprising 2.4 ha of this area, with associated access roads and a new access point from the A84.
 - **Central Sub-Area (10.5 ha):** A mixed use development is proposed within the central area of the Site, which wraps round the north side of the Crag – including residential apartments, leisure and retail facilities, a nursery, and a hotel.
 - **South Sub-Area (18.7 ha):** A mixed use development is proposed for this area, which wraps around the south side of the Crag – consisting of residential properties, and a care home supported living housing and community facility.
 - **South Access (1.3 ha):** This extends to the south, along Kersebonny Road. No upgrades to this road are currently proposed.

- 9.1.5 This chapter supports the Proposed Development (PPiP Masterplan) application for the full Site and the Proposed Development (Detailed Application) for the North Site. As such, a summary of the assessment, as it pertains to the North Site, is provided in Section 9.5 – North Site (Office HQ) Assessment – with the full Masterplan Assessment provided in Section 9.6.
- 9.1.6 Full details of the Proposed Development are provided in Chapter 4: Description of Proposed Development.

Aims

- 9.1.7 The aims of the survey were:
- to establish a robust ecological baseline assessment for ecological receptors which could potentially influence, or be influenced by, the Proposed Development;
 - Identify and evaluate the nature conservation and biodiversity interest of ecological receptors in the context of the Site and wider environment; and

- Identify any features requiring further survey.

Policy Context

9.1.8 This assessment has taken into account the following legislation and planning policy relevant to ecology and wildlife:

- The Conservation (Natural Habitats etc.) Regulations 1994 (as amended) (called "The Habitats Regulations") transposed from the EC Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora¹
- The Conservation of Habitats and Species Regulations 2010²;
- The Wildlife and Countryside Act 1981 (as amended)³;
- Nature Conservation (Scotland) Act 2004 (as amended)⁴;
- The Protection of Badgers Act 1992⁵;
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017⁶;
- Scottish Planning Policy⁷; and
- Planning Advice Note (PAN) 60 Planning for Natural Heritage 2000⁸.

9.1.9 Other guidance relevant to this assessment includes:

- Stirling Local Biodiversity Action Plan⁹; and
- UK Biodiversity Action Plan¹⁰.

9.2 Assessment Methodology & Significance Criteria

9.2.1 The approach taken to assess ecological effects follows the guidance document produced by the Chartered Institute of Ecology and Environmental Management (CIEEM)¹¹. These guidelines set out the process for assessment through the following stages:

- Describing the ecological baseline in the zone of influence through survey and desk study;
- Assigning a value to "Valued Ecological Receptors" (VERs) - these are the designated sites, habitats and species of highest ecological value present;
- Identifying and characterising the potential effects on these VERs based on the nature of construction, operation and decommissioning activities associated with the Development;
- Describing any mitigation, compensation and/or enhancement measures associated with the Development and assessing residual significance; and
- Identification of any monitoring requirements.

Evaluating Features of Ecological Interest

9.2.2 The value the features of ecological interest is defined on the basis of the geographic scale

1 The Conservation (Natural Habitats, &c) Regulations 1994 [online]. Available at: <http://www.legislation.gov.uk/uk/si/1994/2716/contents/made>

2 The Conservation of Habitats and Species Regulations 2010 [online]. Available at: <http://www.legislation.gov.uk/uk/si/2010/490/contents/made>

3 Wildlife and Countryside Act 1981 [online]. Available at: <http://www.legislation.gov.uk/ukpga/1981/69>

4 Nature Conservation (Scotland) Act 2004 [online]. Available at: <http://www.legislation.gov.uk/asp/2004/6/contents>

5 Protection of Badgers Act 1992 [online]. Available at: <http://www.legislation.gov.uk/ukpga/1992/51/contents>

6 Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017

7 Scottish Government, (2014), 'Scottish Planning Policy', Available [online] at: <http://www.scotland.gov.uk/Resource/0045/00453827.pdf>

8 Scottish Executive, 2000. PAN 60: Planning for Natural Heritage. Edinburgh: Scottish Executive.

9 Stirling Council. Stirling Local Biodiversity Action Plan.

10 JNCC and Defra (2012). UK Post-2010 Biodiversity Framework. Available at: <http://data.jncc.gov.uk/data/587024ff-864f-4d1d-a669-f38cb448abdc/UK-Post2010-Biodiversity-Framework-2012.pdf>

11 CIEEM (2018). Guidelines for Ecological Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. CIEEM

given in Table 9.1. Attributing a value to a receptor is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of a value level. For example, a Special Area of Conservation (SAC) designated under the Habitats Directive is explicitly of European (International) importance. For non-designated receptors, the use of guidelines, such as the national guidelines for the selection of Sites of Special Scientific Interest (SSSI), can be helpful in attributing a value to a receptor.

- 9.2.3 It should be noted that some receptors, such as legally protected species, may be of insufficient ecological value to warrant consideration within the ecological impact assessment, but are instead considered in the context of legal and policy implications.

Table 9.1 Determining Value

Level of Value	Examples
International	An internationally designated site (e.g. SAC), or site meeting criteria for international designations.
	Species present in internationally important numbers (>1% of biogeographic populations).
National	A nationally designated site (SSSI, or a National Nature Reserve (NNR)), or sites meeting the criteria for national designation.
	Species present in nationally important numbers (>1% UK population).
	Large areas of priority habitat listed on Annex I of the EC Habitats Directive and smaller areas of such habitat that are essential to maintain the viability of that ecological resource.
Regional	Species present in regionally important numbers (>1% of the Natural Heritage Zone population).
	Sites falling short of criteria for selection as a SSSI, but of greater than the local criteria below.
Local	Scottish Wildlife Trust Reserves, Local Nature Reserves that do not include features as described above.
	Areas of semi-natural ancient woodland smaller than 0.25ha.
	Areas of habitat or species considered to appreciably enrich the ecological resource within the local context, e.g. species-rich flushes or hedgerows.
Negligible	Usually widespread and common habitats and species. Receptors falling below local value are not normally considered in detail in the assessment process.

- 9.2.4 Part of the process of attributing value to species, involves defining the population to be valued and requires professional judgment in order to identify an ecologically coherent population against which effects on integrity can be assessed. For example, for wide-ranging species such as otter, it may be more appropriate to value the otter population in a whole catchment, whereas for more localised species, such as water vole, value may be attributed to groups of related colonies which function as a meta-population.

- 9.2.5 Socio-economic, cultural, and secondary/supporting values may be considered, where appropriate, but do not otherwise form a key part of this assessment.

9.3 Characterisation of Potential Effects

- 9.3.1 This section identifies the likely significant effects on the environment resulting from the Proposed Development during demolition, construction, and operational phases. A description

of the likely significant effects of the Proposed Development and an assessment of its predicted significance is provided.

- 9.3.2 The magnitude of effects is predicted quantitatively where possible. Where this is not possible, a more qualitative approach is taken. Magnitude can be adverse (very high, high, moderate, low or negligible) or beneficial. High magnitude effects could include large-scale permanent and/or high probability changes that affect the receptor's population or extent. Low magnitude effects would typically be small in scale or possibly temporary in their effect. The criteria used in this assessment for describing the overall magnitude of a potential effect are summarised in Table 9.2.

Table 9.2 Magnitude of Effect

Magnitude of Effect	Description
Very high adverse	Very high effects would result in total or almost complete loss of a population/habitat and would result in a permanent adverse effect on the integrity of the population. The conservation status of the receptor would be affected.
High adverse	High effects may include those that result in large-scale, permanent changes in a receptor, and likely to change its ecological integrity. These effects are therefore likely to result in overall changes in the conservation status of a species population/habitat.
Moderate adverse	Medium effects may include moderate-scale permanent changes in a receptor, or larger-scale temporary changes, but the integrity of the population/habitat is not likely to be affected. This may mean that there are temporary changes in the conservation status of the population/habitat, but these are reversible and unlikely to be long-term.
Low adverse	Low effects may include those that are small in magnitude, have small-scale temporary changes, and where integrity is not affected. These effects are unlikely to result in overall changes in the conservation status of a population/habitat.
Negligible	No perceptible change in the ecological receptor.
Beneficial	The changes in the ecological receptor are considered to be beneficial.

- 9.3.3 The assessment also takes into account whether the effect is beneficial or adverse, short term (for example only during construction) or long term (throughout the lifetime of the development), reversible or permanent.

- 9.3.4 It is also important to consider the degree of confidence in the assessment and to quantify the certainty of the effects on the ecological resource. The following categories are used in this assessment:

- Certain/near certain: probability estimated at 95% or higher;
- Probable: probability estimated above 50% but below 95%;
- Unlikely: probability estimated at above 5% but less than 50%; and
- Extremely unlikely: probability estimated at less than 5%.

Determining Significance of Potential Ecological Effects

- 9.3.5 Having followed this process, the significance of an effect is then determined. The CIEEM Guidelines use only two categories: "significant" or "not significant". A significant effect is defined in ecological terms as an effect on the integrity or conservation status of a defined site,

habitat or species. The significance of an effect is determined by considering the value of the receptor and the magnitude of the effect and applying professional judgement as to whether the integrity of the receptor will be affected. This concept can be applied to both designated sites (for example, a SSSI) and to defined populations (for example a great crested newt breeding population).

- 9.3.6 The term integrity is used here in accordance with the definition adopted by the ODPM Circular 06/2005 on Biodiversity and Geological Conservation. This guidance applies in England, but the definition is equally relevant here. This states that designated site integrity refers to “...*coherence of ecological structure and function...that enables it to sustain the habitat, complex of habitats and/or levels of populations of species for which it was classified*”. Integrity therefore refers to the maintenance of the conservation status of a habitat or species population at a specific location or geographical scale.
- 9.3.7 Effects are more likely to be considered significant where they affect receptors of higher conservation value or where the magnitude of the effect is high. Effects not considered to be significant would be those where the integrity of the receptor is not threatened, effects on receptors of lower conservation value, or where the magnitude of the effect is low.
- 9.3.8 In this assessment, an effect that threatens the integrity of a receptor is considered to be significant in terms of the EIA Regulations. Effects assessed as not significant should be considered as not significant in terms of the EIA Regulations. It should be noted that, alongside the criteria provided, professional judgement is applied in determining the significance of potential effects. Mitigation measures and detailed design work avoid and reduce potentially significant effects, but it is also best practice to propose mitigation measures to reduce adverse effects that are not significant.

Mitigation, Compensation and Enhancement

- 9.3.9 Mitigation, compensation, and enhancement measures should be presented in terms of the integrity/conservation status of the ecological resource to which it applies.
- 9.3.10 Mitigation measures should be developed during the design process where possible and aim to:
- Avoid adverse ecological effects – especially those that could be significant; and
 - Reduce adverse effects that cannot be avoided.
- 9.3.11 Compensation seeks to minimise any remaining significant adverse ecological effects that cannot be avoided by a mitigation strategy. Compensation measures often carry a degree of uncertainty and there may also be a time lag between damage and compensation.
- 9.3.12 Ideally, enhancement measures should also be implemented where possible to achieve net ecological gain.

9.4 Baseline Conditions

- 9.4.1 This section describes and evaluates the baseline environmental conditions i.e. the current situation and anticipated changes over time, assuming the Site remains undeveloped. Due to the holistic nature of an ecological baseline, the baseline is presented for both the Proposed Development (Detailed Application) covering the North Site and the Proposed Development (PPiP Masterplan) as one unified feature. However, the potential effects have been estimated for the Proposed Development (Detailed Application) and Proposed Development (PPiP Masterplan) separately due to the higher level of detail available for the North Site.

Statutory Designated Sites

9.4.2 Statutory designated sites, located within 5 km of the Site, are considered in this assessment. Statutory designated sites are protected by EU and UK legislation and include:

- Special Protection Areas (SPA);
- Special Areas of Conservation (SAC);
- Ramsar sites;
- Sites of Special Scientific Interest (SSSI);
- National Nature Reserves (NNR); and
- Local Nature Reserves (LNR).

9.4.3 The statutory sites designated for nature conservation are presented in Table 9.3 below.

Table 9.3 Designated Sites

Site Name	Designation	Proximity to Development Site (km)	Qualifying Feature
River Teith	SAC	0.2 km North	Designated on account of its Atlantic salmon <i>Salmo salar</i> and river, brook and sea lamprey <i>Lampetra fluviatilis</i> , <i>L. planeri</i> and <i>L. marinus</i> populations.
Kippenrait Glen	SAC/SSSI	3.2 km North East	SAC: Designated for its mixed woodland habitat. SSSI: Notified on account of its mixed ash woodland habitat and on account of its beetle and crane fly <i>Lipsothrix ecucullata</i> populations.
Ochertyre Moss	SSSI	3.4 km North West	Notified on accounts of its raised bog habitat and on account of its spider <i>Heliophanus dampfi</i> population.
Abbey Craig	SSSI	3.4 km East	SSSI: Notified on account of its mixed ash woodland habitat and on account of its beetle population.
Sauchie Craig Wood	SSSI	3.5 km South	SSSI: Notified on account of its mixed ash woodland habitat.
Balquhiddelock Wood	SSSI/LNR	4.3 km South East	Notified for its wet woodland habitat.

9.4.4 In addition to the above, a search for areas of woodland, listed on the Ancient Woodland Inventory (AWI), was undertaken within 1 km of the Development Site. Crag Wood is listed on the AWI as a long-established woodland of plantation origin. It has come to the attention of the biodiversity team, through consultation with Stirling Council, that this feature has been put forward as a potential Local Nature Conservation Site.

Site Habitats (see Figure 9.1)

9.4.5 The northern section of the Site comprises the Lomond View Building and associated car park. Semi-natural habitats present within the northern area of the Site comprise lines of standard

trees, most notably a group of standard oak *Quercus sp.* trees, which are very mature in nature. An area of rank marshy grassland lies to the north west of the car park, beyond which lies the River Forth. A small pond lies in the west of the northern section of the Site. However, this feature was choked with great reedmace *Typha latifolia* and held little to no standing water at the time of survey. Hydrological modelling suggests that the wet areas are as a result of surface water flow rather than being Ground Water Dependent Terrestrial Ecosystems (GWDETs)

- 9.4.6 The central section of the Site comprises a series of buildings and hardstanding associated with the Prudential financial services company. Craigforth House, which is currently used as a nursery, also lies within this section, along with two residential bungalows. Semi-natural habitats in this section comprise a line of standard lime trees *Tilia cordata* associated with the road which runs through the Site and small areas of amenity grassland.
- 9.4.7 A small section of woodland lies in the central section, which is part of the wider woodland that lies around the Crag, which is encapsulated between the central and southern section of the Site. This woodland is listed on the Ancient Woodland Inventory as 'Long Established Woodland of Plantation Origin' (LEPO). The 'Crag Woodland' comprises a canopy formed by a range of native and ornamental species including sycamore *Acer pseudoplatanus*, Corsican pine *Pinus nigra*, sitka spruce *Picea sitchensis*, pedunculate oak *Quercus robur*, horse chestnut *Aesculus hippocastanum*, silver birch *Betula pendula* and alder *Alnus glutinosa*. The understorey, where present, comprises smaller growing tree species such as holly *Ilex aquifolium* and rowan *Sorbus aucuparia*, along with patches of rhododendron *Rhododendron ponticum* and bramble *Rubus fruticosus* agg scrub. The ground flora comprises a range of grasses such as brome *Bromus sp.*, ferns and patches of bluebells *Hyacinthoides non-scripta*. Wetter areas, at the edge of the woodland, also contain great reedmace.
- 9.4.8 The southern section of the Site largely comprises farmland which is being managed for arable purposes and a silage crop associated with Kaimes Farm. A hedgerow comprised largely of snowberry *Symphoricarpos albus*, separates this section of the development site from the Crag Woodland.
- 9.4.9 The western boundary of the Site is largely comprised by the mid-point of the bed of the River Forth. The river channel meanders naturally along the boundary and varies between 10-15 m in width. The water is deep and slow flowing in this section of the River Forth. There is abundant bankside cover provided by riparian woodland, which largely comprises alder *Alnus glutinosa* sycamore *Acre Psuedoplatanus*, ash *Fraxinus excelsior* and cherry *Prunus sp.* trees.

Protected Mammal Species

- 9.4.10 The NBN Atlas database has no records of protected mammal, reptile and amphibian species within the Site within the last five years. However, there are records of the following protected species within 5 km of the Site:
- Beaver *Castor fiber*;
 - Otter *Lutra lutra*;
 - Common pipistrelle bat *Pipistrellus pipistrellus*;
 - Soprano pipistrelle bat *Pipistrellus pygmaeus*;
 - Badger *Meles meles*;
 - Red squirrel *Sciurus vulgaris*; and
 - Pine marten *Martes martes*.
- 9.4.11 No evidence of the presence of protected mammal species was recorded during the preliminary ecology survey. However, some of the habitat types present do have the potential to support

protected species, notably bats.

Otter and Water Vole

- 9.4.12 No evidence of these species was recorded within the survey area. However, otters are often found at rivers, small streams, ditches, ponds, lakes, canals, marshes, rocky shores and estuaries. They may rest and rear young within tree roots, holes in riverbanks, rocks or flattened areas of vegetation. Old and fallen trees in woodland provide holt sites and woodland understory vegetation offers cover above ground. Likewise, water vole are often found on vegetated banks of slow flowing rivers, ditches, dykes and lakes where they excavate extensive burrow systems into the banks of waterways.
- 9.4.13 The Site is bounded, to the west, by the mid-point of the bed of the River Forth which has riparian woodland vegetation, which is a good habitat for both otters and watervoles.
- 9.4.14 With regards to otters, due to access issues, searches were restricted to the east bank of the watercourse only, with a detailed search of the west bank undertaken with the aid of binoculars. Despite no evidence of the presence of otter, recorded at the time of survey, the River Forth offers excellent foraging conditions for otter and they will use the channel for commuting also. An issue though could be that the habitats within the survey area are subject to high levels of recreational use from the staff that work at Craigforth, and as such, it is unlikely that otters would rest in the survey area for any length of time.
- 9.4.15 Likewise, the survey found no evidence of water vole on the Site. This though, is due to the watercourses within the survey area being of limited suitability for this species, as they are typically too substantial and lacking in bankside burrowing opportunities.

Badger

- 9.4.16 Typically, a patchwork of pasture and woodland providing good areas for earthworms and foraging, provide good badger habitats, as well as good areas for setts. There is good woodland coverage within the Crag, and reasonable foraging opportunities in the farmland in the south of the Development Site. The Site is, however, cut off from other suitable habitat via the M9 to the east and the River Forth to the west, limiting opportunities for colonisation by this species and no evidence of this species recorded within the survey area.

Red Squirrel and Pine Marten

- 9.4.17 Red squirrel typically build dreys in the forks between tree trunks and branches in coniferous and mixed woodland, while pine marten build dens mainly in woodland, in hollow trees or scrub-covered fields. Occasionally house roofs, rabbit burrows, rocky outcrops or under tree roots.
- 9.4.18 No evidence of these species was found on Site. The reason for this is likely to be that Crag Wood represents a sub-optimal habitat for these species as it is isolated from other suitable habitat by the presence of the River Forth and the M9 carriageway on the western and eastern boundaries.

Bats

- 9.4.19 Habitats suitable for bats are abundant on the Site as the waterways, woodland and grass habitats provide ample foraging opportunities as well as commuting pathways.
- 9.4.20 The trees on the site, as well as some of the older buildings, also provide roosting opportunity.
- 9.4.21 Three bat activity transects were undertaken walking a fixed route within 10 listening stops along the route. Activity transects were undertaken on 3rd June, 24th July and 12th September 2019 in favourable weather conditions; dry, light wind and > 10°C.

- 9.4.22 Moderate numbers of soprano pipistrelle bats (peak of 26 bat passes at a given stop) and low numbers of common pipistrelle bats (peak of seven bat passes at a given stop) were recorded during the bat activity transects. Single Myotis species bat passes (likely Daubentons bat *Myotis daubentonii*) were recorded during the June and September visits.
- 9.4.23 Craigforth House is an old building of stone construction and is considered to be of high roosting potential for bats. There are numerous potential ingress points for bats via cracks in the render/stonework, around the chimney masonry, and through lifted slates and flashing on the roof. As a listed building, any future alterations and change of use of Craigforth House will be subject to separate applications for planning and listed building consent. These applications will therefore not have any direct impact on potential bat roosts at Craigforth House. The remainder of the buildings within the Site are all of low or negligible potential for supporting roosting bats. The mature standard oak trees have been identified as having moderate potential to support roosting bats. The woodland habitat within the Site also provides excellent foraging and commuting opportunities for this group, as do linear features such as the line of lime trees along the main road within the business park and riparian woodland edge, Table 9.4.

Table 9.4 Bat Activity Surveys

Species/Guild	Level of Bat Potential
Gatehouse building	Low
Small brick building between Riverside Building and Administration Centre	Low
Main/Central buildings	Low
Craigforth House	High
Dining Hall and Conference Centre	Low
Bungalow 1	Low
Bungalow 2	Low

Herpetofauna

- 9.4.24 The choked, small pond and marshy grassland will likely support common amphibian species such as common frog and toad, but the habitats are considered to be of little to no suitability for supporting the protected species, great crested newt (*Triturus cristatus*). As no sign of this species was discovered, this species is not considered further in this report.
- 9.4.25 The habitats present within the Site largely comprise hard standings and areas of well-managed, close clipped vegetation (save for Crag Wood). As such, they are of little suitability for supporting common reptile species.

Birds

- 9.4.26 The bird species recorded during the survey are presented on Table 9.5.

Table 9.5 Bird Walkover Survey Results

Species		
Common name	Latin name	Status
Pied wagtail	<i>Motacilla alba</i>	Green
Black-headed gull	<i>Chroicocephalus ridibundus</i>	Green
Grey heron	<i>Ardea cinerea</i>	Green
Buzzard	<i>Buteo buteo</i>	Green
Goosander	<i>Mergus merganser</i>	Green
Reed bunting	<i>Emberiza schoeniclus</i>	Amber
Blackcap	<i>Sylvia atricapilla</i>	Green
Great tit	<i>Parus major</i>	Green
Robin	<i>Erithacus rubecula</i>	Green
Blue tit	<i>Cyanistes caeruleus</i>	Green
House martin	<i>Delichon urbicum</i>	Amber
Sedge warbler	<i>Acrocephalus schoenobaenus</i>	Green
swallow	<i>Hirundo rustica</i>	Green
Chaffinch	<i>Fringilla coelebs</i>	Green
House sparrow	<i>Passer domesticus</i>	Red
Willow warbler	<i>Phylloscopus trochilus</i>	Amber
Mallard	<i>Anas platyrhynchos</i>	Amber
Chiffchaff	<i>Phylloscopus collybita</i>	Green
Wren	<i>Troglodytes troglodytes</i>	Green
Oystercatcher	<i>Haematopus ostralegus</i>	Amber
Goldfinch	<i>Carduelis carduelis</i>	Green

Invasive species

9.4.27 Two invasive vascular plant species, listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), were recorded during the survey visit. Giant hogweed *Heracleum mantegazzianum* was recorded at the western edge of the car park in the central section of the Site, along the River Forth on the western boundary of the Site and in the rank marshy grassland in the northern section of the Site. Himalayan balsam *Impatiens glandulifera* was also recorded along the banks of the River Forth.

9.5 North Site (The Proposed Development (Detailed Application)) Assessment

Assumption and Limitations

- 9.5.1 While the assessment is based on the development of a detailed ecological baseline, specific detailed bat survey data is not available at time of writing. The absence of survey data to inform this chapter is a result of the Coronavirus pandemic and consequent lockdown of non-essential work activities instructed by the Scottish Government which severely limited site access from the beginning of the bat survey season. Now that there is limited site access, bat surveys will be undertaken according to the schedule identified in the ecological management plan (Appendix 9.2) and completed by September 2020 and prior to any construction work occurring on the Site.

Changes likely to occur over time in the absence of developing the project

- 9.5.2 The northern section of the North Site is marshy grassland which is quite isolated from much of the surrounding ecology by the A84 and Craigforth campus itself. Increase flooding would likely make the area even more marshy.

Potential effects

- 9.5.3 The northern section of the Site contains a few ponds which are not GWDTEs but are as a result of inundation by the Forth during rainfall events. The marshy grassland here is of limited ecological value and will not be developed as it acts as a functional floodplain.
- 9.5.4 Potential impacts on the ecology of the section of the Site would be restricted to the construction programme
- 9.5.5 The section of the River Forth within the Site does contain Himalayan balsam and Giant Hogweed.
- 9.5.6 The oak trees present on this site may also form ecologically valuable bat roosts. It is noted that the intent is to keep these trees, however if they are removed, they would need to be subject to a detailed bats roost survey.
- 9.5.7 Potential effects, if not managed efficiently, are shown in table 9.6.

Table 9.6 Potential Ecological Effects

Ecological Feature	Potential Effect	scale	magnitude	significance
The River Teith SAC	Potential for silt or fuel spill to impact the river effecting lamprey species and salmonid spawning grounds.	national	High Adverse	Significant
Invasive species along the bank of the River Forth	Potential to encourage spread during construction works.	local/ regional	Moderate adverse	Significant
Mature oak trees	Potential to lose bat roosts.	local	Moderate adverse	Significant
Birds	One of the trees may be providing nesting site during the breeding bird season. Construction works could cause disturbance.	local	Moderate adverse	Significant

Habitat loss	Some loss on the marshy grassland may occur.	local	minor	Not significant
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Additional mitigation

9.5.8 The avoidance of adverse effects can also be achieved through good pre-construction planning, site practices and adherence to the most up to date relevant pollution prevention guidelines (PPGs) including:

- PPG1: General Guide to the Prevention of Water Pollution¹²;
- PPG5: Works In, Near or Liable to Affect Watercourses¹³;
- PPG6: Working at Construction and Demolition Sites¹⁴.

9.5.9 Additionally, it is recommended that artificial lighting during construction and post construction is designed in such a way as to minimise light spill onto the River Forth. This is to safeguard otter, bats and fish from disturbance.

Invasive Species Management Plan

9.5.10 An Invasive Species Management Plan is required to avoid the illegal spread of species listed in Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) (giant hogweed and Himalayan balsam).

9.5.11 Prior to any construction works being carried out, a tree management plan for the North Site will be devised ensuring that most ecologically valuable trees are maintained and any trees to be removed are subject to detailed bat surveys (Appendix 9.2). If any tree removal or other construction works are scheduled within the breeding bird season, a full breeding bird survey should be carried out to inform a breeding bird management plan.

Residual effects

9.5.12 If mitigation is put in place and the ecological management plan set out in Appendix 9.2 is adhered to, then the following residual effects are likely:

¹² Pollution Prevention Guidelines. Understanding Your Environmental Responsibilities – Good Environmental Practices [online] Available: <https://www.netregs.org.uk/media/1686/ppg-1.pdf>

¹³ Pollution Prevention Guidelines. Works and maintenance in or near water [online] Available: https://www.netregs.org.uk/media/1418/gpp-5-works-and-maintenance-in-or-near-water.pdf?utm_source=website&utm_medium=social&utm_campaign=GPP5%2027112017

¹⁴ Pollution Prevention Guidelines. Working at construction and demolition sites [online] Available: <https://www.netregs.org.uk/media/1672/ppg-6.pdf>

Table 9.7 Summary of Residual Impacts

Ecological Feature	Potential Effect	Mitigation	Residual
The River Teith SAC	High Adverse Significant	Adherence to oil storage and silt management (appendix 9.2)	Not Significant
Invasive species along the bank of the River Forth	Moderate Adverse Significant	Invasive species management plan to be approved prior to construction	Not Significant
Mature oak trees	Moderate Adverse Significant	Survey all trees for bat roosts prior to construction, put in place a bat management plan suitable for any species found	Not Significant
Birds	Moderate Adverse Significant	Construction activities to take place outside the breeding bird season, if the season cannot be avoided a detailed breeding bird survey and breeding bird management plan must be emplaced.	Not Significant

Cumulative effects

9.5.13 No cumulative effects are anticipated.

9.6 Masterplan Assessment (The Proposed Development (PPiP Masterplan))

9.6.1 Within this section, potential effects are assessed on a 'receptor by receptor' basis. It identifies the likely significant effects on the environment resulting from the Proposed Development (PPiP Masterplan) during demolition, construction and operational phases. A description of the likely significant effects of the Proposed Development (PPiP Masterplan) and an assessment of their predicted significance is provided.

9.6.2 Potential effects are discussed in the context of construction and post construction phases of the Proposed Development (PPiP Masterplan).

Valued Ecological Receptors

9.6.3 On the basis of the description of the ecological baseline as presented in Section **Error! Reference source not found.**, the values attributed to ecological receptors within the zone of influence are shown in Table 9.8.

Table 9.8 Ecological Value

Receptor	Value	Comments
River Teith SAC	International	The River Teith is afforded European level protection via its SAC designation on account of its Atlantic salmon and lamprey populations.
Crag Wood	Regional	16.35Ha of long-established woodland of plantation origin, listed on the Ancient Woodland Inventory.

Receptor	Value	Comments
Remaining Sites Designated for Nature Conservation	International (SAC) and National (SSSI)	The remaining sites within the 5km area of search are notified on account of the habitats they support. The closest of these lies over 3 km from the boundary of the development site and no effects are predicted on these receptors. Scoped out of further assessment.
Arable and amenity grassland	Negligible	These habitats are common and widespread in the local area and considered to be of limited ecological value. Does not constitute a Groundwater Dependent Terrestrial Ecosystem (GWDTE). Scoped out of further assessment.
Mixed plantation woodland	Negligible	This habitat is common and widespread in the local area and is considered to be of limited ecological value. Does not constitute a GWDTE. Scoped out of further assessment.

Designated Sites

- 9.6.4 The River Teith SAC lies approximately 200m to the north of the Site at its closest point. The SAC is designated for its Atlantic salmon and lamprey (sea, river and brook) populations.
- 9.6.5 There are no barriers preventing the dispersal of the SAC qualifying species moving upstream into the section of the River Forth which forms part of the Site boundary. That said, this section of the River Forth is considered to be of relatively low sensitivity for these species as there is a lack of spawning gravel, or marginal fine sediment (used by lamprey to burrow into during their ammocoete phase).
- 9.6.6 Furthermore, there will be no stream crossings required as a result of the works, and no need for any instream works.
- 9.6.7 Prior to construction, an Environmental Management Plan (EMP) will be prepared, which will contain a section setting out environmental commitments required when working near (within 10m of a watercourse). The EMP will set out measures for effective mitigation of silt and safe storage of potential pollutants.
- 9.6.8 Based on the above, any adverse effect on the River Teith SAC resulting from the Proposed Development (PPiP Masterplan) is predicted to be extremely unlikely and it is considered that it should be possible to screen the SAC out of the need for a Habitats Regulations Assessment (see Appendix 9.3).
- 9.6.9 It is considered that, without mitigation, there is the potential for pollution of the River Teith SAC. As a worst-case scenario there is the potential for a high adverse, short term significant effect on this receptor. However, this is considered to be extremely unlikely. Mitigation measures to further ameliorate this risk are set out in Section 9.7 below.

Ancient Woodland

- 9.6.10 A single area of woodland listed on the Ancient Woodland Inventory (AWI) lies within the site. Crag Woodland is a long-established woodland of plantation origin (LEPO). It is presently a proposed Local Nature Conservation Site (LNCS) There are no other areas of woodland listed on the AWI within 1km of the development site. Although this habitat is to be retained under the proposals, the masterplan indicates the addition of 'Crag Viewpoints' within this area. Any

habitat loss to accommodate viewpoints, if required at all, will be extremely minimal and effects on Crag Wood are predicted to be **not significant**. Nonetheless, should the removal of any trees be required to facilitate the addition of viewpoints, individual trees should first be surveyed for their potential to support roosting bats (see below).

Bats

- 9.6.11 Seven buildings within the Site have been identified as having the potential to support roosting bats. Additionally, Crag Wood and some of the mature standard broadleaved trees within the Site also have the potential to support roosting bats (Appendix 9.1).
- 9.6.12 Three bat activity transects recorded the presence of moderate numbers of soprano pipistrelle, low numbers of common pipistrelle and single myotis bats foraging and commuting within the Site.
- 9.6.13 Bat emergence/return surveys at potentially suitable roosting habitats have not been undertaken, due to the impact of the Coronavirus related restrictions on non-essential working.
- 9.6.14 As construction will not start for another 24 months, it was considered that bat roost surveys would be out of date if they were conducted as a part of this assessment. As such, the presence of roosting bats was not confirmed, or quantified at this time.
- 9.6.15 In the absence of this information it is not possible to rule out the potential **High Adverse, Irreversible** adverse **Significant** effect on bats at the time when construction commences. However, ensuring that data on bat roosting and foraging on the site is up to date at that time will allow for the identification of the number and type of bats using the site and for a comprehensive bat management plan to be devised as a part of the ecological management plan.
- 9.6.16 Emergence/return surveys are required (to be undertaken between May and September inclusive) at potentially suitable roosting habitats prior to any proposed work in these areas to avoid the potential for a legislative breach and the risk of harm to bats, as well as to quantify the effect of the development on bats and inform any mitigation measures and licensing needs.

9.7 Mitigation Measures

- 9.7.1 This section describes the measures which would be implemented to mitigate against potential adverse impacts. Where possible, enhancement measures have also been proposed.

General Mitigation Recommendations

- 9.7.2 As with the North Site, the avoidance of adverse effects will also be achieved through good pre-construction planning, site practices, and adherence to the relevant pollution prevention guidelines (PPGs) including:

- PPG1: General Guide to the Prevention of Water Pollution¹⁵;
- PPG5: Works In, Near or Liable to Affect Watercourses¹⁶;
- PPG6: Working at Construction and Demolition Sites¹⁷.

- 9.7.3 Again, it is recommended that artificial lighting during construction and post construction is

¹⁵ Pollution Prevention Guidelines. Understanding Your Environmental Responsibilities – Good Environmental Practices [online] Available: <https://www.netregs.org.uk/media/1686/ppg-1.pdf>

¹⁶ Pollution Prevention Guidelines. Works and maintenance in or near water [online] Available: https://www.netregs.org.uk/media/1418/gpp-5-works-and-maintenance-in-or-near-water.pdf?utm_source=website&utm_medium=social&utm_campaign=GPP5%2027112017

¹⁷ Pollution Prevention Guidelines. Working at construction and demolition sites [online] Available: <https://www.netregs.org.uk/media/1672/ppg-6.pdf>

designed in such a way as to minimise light spill onto the River Forth. This is to safeguard otter, bats and fish from disturbance.

Bat Species Protection Plan

- 9.7.4 Prior to any construction programme occurring, a detailed bat roost protection survey should be carried out and any buildings that show a possibility of bat impacts will need to be surveyed. The buildings to be surveyed, if modified, are shown in Table 9.79, along with the survey requirements needed.
- 9.7.5 It is recommended that these surveys be carried out prior to construction occurring so the construction programme can be informed by the most up to date information.
- 9.7.6 The following surveys are recommended:

Table 9.9 : Bat Activity Surveys

Species/Guild	Level of Bat Potential	Number of Activity Surveys Required	Number of Surveyors Required for Effective Coverage
Gatehouse building	Low	One	Two
Small brick building between Riverside Building and Administration Centre	Low	One	Two
Main/Central buildings	Low	One	Eight
Craigforth House	High	Three	Four
Dining Hall and Conference Centre	Low	Two	Four
Bungalow 1	Low	One	Two
Bungalow 2	Low	One	Two

- 9.7.7 Once the bat baseline is fully quantified, appropriate mitigation relating to the need for a derogation licence (to remove or disturb roosting bats), and the type and number of any replacement bat roosts can be implemented accordingly.

Otter Species Protection Plan

- 9.7.8 As no water crossings are proposed, and all infrastructure is located at least 50m from watercourses, no pre-construction checking surveys for otter are proposed. However, in order to address disturbance to otter during construction works, escape ramps will be provided in any trenches or excavations where otters could be entrapped. Where construction works may be required at night, lighting will be designed to minimise spill onto watercourses.
- 9.7.9 There will be no significant residual effects on otters as a result of the Proposed Development (PPiP Masterplan).

Badger Species Protection Plan

- 9.7.10 Although the majority of habitats to be affected by the Proposed Development (PPP Masterplan) are considered to be sub-optimal for badger, small areas of suitable habitat are present. A re-survey of suitable habitat will be undertaken prior to construction to search for new setts that may have been created. A licence will be applied for if any badger setts are identified that may be affected by the Proposed Development (PPP Masterplan).
- 9.7.11 In order to minimise harm to badger, escape ramps will be provided in any trenches or excavations where badger could be entrapped.
- 9.7.12 There will be no significant residual effects on badger as a result of the Proposed Development (PPiP Masterplan).

Bird Management Plan

- 9.7.13 A range of common bird species are considered to be breeding within the Site. The bird breeding season runs from April to August inclusive.
- 9.7.14 It is recommended that construction is timed to either avoid the breeding season altogether, or scheduled to start before the breeding season starts (ideally before mid-March), so that birds returning to the area to breed can choose a territory/nest location away from potentially disturbing activities.

9.8 Residual Effects

- 9.8.1 The residual effects, i.e. the remaining effects of the Proposed Development (PPiP Masterplan), assuming implementation of the proposed mitigation measures, have been estimated and presented.

Designated Sites and Habitats

- 9.8.2 Mitigation measures set out in this report are predicted to safeguard the River Teith SAC from adverse effects. Habitats to be lost as a result of the Proposed Development (PPiP Masterplan) are of limited ecological value.
- 9.8.3 While the significance of effects on bat populations is difficult to quantify at this stage, a detailed monitoring programme to inform a bat management plan, can be agreed between the developer, planning office and SNH, would be enough to mitigate any effects on bat populations. Such a programme should be required as a formal planning condition. A suggested bat management plan is to be found in Appendix 9.2
- 9.8.4 Overall no significant residual effects on habitats or protected species are predicted.

9.9 Cumulative Effects

- 9.9.1 This section considers the cumulative effects of the Proposed Development (PPiP Masterplan) with committed developments identified within the vicinity of the Site. Any likely significant effects on the environment arising in this respect are set out in this section.
- 9.9.2 All impacts arising from the Proposed Development (PPiP Masterplan) are predicted to be negligible, with the implementation of the potential pollution mitigation measures set out in this chapter. The Site is currently used for commercial purposes and footfall and hardstandings are predicted to be of a similar level following implementation of the Proposed Development (PPiP Masterplan). As such, it is considered extremely unlikely that there will be an additional effect arising from the Proposed Development (PPiP Masterplan) which could meaningfully contribute

to a cumulatively significant effect on the ecology resource present.

9.10 Summary

- 9.10.1 The Proposed Development at Craigforth will be designed to minimise ecological impacts with additional habitat creation and ecologically sensitive design being inherent (Chapter 4). However, as with all developments, there is the potential for significant adverse ecological effects to occur, particularly during the construction phase of a project.
- 9.10.2 At the detailed design stage, options for removing these effects need to be firmed up. Consequently, commitments to good environmental practice to ensure the River Teith is not affected as a result of silt production for fuel spillages (as laid out on the draft Ecological Management Plan Appendix 9.2) need to be committed to and overseen by an ecological clerk of works.
- 9.10.3 Trees in the Crag section should be retained. Any trees to be removed would need to be surveyed for potential bats roosts and all works should be completed outwith the bird breeding season. If this cannot be avoided, then a breeding bird survey and management plan will be instigated.
- 9.10.4 The invasive species along the bank of the River Forth should be removed, in line with the invasive species management plan, as a matter of good environmental stewardship.
- 9.10.5 With regard to the Proposed Development (PPiP Masterplan), there is uncertainty surrounding the importance of the site for bats. Due to Coronavirus restrictions on non-essential working, it was not possible to conduct detailed bats surveys. However, there will be good time to carry out these surveys prior to any construction activities taking place. Survey requirements have been identified and are presently underway. The results will be incorporated into a detailed bat management plan (Appendix 9.2). The Proposed Development (PPiP Masterplan) will have little or no significant impact upon the proposed LNCS and beyond this there is little ecological value to the Site. It is thought that this is due to the fact that the site has poor ecological connectivity to the wider area due to its locality and the M9, A84 and the River Forth. So, while the adverse impacts on ecological resources are not significant (with the aforementioned caveat relating to bats), there is a great potential for habitat and biodiversity enhancement.

9.11 References

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9.12 Assessor information

9.12.1 The survey team was led by Colin Nisbett, a fully qualified ecologist of 15 years' experience. He is a full member of the Chartered Institute of Ecology and Environmental Management (MCIEEM) and a full Member of the Association of Environmental & Ecological Clerks of Works (MAEECoW). The ecological impact assessment has been prepared by Dr Gen Cannibal, a specialist who holds a degree in Ecology and a Doctorate in EIA, with 35 years' experience, who is a full member of the Institute of Environmental Sciences (IES) and a Chartered Environmentalist (CEnv) with the Royal Society for the Environment.

10 Flood Risk

10.1 Introduction

10.1.1 This chapter of the Environmental Impact Assessment Report (EIA Report) assesses the effect of the Proposed Development at Craigforth Campus, Stirling (hereafter referred to as the Site) on flood risk. This assessment has been undertaken by Fairhurst and is supported by:

- Figure 10.1: Baseline Water Environment (Volume 2)
- Appendix 10.1: Flood Risk Assessment (Volume 3)

10.1.2 Effects on flood risk are closely interlinked with effects on drainage and hydrology. These are fully considered in Chapter 11: Drainage & Hydrology of this EIA Report. Note that this chapter considers flood risk to the existing environment as a result of the Proposed Development, with flood risk to the Proposed Development itself being dealt with fully in Appendix 10.1.

Overview

10.1.3 The Site covers a total area of approximately 54 hectares (ha), located in the Stirling Council local authority area, centred on Craigforth Crag to the west of Stirling City, see Figure 10.1 (Volume 2). Craigforth Crag is a natural rampart, comprising a crag and tail created by the glacial erosion of a volcanic plug of very hard igneous rock, and surrounded by relatively flat, low-lying ground. The Site is situated on the south-west corner of Junction 10 of the M9 and is accessible from the A84 to the north and from Dumbarton Road, via Kersebonny Road, to the south. It is bounded by a meandering section of the River Forth to the west, the A84 to the north, the M9 to the east and the Raploch Burn and agricultural land to the south.

10.1.4 The Proposed Development surrounds the Crag (occupying 15.4 ha of the Site) and comprises an office led mixed use development including hotel, leisure, retail, healthcare and residential with new access, servicing, parking, open space, and associated infrastructure. This is made up of the following:

- **North Area (8.2 ha):** This is separated from the wider site by a narrow vehicular and pedestrian route and borders the A84 to the north.
 - **North Site (2.4 ha):** A detailed planning application is being made for new office buildings and parking areas comprising 2.4 ha of this area, with associated access roads and a new access point from the A84.
- **Central Area (10.5 ha):** A mixed use development is proposed within the central area of the Site, which wraps round the north side of the crag – including residential apartments, leisure and retail facilities, a nursery, and a hotel.
- **South Area (18.7 ha):** A mixed use development is proposed for this area, which wraps around the south side of the crag – consisting of residential properties, care home supported living housing and community facility.
- **South Access (1.3 ha):** This extends to the south along Kersebonny Road, no upgrades to this road are currently proposed.

10.1.5 This chapter supports the planning permission in principle (PPP) application for the full Site and the detailed planning application for the North Site. As such, a summary of the assessment as it pertains to the North Site is provided in Section 10.3 – North Site (Office HQ) Assessment – with the full Masterplan Assessment provided in Section 10.4.

10.1.6 Full details of the Proposed Development are provided in Chapter 4: Description of Proposed Development.

Scope of Assessment

- 10.1.7 Baseline flood risk at the Site is established within this chapter in order to identify any effects during both (short term) construction and (long term) operation of the Proposed Development. Consideration is made of flood risk both to the Site and to receptors elsewhere. The Proposed Development will introduce physical changes which may alter the hydrological characteristics of the area and effect flood risk. Potential effects are considered, and mitigation or design measures identified to reduce, eliminate or offset any risk. The EIA ensures that proper consideration is given to these factors and that environmental effects and proposed mitigation are fully known, to both the public and the determining authority.
- 10.1.8 As outlined in paragraph 10.1.2, this chapter considers flood risk to the existing environment as a result of the Proposed Development, with flood risk to the Proposed Development itself being dealt with fully in Appendix 10.1.

Study Area

- 10.1.9 The Proposed Development is located entirely within the catchment of the River Forth, see Figure 10.1 (Volume 2), which drains a total area of over 1,000 km², commencing at Ben Lomond and flowing south-east to discharge to the Firth of Forth. The River Forth flows along the western boundary of the Site and reaches a confluence with the River Teith some 0.5 km to the north-west of the Site. The Raploch Burn tributary flows through the South Site, running adjacent to the southern boundary, and discharging to the River Forth approximately 0.9 km south-west of the western Site Boundary. These watercourses are the primary source of flood risk to the Site.
- 10.1.10 The River Forth and its tributaries provide a pathway for effects to propagate elsewhere, with any alterations to runoff within the Site having the potential to effect flood risk receptors outwith the Site. The spatial extent of this assessment is, therefore, constrained by the catchment of the River Forth, with a focus on the sub-catchments draining the Site.

Effects to be assessed

- 10.1.11 The Screening and Scoping Report (2019) identified the following potential sources of flood risk:
- Fluvial flooding, from the River Forth and the Raploch Burn;
 - Infrastructure failure, due to failure of upstream reservoirs or blockage of bridges and culverts associated with the River Forth and Raploch Burn;
 - Overland flow;
 - Groundwater flooding;
 - Coastal flooding, due to the tidal influence on the River Forth; and
 - Sewer flooding.
- 10.1.12 Effects of these sources of flooding are assessed in terms of:
- Construction, i.e. short term effects; and
 - Operation, i.e. long term effects.
- 10.1.13 The Proposed Development will introduce physical changes which may alter the characteristics of the Site. Key issues will include:
- Alterations in land use (i.e. to more vulnerable uses) in areas at risk of flooding; and
 - Alterations to drainage and hydrology (fully considered in Chapter 11: Drainage & Hydrology).

10.1.14 Taking this into account, this chapter of the EIA covers the following potential effects:

- Effects on flood risk at the Site; and
- Effects on flood risk elsewhere.

Effects scoped out of the assessment

10.1.15 The following were scoped out of the assessment as part of the screening and scoping exercise:

- The inland location and elevation of the Site means it is not considered at risk from coastal waves. However, consideration has been made of the tidal influence on flood levels in the River Forth.
- No engineering works are proposed within the water environment and the Proposed Development incorporates a minimum 25 m buffer from adjacent watercourses (see Chapter 4: Description of Proposed Development). As such, potential effects on fluvial flood risk focus on those arising from activities or development within the wider catchment and/or functional floodplain, with the catchment areas and associated floodplain identified as receptors. As there is no expected reduction in channel capacity the watercourse itself is not considered a receptor.

10.2 Assessment Method

Guidance / Objectives / Targets / Standards

Water Framework Directive

10.2.1 Water management in all European Union (EU) member states is controlled by the Water Framework Directive 2000/60/EC (WFD). This aims to maintain or improve the physical and chemical quality of waterbodies within the EU by 2027. The key objective of the WFD of relevance to this assessment is to mitigate the effects of floods and droughts. The EIA takes into account the requirements of the WFD, which has been transposed into law by the Water Environment & Water Services (Scotland) Act 2003.

Scottish Planning Policy

10.2.2 Scottish Planning Policy (SPP) sets out national planning policies which reflect Scottish Ministers' priorities for operation of the planning system and for the development and use of land. The key provision in relation to flood risk is to manage flooding to reduce its economic and social consequences and safeguard services and infrastructure. SPP and the Scottish Government's online Planning Advice on Flood Risk require that adequate protection against flooding from all sources exists or can be provided for the Proposed Development and that it does not increase any existing flood risk to persons or property upstream and downstream.

10.2.3 The flood risk framework guiding development sets out three categories of coastal and fluvial flood risk, together with guidance, are as follows:

- **Little or No Risk** - annual probability of coastal or watercourse flooding is less than 0.1% (1:1000 years). No constraints due to coastal or watercourse flooding.
- **Low to Medium Risk** - annual probability of coastal or watercourse flooding is between 0.1% and 0.5% (1:1,000 to 1:200 years). Suitable for most development. A flood risk assessment may be required at the upper end of the probability range (i.e. close to 0.5%), and for essential infrastructure and the most vulnerable uses.
- **Medium to High Risk** - annual probability of coastal or watercourse flooding is greater than 0.5% (1:200 years). May be suitable for essential infrastructure, low vulnerability developments and residential, institutional, commercial and industrial development within

built-up areas provided flood protection measures to the appropriate standard already exist or are a planned measure in a current flood risk management plan. Where built development is permitted, measures to protect against or manage flood risk will be required and any loss of flood storage capacity mitigated to achieve a neutral or better outcome.

10.2.4 Guidance on surface water flooding includes the following:

- Infrastructure and buildings should generally be designed to be free from surface water flooding in rainfall events where the annual probability of occurrence is greater than 0.5% (1:200 years).
- Surface water drainage measures should have a neutral or better effect on the risk of flooding both on and off the Site, taking account of rain falling on the Site and run-off from adjacent areas.

Local Planning Policy

10.2.5 The Stirling Local Development Plan was adopted by Stirling Council (SC) in October 2018 and outlines local authority guidance on protection of the water environment, flooding, and drainage. Policies and supplementary guidance of relevance to this assessment include:

- Primary Policy (PP) 3: Provision of Infrastructure [Policy 3.2 – Site Drainage]
- PP5: Flood Risk Management;
- PP13: The Water Environment; and
- Flood Risk Management and the Water Environment Supplementary Guidance [Draft, June 2019].

10.2.6 The planning policy and supplementary guidance support the policies set out in SPP and provide information on local standards and requirements, which have been accounted for in this assessment.

Key Policies, Legislation and Guidance

10.2.7 Key policies, legislation and guidance in relation to the water environment are summarised in Table 10.1; this has been taken into account throughout this assessment.

Table 10.1 Guidance and Best Practice

Source	Guidance
Legislation	<ul style="list-style-type: none"> • The Water Framework Directive (2000/60/EC) (WFD) • Water Environment and Water Services (Scotland) Act 2003 • The Water Environment (Controlled Activities) (Scotland) Regulations 2011
Scottish Government Guidance	<ul style="list-style-type: none"> • Scottish Planning Policy (SPP) 2014 • PAN 61 Planning and Sustainable Urban Drainage Systems • PAN 79 Water and Drainage
Local Development Policy	<ul style="list-style-type: none"> • Stirling Council, 2018. Local Development Plan • Stirling Council, 2019. Flooding Risk Management and the Water Environment Supplementary Guidance [Draft]
SEPA	<ul style="list-style-type: none"> • SEPA Controlled Activities Regulations: A Practical Guide, Version 8.4 (2019) • SEPA Regulatory Method (WAT-RM-08) Sustainable Urban Drainage Systems • SEPA Supporting Guidance (WAT-SG-12) – General Binding Rules for Surface Water Drainage Systems • SEPA Supporting Guidance (WAT-SG-75)– Sector Specific Guidance: Construction Sites

Source	Guidance
	<ul style="list-style-type: none"> • SEPA Technical Flood Risk Guidance for Stakeholders, Version 10. • SEPA Guidance LUPS-GU24 Flood Risk and Land Use Vulnerability Guidance. Version 4 • SEPA Guidance LUPS-CC1: Climate change allowances for flood risk assessment in land use planning. Version 1. • SEPA Guidance LUPS-BP-GU2b: Planning Background Paper: Water Environment (2017)
Construction Industry Research and Information Association (CIRIA) Guidance	<ul style="list-style-type: none"> • C609 Sustainable Drainage Systems - Hydraulic, structural and water quality advice • C624 Development and Flood Risk – guidance for the construction industry (2004) • C698 Site Handbook for the Construction of SUDS (2007) • C741 Environmental Good Practice on Site, 4th Edition (2015) • C750 Groundwater Control - Design and Practice (2016) • C753 The SUDS Manual (2015) • C768 Guidance on the Construction of SUDS (2017) • X108 Drainage of development sites - a guide (2004)
Other Guidelines	<ul style="list-style-type: none"> • SUDS Working Party, Water Assessment and Drainage Assessment Guide (WADAG) • SUDS Working Party, SUDS for roads • Scottish Water, Sewers for Scotland, v4.0 • British Standards BS6031: 1981 Code of Practice for Earth Works • Good Practice Guide for Handling Soils (MAFF 2000) • Forestry Commission, Forests and Water, UK Forestry Guidelines, 2011

Consultation

10.2.8 Key stakeholders and consultees relating to flood risk include:

- Stirling Council; and
- SEPA.

10.2.9 Consultation responses relating to flood risk are summarised in Table 10.2.

Table 10.2 Consultation Responses

Consultee	Consultee Comment	Response
SEPA 24 th Mar '20	<p>Generic Comments</p> <p>We consider that the following key issues must be addressed in the Environmental Impact Assessment process. To avoid delay and potential objection the following information must be submitted in support of the application.</p> <ul style="list-style-type: none"> • Flood risk • <i>Waste water drainage [see Chapter 11]</i> • <i>Surface water drainage [see Chapter 11]</i> • <i>Ecology [see Chapter 14]</i> • <i>Pollution prevention and environmental management [see Chapter 11]</i> • <i>Engineering activities in the water environment [see Chapter 11]</i> • <i>Existing groundwater abstractions [see Chapter 11]</i> • <i>Groundwater abstractions [see Chapter 11]</i> • <i>Space for waste management provision within site layout [see Chapter 17]</i> • <i>Air Quality [see Chapter 10]</i> • <i>Energy Statement [see Chapter 16]</i> 	Chapter 10: Flood Risk and Appendix 10.1 (Flood Risk Assessment)

Consultee	Consultee Comment	Response
<p>SEPA 24th Mar '20</p>	<p>Flood risk The site should be assessed for flood risk from all sources in line with Scottish Planning Policy (Paragraphs 254-268). We note the intention to carry out a flood risk assessment (FRA) and we would remind the applicant that this should be carried out following the guidance set out in the document Technical flood risk guidance for stakeholders and it should also include a FRA checklist.</p> <p>We provided pre-application advice to Fairhust on the 21 June 2019 (our ref: PCS/165938) and will therefore repeat our comments here:</p> <ul style="list-style-type: none"> • We have reviewed the information provided in this consultation and it is noted that the application site (or parts thereof) lies within the medium likelihood (0.5% annual probability or 1 in 200 year) flood extent of the SEPA Flood Map, and may therefore be at medium to high risk of flooding. • We hold multiple records of flooding in the area in 1877, 1894, 2005, 2006, 2012, 2016, and 2018. These records include fluvial and surface water flooding mechanisms. We also hold aerial photographs of flooding near to Dobbies Garden Centre in 2005 and 2006. • Multiple flood studies have been undertaken by Stirling Council along the River Forth and River Teith. We are currently aware that a Flood Study is underway for the River Forth and Allan Water. We therefore strongly suggest that the Flood Risk Management Authority is contacted to glean any information/local knowledge that they may possess. • A SEPA gauging station is located just downstream of the M9 motorway on the River Forth crossing at Craigforth. Station number 18011. For AMAX, water level and general information please contact the local hydrometry team which will be able to provide this information. 	<p>Appendix 10.1 (Flood Risk Assessment)</p>
<p>Stirling Council, Screening Opinion 17th Apr '20</p>	<p>The main issues arising from the screening opinion in relation to the Water Environment are as follows:</p> <ul style="list-style-type: none"> • Potential impact on Flood Risk, and • Potential impact on Drainage & Hydrology. <p>The site is located on a largely undeveloped site with exception of the office development. The site is located to the west of the M9. The proposed development may result in significant impacts in terms of water catchments and the nearby SAC. The potential for significant flooding is also possible. The site is located within the vicinity of the River Forth. It is considered that the proposed development may result in significant effects on the River Forth and the surrounding environment including River Teith SAC. The site sits near to the Kildean Business Park site, which is under development. The development is considered to be located a sufficient distance away from the Kildean Business Park to result in any significant impacts.</p>	<p>Table 10.11 (Assessment of Effects)</p> <p>Paragraphs 10.4.32 to Error! Reference source not found. (Cumulative Effects)</p>
<p>Stirling Council, Scoping Opinion 23rd Apr '20</p>	<p>Short Term Impacts The environmental report should assess impacts upon the surrounding area during the construction phase in terms of any potential for, inter alia, flooding, road congestion, noise, vibration and pollution. The consequence of construction works should be assessed and addressed by means of a method</p>	<p>Table 10.11 (Assessment of Effects)</p> <p>Table 10.10 (Schedule of mitigation)</p>

Consultee	Consultee Comment	Response
	statement, environmental management plan, mitigation programme, reinstatement measures and monitoring regime.	
Stirling Council, Scoping Opinion 23 rd Apr '20	<p>Flooding and Drainage</p> <p>The Council's screening opinion identifies that there is a flood risk area within the proposed development site. It is noted that it is intended that Flooding and Drainage Issues will be considered within a submitted Flood Risk Assessment and within a specified chapter of the EIA Report, This approach is considered acceptable and details shall be included within the EIA Report which details how the development has been designed to address any identified flood risk constraint. Also take note of the SEPA and Council comment on this aspect.</p> <p>Schedule 4 of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 states that the following must be incorporated: <i>'A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.'</i></p> <p>In response the EIA will explain the site selection process and include consideration of alternative layouts, as appropriate. Given indisputable significance of the flood risk impacts and inherent practical difficulties in long term mitigation, the environmental report should consider as a reasonable alternative, a site layout where vulnerable development avoids areas of medium to high flood risk, as defined by detailed hydrological studies.</p>	<p>Appendix 10.1: Flood Risk Assessment</p> <p>Paragraphs 10.4.25 to 10.4.28 (Potential effects – Operational Phase)</p> <p>Appendix 10.1: Flood Risk Assessment</p> <p>Chapter 3: Alternatives & Design Evolution</p>

Establishing Baseline Conditions

10.2.10 Baseline conditions have been established via a desktop survey, supplemented by site surveys, consultation, and hydraulic modelling. This has been used to identify all relevant sources of flooding and identify existing flood risk to the Site and to receptors elsewhere.

10.2.11 Information sources consulted to establish baseline conditions are outlined in Table 10.3. A site visit was carried out on the 2nd of December 2019 to verify and augment this information.

Table 10.3 Baseline Information Sources

Topic	Sources of Information
General	<p>Ordnance Survey (OS) 1:50,000 raster and 1:10,000 vector mapping.</p> <p>Aspect Land & Hydrographic Surveys, 2019. Topographic Survey (Drawings G/WAF/1041, Sheets 1 - 16)</p> <p>William Nimmo & Partners, 2019. Site Drainage Layout (Drawing 1878-26)</p>
Fluvial Flooding	<p>SEPA Flood Maps (http://map.sepa.org.uk/floodmap/map.htm)</p> <p>Flood Estimation Handbook (FEH) Web Service (https://fehweb.ceh.ac.uk/)</p> <p>SEPA flow records and ratings for the:</p> <ul style="list-style-type: none"> • Forth @ Gargunnoch; • Teith @ Bridge of Teith; and • Forth @ Craigforth. <p>Halcrow (2013) Hydraulic model (<i>utilised as part of the Forth and Teith Rural Flood Maps updates</i>)</p> <p>Fairhurst (2020) 1D-2D hydraulic model of the Raploch Burn, River Forth and River Teith (Appendix 10.1).</p> <p>Aspect Land & Hydrographic Surveys, 2019. River Cross Section Survey (Drawing A7208, Sheets 1 to 5)</p>

Topic	Sources of Information
Infrastructure Failure	SEPA Reservoir Inundation Maps (http://map.sepa.org.uk/reservoirsfloodmap/Map.htm) Fairhurst (2020) 1D-2D hydraulic model of the Raploch Burn, River Forth and River Teith (Appendix 10.1).
Overland Flow	SEPA Flood Maps (http://map.sepa.org.uk/floodmap/map.htm)
Groundwater Flooding	SEPA Flood Maps (http://map.sepa.org.uk/floodmap/map.htm)
Sewer Flooding	Scottish Water Asset Plans
Modifying Influences	UK Climate Projections (UKCP18) Scottish Environment Protection Agency, 2019. LUPS-CC1: Climate change allowances for flood risk assessment in land use planning. Version 1.

Predicting effects

10.2.12 The significance of the potential effects of the Proposed Development on flood risk have been assessed with reference to two main factors; the sensitivity of the receiving environment and the potential magnitude should the effect occur.

10.2.13 A sensitivity in relation to flood risk has been defined for the North, Central and South regions of the Site (defined Paragraph 10.1.4) based on the vulnerability of existing land use at the Site and at receptors elsewhere, as defined by SEPA (LUPS-GU24) Flood Risk and Land Use Vulnerability Guidance. The criteria utilised to define sensitivity are detailed in Table 10.4. As effects on receptors elsewhere are a result of effects on floodplain storage or flood defences within the Site, these receptors are not individually assessed. Instead, the sensitivity of the Site incorporates the associated sensitivity of receptors elsewhere.

Table 10.4 Sensitivity of Receiving Environment

Receptor value / sensitivity	Receptor type
High	Contains <i>Most Vulnerable Uses</i> – such as hospitals, care homes, nurseries and basement dwellings, and/or contains floodplain or defence associated with a water feature with direct flood risk to >100 residential properties or to <i>Most Vulnerable</i> users in a 1 in 200 year event.
Medium	Receptor contains <i>Highly Vulnerable Uses</i> – such as dwelling houses and hotels, and/or contains floodplain or defence associated with a water feature with direct flood risk to 1 - 100 residential properties, >10 industrial premises, and/or other land use of high vulnerability and/or indirect flood risk to critical infrastructure in a 1 in 200 year event.
Low	Receptor contains <i>Least Vulnerable Uses</i> – such as offices, shops and restaurants, and/or contains floodplain associated with a water feature with direct flood risk to only recreational land and/or affecting <10 industrial premises or high value agriculture (e.g. arable pastures, complex cultivation patterns and agro-forestry) in a 1 in 200 year event.
Negligible	Receptor contains <i>Water Compatible Uses</i> only – such as water or sewage transmission infrastructure, flood control infrastructure and outdoor sports and recreation infrastructure, and/or floodplain associated with a water feature with little or no flood risk affecting land use (e.g. rough grazing land only) or receptors in a 1 in 200 year event.

10.2.14 The magnitude of an effect includes the probability, timing, scale, size, duration and/or frequency and reversibility of the potential effect. The criteria utilised to define the magnitude of effect are detailed in Table 10.5.

Table 10.5 Magnitude of impact

Magnitude	Description
High	An effect, which completely removes sensitive characteristics i.e. total loss or major alteration to key elements from baseline (i.e. pre-development) conditions. This includes major changes to flow regime and catchment hydrology (i.e. change in conveyance capacity, loss in flood storage) and/or a major alteration to the catchment area.
Medium	An effect, which alters the character of the environment in a manner that is consistent with the existing and emerging trends, including partial loss or alteration to key elements from baseline conditions. This includes moderate changes to the flow regime and catchment hydrology (i.e. increase in conveyance capacity, loss in flood storage and a moderate alteration to the catchment area).
Low	An effect, which causes noticeable changes in the character of the environment without affecting its sensitivities i.e. minor shift away from baseline conditions. This includes minor or temporary changes to the flow regime and catchment hydrology (i.e. increase in conveyance capacity, loss in flood storage) and/or a minor or temporary alteration to the catchment area.
Negligible	An effect capable of measurement but without noticeable consequences, i.e. very slight or no alteration from baseline, insufficient magnitude to affect use/integrity. This includes negligible changes to the flow regime (i.e. changes that are within the range of accepted modelling uncertainty) and catchment hydrology (i.e. increase in conveyance capacity, loss in flood storage) and a negligible alteration to the catchment area, with a negligible change in flood risk to sensitive receptors.

10.2.15 The sensitivity of the receiving environment together with the magnitude of the effect defines the significance of the effect, as detailed in Table 10.6. A higher level of significance is attached to all tangible effects on highly sensitive receptors, whilst a high magnitude effect on a low sensitivity receptor is generally considered to be of less significance. Significance is, however, not absolute and selection is based on professional judgement defined in relation to individual assets, their context and location.

Table 10.6 Level of effect

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

10.2.16 Potential effects are concluded to be of Major, Moderate, Minor or Negligible. Effects considered as being Moderate or Major are deemed significant in terms of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations').

10.3 North Site (Office HQ) Assessment

Assumptions and Limitations

- 10.3.1 The information presented in this assessment has been made on the basis of the detailed application layout for the North Site, with the assumption that all recommendations within Appendix 10.1 (Flood Risk Assessment) are adhered to and that there will be no movement of infrastructure into high impact areas, for example, into an area of existing floodplain which could result in the loss of floodplain storage.

Baseline conditions

- 10.3.2 Existing flood risk at the Site is fully assessed in Appendix 10.1 (Flood Risk Assessment) in accordance with SPP, and in consideration of fluvial flows, overland flow, infrastructure failure, sewer flooding, coastal flooding, and groundwater flooding. Baseline conditions in relation to flood risk are fully detailed for the Site as a whole in Section 10.4. The following provides a summary of conditions as they pertain to the North Site, as shown in Figure 10.1 (Volume 2).

Land Use

- 10.3.3 The North Site comprises Least Vulnerable and Water Compatible uses in the form of two office buildings (Lomond View) and a large carpark respectively. Land use adjacent to, and upstream of the North Site is predominantly agricultural. Immediately downstream of the North Site, the River Forth flows through two Potentially Vulnerable Areas (PVAs), with >1,000 residential properties identified as being at risk of flooding.

Flood Risk

Fluvial Flooding

- 10.3.4 The River Forth flows along the southern boundary of the North Site and represents the primary source of flood risk. This watercourse reaches a confluence with the River Teith approximately 0.5 km to the north-west of the Site and flood risk at the North Site can be influenced by flows in both the River Forth and River Teith. Hydraulic modelling of the River Forth and River Teith has been undertaken to quantitatively assess flood risk, and the associated 1 in 200 year flood extent is shown in Figure 10.1 (Volume 2). This constitutes the functional floodplain of this watercourse and is, therefore, not considered suitable for development – due to the potential for associated losses in floodplain storage and increased flood risk downstream.

Infrastructure Failure

- 10.3.5 Peak water levels associated with this flood event are between 9.16 and 9.19 mAOD adjacent to the North Site. Modelling indicates that, should blockage of adjacent bridges occur (including Old Drip Bridge at the north-west corner of the North Site, the A84 crossing 35 m downstream and the M9 crossing approximately 200 m to the north-east), water levels would rise and overtop the crossings in each case, re-joining the watercourse immediately downstream, and cause only a localised increase in flood levels.

Overland Flow

- 10.3.6 Overland flow resulting from extreme pluvial events will tend to be directed towards and accumulate at low points in the topography and cause surface water flooding. Potential overland flow routes through the North Site are shown in Figure 10.1 (Volume 2). The potential for surface water flooding is minimal as the majority of overland flow will arise from areas within the North Site Boundary, rather than from areas outwith the Site. During periods of heavy or prolonged rainfall, runoff generated within the North Site will flow downslope towards the River Forth.

Sewer Flooding

10.3.7 Should any failure occur in the existing sewer network, surcharged water would flow overland following the flow routes illustrated in Figure 10.1 (Volume 2), discharging to the River Forth

Groundwater Flooding

10.3.8 The risk of groundwater flooding is considered to be low and should groundwater emerge at the surface this would follow overland flow paths and be directed towards the River Forth.

Coastal Flooding

10.3.9 The tidal extent of the River Forth is located 2.15 km downstream, with the North Site being located above the 1 in 200 year and 1 in 1,000 year extreme tide level.

Receptor Sensitivity

10.3.10 Following establishment of the baseline conditions for flood risk; Site areas are assigned a sensitivity in Table 10.9 (Section 10.4), alongside justification for this categorisation based on the criteria outlined in Table 10.4. The North Site is classified as High sensitivity in regards flood risk as approximately 50% of the area is inundated in a 1 in 200 year event, see Figure 10.1 (Volume 2), providing a measure of floodplain storage for the River Forth which affects two PVAs immediately downstream, with >1,000 residential properties identified as being at risk of flooding.

Changes likely to occur over time in the absence of the Proposed Development

10.3.11 Hydrological systems are constantly varying due largely to changing climate patterns, which impact primarily rainfall patterns, and land use, which in turn impact runoff and infiltration patterns. Climate change is likely to result in drier summers and wetter winters, with potential for more intense summer storms. This has the potential to lead to more extreme flow values with consequential flooding issues.

10.3.12 The Flood Risk Assessment (Appendix 10.1) considers climate change impacts on peak flows based on SEPA (2019) LUPS-CC1 Guidance and utilises hydraulic modelling to determine the associated changes in flood extents and water levels. This suggests a potential increase in water levels of up to 0.9 m within the vicinity of the North Site. Consideration is also made of potential impacts of sea level rise, which is likely to result in tidally forced inundation of lower lying areas of the North Site.

Potential effects

10.3.13 The potential effects of the Proposed Development on existing flood risk as a result of identified activities during construction and operational phases are the same as those identified for the Site as a whole – these are fully detailed in in Section 10.4. The following summarises the level of potential effect for the North Site, during construction and operation of the Proposed Development (Detailed Application).

Construction Phase

10.3.14 The range of potential construction effects identified are summarised in Table 10.11 (Section 10.5), alongside the expected magnitude of effect defined based on the methodology outlined in Table 10.5. Although the construction phase of the Proposed Development (Detailed Application) will be short term compared to the operational phase, changes in flood risk can occur during this phase – particularly during periods of intense or prolonged rainfall which can flood temporary working areas. However, these effects are likely to be temporary in nature and, as a result, the magnitude of effect has been assessed as Low. The significance or level of predicted effects was determined by comparing the magnitude of change with the sensitivity of

receptor. The level of pre-mitigation effect has, therefore, been assessed as **Moderate** (due to Low magnitude effects on a High sensitivity receptor).

Operational Phase

10.3.15 Site operation will represent a permanent change to the baseline environment. At this phase effects of the Proposed Development (Detailed Application) are long term and so have the potential to have a greater significance of effect on environmental receptors. This can include permanent changes in catchment behaviour due to floodplain encroachment, increases in impermeable surfaces and alterations to surface water drainage. However, the design of the Proposed Development (Detailed Application) has been informed by Appendix 10.1 (Flood Risk Assessment) and will include surface water drainage systems designed to appropriate standards to intercept, attenuate and discharge surface water arising on the North Site to the equivalent greenfield runoff rate (see Chapter 11: Drainage & Hydrology and Appendix 11.1: Drainage Design Strategy Report). The range of potential operational effects identified are summarised in Table 10.11 (Section 10.5), alongside the expected magnitude of effect. With consideration of inherent mitigation, potential operational effects on flood risk will be avoided, prevented, reduced or offset – as a result, the level of effect has been assessed as **Negligible**.

Additional mitigation

10.3.16 An Environmental Management Plan (EMP) will be produced and submitted to SEPA for approval prior to the commencement of construction. The EMP will detail best practice measures and site specific method statements to avoid or minimise potential adverse effects during the construction phase. The schedule of mitigation (Table 10.10 in Section 10.4) provides full details of the measures to be employed during the construction phase to mitigate flood risk, and to be incorporated into the EMP.

Residual effects

10.3.17 By undertaking appropriate mitigation as outlined in Table 10.10 in Section 10.4, it is anticipated that the effect of the Proposed Development (Detailed Application) on flood risk will be **Negligible** for both construction and operational phases – as detailed in Table 10.11 (Section 10.5).

Cumulative effects

10.3.18 Existing and proposed developments within the vicinity of the Proposed Development are discussed in Chapter 19 and summarised in Section 10.4. No change in the level of effect would be expected when considering the cumulative effect of these developments.

10.4 Masterplan Assessment

Assumptions and Limitations

10.4.1 The information presented in this assessment has been made on the basis of the masterplan layout, with the assumption that the detailed design envelope will adhere to all recommendations within Appendix 10.1 (Flood Risk Assessment) and will not result in infrastructure being located in high impact areas, for example, an area of existing floodplain which could result in the loss of floodplain storage.

Baseline conditions

10.4.2 Existing flood risk at the Site is fully assessed in Appendix 10.1 (Flood Risk Assessment) in accordance with SPP, and in consideration of fluvial flows, overland flow, infrastructure failure, sewer flooding, coastal flooding, and groundwater flooding.

Land Use

10.4.3 Flood risk is assessed in relation to land use vulnerability (see Table 10.4) and existing land use across the Site is as follows:

- **North Area (8.2 ha):** This comprises *Least Vulnerable* and *Water Compatible* uses in the form of two office buildings (Lomond View) and a large carpark respectively.
- **Central Area (15.4 ha):** Prudential Corporate Property's existing office operations (*Least Vulnerable* use) wrap round the north side of the crag. This area also comprises *Highly Vulnerable* dwelling houses – Craigforth House, a traditional, B-Listed stately home, and two modern bungalows.
- **South Area (18.7 ha):** This comprises undeveloped farmland (*Water Compatible*) wrapping around the south side of the crag, with a single storey remote IT suite to the west (*Least Vulnerable* use).

10.4.4 Land use adjacent to, and upstream of the Site, is predominantly agricultural. Immediately downstream of the Site, the River Forth flows through the following PVAs:

- **PVA 09/05: Stirling (Cornton and Causewayhead):** This area has a risk of river, coastal and surface water flooding but the majority of damages (94%) are caused by fluvial flooding, with the highest risk being from the River Forth and Allan Water. There are approximately 340 residential properties and 50 non-residential properties at risk of flooding in a 1 in 200 year event in this PVA, as well as a number of utilities, transport links and 2.9 km² of agricultural land.
- **PVA 09/07: Stirling (Raploch and Riverside):** This area has a risk of river, coastal and surface water flooding but the majority of damages (79%) are caused by fluvial flooding, with the highest risk being from the River Forth. There are approximately 760 residential properties and 80 non-residential properties at risk of flooding in a 1 in 200 year event in this PVA, as well as a number of utilities, transport links and 1.4 km² of agricultural land.

Flood Risk

Fluvial Flooding

10.4.5 The River Forth flows along the western boundary of the Site, at which point the catchment drains an area of around 444 km². This watercourse reaches a confluence with the River Teith some 0.5 km to the north-west of the Site and, as a result, flood risk at the Site can be influenced by flows in both the River Forth and River Teith. The Raploch Burn emerges onto the Site from a culvert under the M9 on the eastern Site Boundary. The burn flows through the Site, adjacent to the southern Site Boundary, and discharges to the River Forth approximately 0.9 km south-west of the western Site Boundary, draining a total area of 6 km². Peak flows for the 200 year and 1,000 year return period events for the River Forth, River Teith and Raploch Burn catchments are presented in Table 10.7. Full details of the derivation of these flows are available in Appendix 10.1 (Flood Risk Assessment).

Table 10.7 Flow Estimates

Catchment	Area (km ²)	Peak Flow (m ³ /s)	
		1 in 200 year	1 in 1,000 year
River Forth (at site)	444	223.5	286.1
River Teith	583	720.8	951.6
Raploch Burn	6	16.0	22.8

10.4.6 Hydraulic modelling of the River Forth, River Teith and Raploch Burn has been undertaken to quantitatively assess flood risk at the Site. This indicates that out of bank flooding from both the Raploch Burn and River Forth is predicted in a 1 in 200 year flood event, resulting in inundation of parts of the northern, western and southern areas of the Site. When the River Forth floods, water backs up the Raploch Burn, causing flooding along this watercourse. Flood levels and extents are greater for a critical event on the River Forth than for a critical event on the Raploch Burn alone and so the Forth and Teith model is utilised to inform flood risk. Areas flooded in a 1 in 200 year flood event constitute the functional floodplain and are, therefore, not considered suitable for development. The 1 in 200 year flood extents are shown in Figure 10.1 (Volume 2), with associated peak water levels of between 8.75 and 9.29 mAOD reported adjacent to the Site.

10.4.7 SEPA's 'Flood Risk and Land Use Vulnerability Guidance' outlines additional requirements for development where the associated land use is considered to be 'Most Vulnerable', such as nurseries, holiday parks, care homes, and basement dwellings. Development falling with the 'Most Vulnerable' category must, in general, be located out with the 1 in 1,000 year flood extents. Hydraulic modelling indicates that a 1 in 1,000 year flood event would result in more widespread inundation of northern, western and southern areas of the Site, and also result in flooding of part of the land to the east of the crag. The 1 in 1,000 year flood extents are shown in Appendix 10.1 (Flood Risk Assessment), with associated peak water levels of between 9.38 and 9.93 mAOD reported along the modelled extent.

Infrastructure Failure

10.4.8 During flood conditions, there is the potential for culvert and bridge structures to be partially obstructed by an accumulation of sediment and debris, resulting in a potential increase in flood risk to the Site. Within the vicinity of the Site crossing structures include:

- River Forth: Old Drip Bridge at the north-west corner of the North Site, the A84 crossing 35 m downstream and the M9 crossing approximately 200 m to the north-east of the Site.
- Raploch Burn: Crossing facilitating Kersebonny Road and an agricultural track crossing.

10.4.9 Hydraulic modelling has been undertaken to assess the potential impact of partial blockage of the watercourse crossing structures identified within the vicinity of the Site, as detailed in Appendix 10.1 (Flood Risk Assessment). Results indicate that, should blockage occur, water levels would rise and overtop the crossings in each case, re-joining the watercourse immediately downstream, and causing only a localised increase in flood levels.

10.4.10 SEPA reservoir inundation maps (RIMs) show the Site to be at risk of inundation from the failure of Loch Katrine, Glen Finglas and Loch Venachar reservoirs, with the inundation envelopes extending along the River Forth adjacent to the Site. Within the vicinity of the Site the inundation extent is comparable to the fluvial flood extent, although has the potential to encroach further into the South Site. However, these maps predict inundation as a result of entire dam failure, and, as such, they provide a conservative estimate of associated flooding. Additionally,

mapping uses national scale topography datasets and does not consider site specific flood defences. Inundation associated with dam failure may, in reality, be of smaller extent if higher resolution topography datasets were incorporated in modelling, which better resolve the floodplain. Although dam failure has the potential to cause some inundation, SEPA guidance states that, “*Flooding from reservoirs is very unlikely to occur and there has been no loss of life from reservoir failure in the UK since reservoir safety legislation was introduced in 1930.*” This is, therefore, considered to represent only a low risk to the Site.

Overland Flow

10.4.11 Overland flow resulting from extreme pluvial events will tend to be directed towards and accumulate at low points in the topography and cause surface water flooding. Potential overland flow routes through the Site have been assessed using QGIS watershed analysis tools and LiDAR topographic data. Flow routes are shown in Figure 10.1 (Volume 2). This demonstrates that the majority of overland flow will arise from areas within the Site Boundary, with very limited contribution of runoff from elsewhere. As a result, the potential for surface water flooding is minimal. During periods of heavy or prolonged rainfall, runoff generated within the majority of the Site will flow downslope towards either the Raploch Burn or River Forth.

10.4.12 SEPA flood maps do identify a number of small, discrete areas within the Site which may be at risk from surface water flooding. These are mainly confined to lower-lying areas adjacent to existing buildings and embankments. As the Site is gently sloping it is unlikely that runoff will pond to a significant depth – although there is potential for runoff to accumulate within localised topographic depressions.

Sewer Flooding

10.4.13 Scottish Water sewer records indicate that a waste water pumping station (WWPS) is located within the northern reaches of the Central Area, see Appendix 11.1: Drainage Design Strategy Report (Volume 3). A rising main is indicated to route north from the WWPS towards the Craigforth Roundabout and the main point of access to the Site. The rising main then routes northeast where it crosses the M9 before routing southeast where it is expected to discharge to a local Waste Water Treatment Works. No other adopted sewers are indicated within or near to the Site. Existing foul and surface water drainage infrastructure is present within the Site serving the existing development. The record drawings detailing the existing private drainage within the Site indicate that the foul water is drained by means of a separate foul water drainage system which drains via gravity to private WWPS located within the North and Central Areas. It is expected that these WWPS discharge directly to the Scottish Water WWPS located within the Central Area. The record drawings indicate that the surface water runoff from existing hardstanding areas is drained by means of a separate surface water drainage system. The records indicate that the surface water system discharges freely to the River Forth via several outfalls that are indicated along the western boundary of the site.

10.4.14 There is the potential for sewer flooding if gullies and manholes associated with the drainage network surcharge during extreme rainfall events, particularly if drains become partially blocked by debris or have insufficient capacity or if the WWPS were to fail. However, should this occur, floodwater would flow overland following the flow paths described above, posing minimal risk to the Site.

Groundwater Flooding

10.4.15 Groundwater is generally a contributing factor to flooding rather than the primary source. SEPA flood maps indicate areas where groundwater could influence the duration and extent of flooding from other sources. The Site is situated outside groundwater influenced flood extents

shown on these maps and historic borehole information available from the British Geological Society (BGS) record groundwater levels as being greater than 4 m below ground level (see Chapter 12: Ground Conditions). The majority of the Site slopes down towards the River Forth, and in the event that groundwater emerged at the surface, it would follow the same overland flow paths shown in Figure 10.1 (Volume 2). The risk of groundwater flooding within the Site is, therefore, considered to be low.

Coastal Flooding

10.4.16 The Site is located approximately 41 km from the North Sea coast at Queensferry and the inland location of the Site means that wave action is not considered to contribute to flood risk. However, the River Forth is tidal as far upstream as the tidal weir located approximately 2.15 km downstream. The National River Flow Archive indicates that large tides can influence levels at the Craigforth gauging station located at the M9 crossing, approximately 1.7 km downstream, for short periods.

10.4.17 Relevant extreme tide levels are detailed in Appendix 10.1 (Flood Risk Assessment) and summarised in Table 10.8. The minimum elevation of the Site (at the north-west corner) is approximately 6 mAOD and all existing development in the Site is located above 8 mAOD. Existing receptors on the Site are, therefore, not at risk of tidal inundation under extreme tidal levels.

Table 10.8 Extreme Tide Levels

Return Period	Tide Level (mAOD)
1 in 200 year	5.41
1 in 1,000 year	5.73

Receptor Sensitivity

10.4.18 Following establishment of the baseline conditions in relation to flood risk; flood receptors are assigned a sensitivity in Table 10.9, alongside justification for this categorisation based on the criteria outlined in Table 10.4.

Table 10.9 Receptor Sensitivity

Receptor	Sensitivity	Justification
North Area	High	Contains existing office buildings and car parking (<i>Least Vulnerable</i>). However, over half the area is inundated in 200 year event (Figure 10.1), providing a measure of floodplain storage for the River Forth which affects two PVAs immediately downstream, with >1,000 residential properties identified as being at risk of flooding.
Central Area	High	Contains a number of dwelling houses at present (<i>Highly Vulnerable</i>). The western extent is inundated in 200 year event (Figure 10.1), providing a measure of floodplain storage for the River Forth which affects two PVAs immediately downstream, with >1,000 residential properties identified as being at risk of flooding.
South Area	High	Contains predominantly agricultural land at present (<i>Water Compatible</i>), with proposed residential properties and care home supported living housing (<i>Most Vulnerable</i>). The western and southern extent is inundated in 200 year event (Figure 10.1), providing a measure of floodplain storage for the River Forth which affects two PVAs immediately downstream, with >1,000 residential properties identified as being at risk of flooding.

Changes likely to occur over time in the absence of the Proposed Masterplan (PPiP) Development

10.4.19 Hydrological systems are constantly varying due largely to climate patterns, which impact primarily rainfall patterns, and land use, which in turn impact runoff and infiltration patterns. Information regarding climate change was obtained from the UK Climate Projections (UKCP18) website. UKCP18 is a climate analysis tool which features comprehensive projections for different regions of the UK. For Central Scotland, under a high emissions scenario, UKCP18 predicts that, by the 2070s, winter temperatures will increase by 3.9 °C and summer temperatures will increase 4.2 °C. Precipitation is more difficult to predict, with projections indicating that winter mean precipitation could be between 3% drier and 12% wetter, and summer mean precipitation could be between 40% drier and 8% wetter by the 2070s. In winter months there could be an increase in rainfall and reduction in snowfall. There has also been a suggestion that summer storms are likely to be more intense and frequent and this may lead to more extreme flow values during and immediately following such events, with consequential flooding issues.

10.4.20 SEPA (2019) LUPS-CC1 Guidance requires that climate change impacts on peak flows be accounted for in large catchments (over 50 km²) by applying a defined increase in peak river flow. The Site is situated in the Forth River Basin and as such a 40% increase in peak river flow has been applied to the derived 1 in 200 year flow to provide an estimate of the 1 in 200 year + CC flood flows for the River Forth and River Teith. These flows have been utilised in hydraulic modelling to determine changes in flood extents and water levels that are likely to occur over time and indicate a potential increase of up to 0.9 m within the vicinity of the Site, with peak water levels of between 9.55 and 10.14 mAOD reported along the modelled extent.

10.4.21 SEPA (2019) LUPS-CC1 Guidance indicates that a sea level rise allowance of 0.86 m should be applied in the Eastern region of Scotland. Under this projected sea level rise, low lying areas (6.59 mAOD and below) have the potential to be inundated under both a 1 in 200 and 1 in 1,000 year event. All existing development within the Site is located at 8 mAOD or higher and so will not be impacted by projected sea level rise.

Potential effects

10.4.22 This section summarises the potential effects of the Proposed Development on existing flood risk as a result of identified activities during construction and operational phases, taking into account any inherent mitigation designed into the project.

Construction Phase

10.4.23 The construction phase of the Proposed Development will be short term compared to the operational phase; however, temporary changes in flood risk can occur during this phase – particularly during periods of intense or prolonged rainfall which can flood temporary working areas. Activities of relevance to flood risk include:

- Temporary storage areas and/or welfare facilities located in areas at risk of flooding;
- Temporary stockpiling of material within the functional floodplain, resulting in reduced floodplain storage and increasing flood risk downstream;
- Temporary alteration to greenfield drainage, catchment runoff and infiltration patterns (e.g. as a result of installation of pre-earthworks drainage) resulting in increased surface water runoff rates and total runoff volumes in adjacent watercourses, increasing flood risk downstream; and
- Earthworks, including excavation of foundations and general manipulation of ground levels, increasing groundwater flood risk.

10.4.24 The range of potential construction effects identified for the Site are summarised in Table 10.11, alongside the expected magnitude of effect (defined based on the methodology outlined in Table 10.5). Factors such as duration and reversibility of the effect were taken into consideration when defining magnitude of effect. Although potential effects on flood risk can occur during the construction phase, these are likely to be temporary in nature – as a result, the magnitude of effect has been assessed as Low. The significance or level of effect of predicted effects was determined by comparing the magnitude of change with the sensitivity of receptor, based on the methodology outlined in Table 10.6. The level of effect has, therefore, been assessed as **Moderate** (due to Low magnitude effects on High sensitivity receptors).

Operational Phase

10.4.25 The Operational Phase will represent a permanent change to the baseline environment. During this phase effects of the Proposed Development are long term and so have the potential to have a greater significance of effect on receptors. Changes with the potential to affect flood risk include:

- Land raising in the functional floodplain resulting in reduced floodplain storage, increasing flood risk downstream;
- Permanent alteration to greenfield drainage, catchment runoff and infiltration patterns, resulting in increased surface water runoff rates and total runoff volumes in adjacent watercourses, increasing flood risk downstream; and
- Increased discharges to existing sewer systems, increasing risk from sewer flooding due to a reduction in capacity.

10.4.26 However, the design of the Proposed Development has been informed by Appendix 10.1 (Flood Risk Assessment) – as detailed in Chapter 3: Alternatives & Design Evolution. As a result, this incorporates the following inherent mitigation to protect existing receptors from flood risk:

- No land raising will occur within the functional floodplain (i.e. the 1 in 200 year flood extent, as defined by hydraulic modelling) – see Figure 10.1 (Volume 2). Development within the functional floodplain is generally limited to landscaping and pedestrian access routes and will not involve land raising. Some parking areas and adjacent roads extend marginally into the functional floodplain but will be constructed at or below existing ground levels to negate impacts on floodplain storage.
- The Proposed Development will include surface water drainage systems designed to appropriate standards to intercept, attenuate and discharge surface water arising on the Site (see Chapter 11: Drainage & Hydrology and Appendix 11.1: Drainage Design Strategy Report). The outline surface water drainage design has been prepared based on SUDS principles, and so restricts post development flows to the equivalent greenfield runoff rate. This will prevent any increase in surface water runoff which could affect receptors elsewhere.

10.4.27 Potential operational effects are summarised in Table 10.11, alongside the expected magnitude of effect. With consideration of inherent mitigation, potential operational effects on flood risk will be avoided, prevented, reduced or offset – as a result, the level of effect has been assessed as **Negligible**.

10.4.28 This chapter considers flood risk to the existing environment, with flood risk to the Proposed Development itself being dealt with fully in Appendix 10.1 (Flood Risk Assessment). The FRA details measures required to ensure the Proposed Development is protected. These are incorporated in Chapter 3: Alternatives & Design Evolution and include setting FFLs to provide a freeboard above adjacent 1 in 200 year flood levels, with consideration of the impacts of

climate change. FFLs will also be set above surrounding ground levels and ground levels profiled to route runoff around and away from buildings. Fluvial flood extents and levels associated with a 1 in 1,000 year return period event have also been defined and utilised to inform the siting and FFLs of the nursery in the Central Area and care home in the South Area, which are considered Most Vulnerable Uses in terms of flood risk.

Additional mitigation

Construction Phase

10.4.29 An Environmental Management Plan (EMP) will be produced and submitted to SEPA for approval prior to the commencement of construction – as per Chapter 11: Drainage & Hydrology Mitigation Item M11.1 (Table 11.10). The EMP will detail best practice measures and site specific method statements to avoid or minimise potential adverse effects during the construction phase. The schedule of mitigation (Table 10.10) provides details of the measures which will be employed during the construction phase to mitigate flood risk, to be incorporated into the EMP.

Table 10.10 Schedule of Mitigation

Mitigation Item	Description	Purpose	Timing
M10.1	Installation of temporary drainage systems / SuDS systems (or equivalent) as appropriate, including pre-earthworks drainage, with appropriate outfalls in place prior to any earthworks activities to control the rate of flow before water is discharged into a receiving waterbody.	To mitigate flood risk	Construction
M10.2	All temporary welfare facilities to be located in areas at a low risk of flooding and >10 m from any watercourse.		
M10.3	All temporary storage areas to be located in designated areas at a low risk of flooding and >10 m from any watercourse.		

Operational Phase

10.4.30 Inherent mitigation realises the benefits of measures to mitigate potential effects through the initial scheme design and removes the need for additional measures to be implemented for the operational phase.

Residual effects

10.4.31 By undertaking appropriate mitigation as outlined in Table 10.10, it is anticipated that the effect of the Proposed Development on flood risk will be **Negligible** for both construction and operational phases – as detailed in Table 10.11.

Cumulative effects

10.4.32 Existing and proposed developments within the vicinity of the Proposed Development are discussed in Chapter 19.

10.5 Summary

10.5.1 This chapter assess changes in potential flood risk to both the Site and receptors elsewhere as a result of the Proposed Development. The assessment of effects is summarised in Table 10.11.

10.5.2 The Proposed Development has the potential to introduce physical changes which may alter

the hydrological characteristics of the area and impact on flood risk. However, the design has been informed by a site specific FRA, which utilises hydraulic modelling to define fluvial flood extents associated with a 1 in 200 year return period event at the Site. This demonstrates that areas in the north, west and south are likely to flood in a 1 in 200 year flood event. This is considered to represent the functional floodplain of adjacent watercourses and the Proposed Development has been designed to avoid landraising in these areas, in order to avoid any reduction in floodplain storage and associated impacts on receptors elsewhere. A Drainage Design Strategy Report has been produced (see Chapter 11: Drainage & Hydrology) and provides an outline surface water drainage design based on SUDS principles, which will be incorporated into the Proposed Development to ensure that the greenfield discharge rate is achieved. This will prevent any increase in surface water runoff which could affect downstream receptors.

- 10.5.3 Although there is potential for low magnitude effects on flood risk during the construction phase of the Proposed Development, these are likely to be temporary in nature and can be avoided or minimised through the application of appropriate additional mitigation measures, as outlined in the schedule of mitigation. Residual (post-mitigation) construction effects have, therefore, been identified as negligible. With consideration of inherent mitigation, embedded within the design, potential operational effects on flood risk have also been assessed as Negligible. Overall, **no significant effects** have been identified on flood risk.

Table 10.11 Assessment of Effects

Receptor	Receptor Sensitivity	Potential Effect (with inherent mitigation)	Magnitude of Effect	Level of Effect	Additional Mitigation	Residual Magnitude of Effect	Residual Significance of Effect
Construction Effects							
North Area	High	Temporary reductions in floodplain storage and/or alterations of surface water runoff patterns and increase in flood risk downstream. Temporary works located in floodplain at risk of flooding. Temporary increase in groundwater flood risk as a result of excavations.	Low	Moderate	M11.1, M11.2 & M11.3	Negligible	Negligible
Central Area	High		Low	Moderate		Negligible	Negligible
South Area	High		Low	Moderate		Negligible	Negligible
Operational Effects							
North Area	High	With consideration of inherent mitigation, potential operational effects on flood risk, such as: <ul style="list-style-type: none"> permanently reducing floodplain storage causing an increase in flood risk downstream; altering surface water runoff patterns, causing an increase in flood risk downstream; and increasing pressure on existing sewer systems. will be avoided, prevented, reduced or offset. 	Negligible	Negligible	Not Required	Negligible	Negligible
Central Area	High		Negligible	Negligible		Negligible	Negligible
South Area	High		Negligible	Negligible		Negligible	Negligible

10.6 References

Aspect Land & Hydrographic Surveys, 2019. Topographic Survey (Drawings G/WAF/1041, Sheets 1 - 16)

Aspect Land & Hydrographic Surveys, 2019. River Cross Section Survey (Drawing A7208, Sheets 1 to 5)

Flood Estimation Handbook (FEH) Web Service (<https://fehweb.ceh.ac.uk/>)

Halcrow (2013) Hydraulic model (*utilised as part of the Forth and Teith Rural Flood Maps updates*)

Ordnance Survey (OS) 1:50,000 raster and 1:10,000 vector mapping.

SEPA, Flood Maps (<http://map.sepa.org.uk/floodmap/map.htm>)

SEPA, Reservoir Inundation Maps (<http://map.sepa.org.uk/reservoirsfloodmap/Map.htm>)

SEPA, 2018. Guidance LUPS-GU24 Flood Risk and Land Use Vulnerability Guidance. Version 4.

SEPA, 2019. Guidance LUPS-CC1: Climate change allowances for flood risk assessment in land use planning. Version 1.

SEPA, 2019 Technical Flood Risk Guidance for Stakeholders, Version 10.

Scottish Planning Policy (SPP), 2014

Stirling Council, 2018. Local Development Plan

Stirling Council, 2019. Flooding Risk Management and the Water Environment Supplementary Guidance [Draft]

UK Climate Projections (UKCP18) –
(<https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index>)

William Nimmo & Partners, 2019. Site Drainage Layout (Drawing 1878-26)

10.7 Assessor information

10.7.1 The EIA Report has been prepared under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations'). EIA Regulation 5.(b) requires that an outline of relevant expertise or qualifications of contributors accompanies an assessment. The relevant information for the team is provided below for each of the EIA Report chapters.

10.7.2 This assessment has been carried out by a suitably qualified hydrologist with over seven years' experience in carrying out environmental impact assessments in relation to the water environment. The flood risk assessment has been completed by a chartered engineer with over 35 years' experience as water engineering specialist and the chapter reviewed by a chartered environmental consultant with over ten years' experience in delivering EIA reports.

11 Drainage & Hydrology

11.1 Introduction

11.1.1 This chapter of the Environmental Impact Assessment Report (EIA Report) assesses the effect of the Proposed Development at Craigforth Campus, Stirling (hereafter referred to as the Site) on drainage and the surrounding hydrological environment. This assessment has been undertaken by Fairhurst and is supported by:

- Figure 10.1: Baseline Water Environment (Volume 2)
- Appendix 11.1: Drainage Design Strategy Report (Volume 3)

11.1.2 Effects on drainage and hydrology may also result in secondary effects on flood risk, habitats, or species, and on the character of the surrounding landscape. These are fully considered in Chapter 10: Flood Risk (and Appendix 10.1: Flood Risk Assessment), Chapter 9: Biodiversity and Chapter 7: Landscape & Visual Impact of this EIA Report.

Overview

11.1.3 The Site covers a total area of approximately 54 hectares (ha), located in the Stirling Council local authority area, centred on Craigforth Crag to the west of Stirling City, see Figure 10.1 (Volume 2). Craigforth Crag is a natural rampart, comprising a crag and tail created by the glacial erosion of a volcanic plug of very hard igneous rock, and surrounded by relatively flat, low-lying ground. The Site is situated on the south-west corner of Junction 10 of the M9 and is accessible from the A84 to the north and from Dumbarton Road, via Kersebonny Road, to the south. It is bounded by a meandering section of the River Forth to the west, the A84 to the north, the M9 to the east and the Raploch Burn and agricultural land to the south.

11.1.4 The Proposed Development comprises an office led mixed use development including hotel, leisure, retail, healthcare and residential with new access, servicing, parking, open space, and associated infrastructure. This is made up of the following:

- **North Sub Area (8.2 ha):** This is separated from the wider Site by a narrow vehicular and pedestrian route. It comprises two buildings (Lomond View) and a large carpark and borders the A84 to the north.
 - **North Site (2.4 ha):** A detailed planning application is being made for new office buildings and parking areas comprising 2.4 ha of this area, with associated access roads and a new access point from the A84.
- **Craigforth Crag (15.4 ha):** The crag is predominantly covered by trees, categorised as ancient and semi-natural woodland, with some sheer rock faces. An existing track / footpath runs around the crag and no development is proposed within this area.
- **Central Sub Area (10.5 ha):** Prudential Corporate Property's existing office operations wrap round the north side of the crag. This area also comprises Craigforth House, a traditional, B-Listed stately home, and two modern bungalows. A mixed use development is proposed within the central area of the Site including residential apartments, leisure and retail facilities, a nursery, and a hotel.
- **South Sub Area (18.7 ha):** This comprises undeveloped farmland wrapping around the south side of the crag, with a single storey remote IT suite to the west. A mixed use development is proposed for this area, consisting of residential properties, care home supported living housing and community facility.
- **South Access (1.3 ha):** This extends to the south along Kersebonny Road.

11.1.5 This chapter supports the Proposed Development (PPiP Masterplan) application for the full Site and the Proposed Development (Detailed Application) for the North Site. As such, a summary of the assessment as it pertains to the North Site is provided in Section 11.3 – North Site (Office HQ) Assessment – with the full Masterplan Assessment provided in Section 11.4.

11.1.6 Full details of the Proposed Development are provided in Chapter 4: Description of Proposed Development.

Scope of Assessment

11.1.7 The baseline hydrological conditions at the Site, and within associated areas downstream, are established within this chapter, to aid in the identification of sensitive receptors and any likely significant environmental effects resulting from both (short term) construction and (long term) operation of the Proposed Development; and to identify mitigation or design measures to reduce, eliminate or offset these effects. Potential effects are assessed taking into account any inherent mitigation designed into the Proposed Development and additional mitigation is identified as required, e.g. in regards potential construction phase effects. Residual effects are then assessed. The EIA ensures that proper consideration is given to sensitive receptors and that environmental effects and proposed mitigation are fully known, to both the public and the determining authority.

Study Area

11.1.8 The Proposed Development is located entirely within the catchment of the River Forth, see Figure 10.1 (Volume 2), which drains a total area of over 1,000 km², commencing at Ben Lomond and flowing south-east to discharge to the Firth of Forth. The wider catchment contains not only the River Forth, but a number of major tributaries including the River Teith.

11.1.9 The River Forth and its tributaries provide a pathway for effects to propagate downstream, eventually reaching the Forth Estuary. The spatial extent of this assessment is, therefore, constrained by the catchment of the River Forth, with a focus on the sub-catchments draining the Site. A 1 kilometre (km) search radius was applied to the Proposed Development boundary for the purpose of identifying water abstractions with the potential to be affected.

Effects to be assessed

11.1.10 The following receptors have been identified in relation to the water environment:

- River Forth;
- Raploch Burn;
- Callander Groundwater Body;
- Teith and Forth Valley Groundwater Body; and
- Carron and Touch Groundwater Body.

11.1.11 Effects on these receptors are assessed in terms of:

- Construction, i.e. short term effects; and
- Operation, i.e. long term effects.

11.1.12 The Proposed Development will introduce physical changes which may alter the hydrological characteristics of the Site. Potential sources of pollution will also be present on Site during both the construction and operational phases of the Proposed Development. Key issues will include:

- Pollution prevention and environmental management;
- Surface water drainage; and

- Waste water drainage.

11.1.13 Taking this into account, this chapter of the EIA covers potential effects on:

- Hydrology and drainage patterns;
- Water quality; and
- Hydromorphology.

11.1.14 Effects on associated protected areas, freshwater ecology or water uses due to pollution, obstruction of watercourses, or changes in the hydrological regime are also taken into consideration.

Effects scoped out of the assessment

11.1.15 The following effects were scoped out of this assessment:

- Effects of engineering activities in the water environment
 - No engineering works are proposed within the water environment (see Chapter 4: Description of Proposed Development).
- Effects on identified ponds
 - See Paragraph 11.4.6
- Effects on water abstractions
 - See Paragraphs 11.4.14 to 11.4.16.
- Effects on wetlands, peatlands and Groundwater Dependent Terrestrial Ecosystems (GWDTEs)
 - See Paragraph 11.4.13.
- Effects on the Covered Reservoir
 - This feature was identified in the centre of the Crag. As this is located above the development area and no associated pipelines are identified on Scottish Water Asset Plans (see Paragraph 11.4.15), this is not considered to be at risk from the Proposed Development.
- Effects on the Forth Estuary
 - The Forth Estuary is located over 7 km downstream of the Site and receives runoff from the entire 1,000 km² River Forth catchment (with the Proposed Development representing less than 0.5 km² of this). As a result, any effect on the Site watercourses would be expected to have a negligible impact on this coastal receptor.

11.2 Assessment Method

Guidance / Objectives / Targets / Standards

Water Framework Directive

11.2.1 Water management in all European Union (EU) member states is controlled by the Water Framework Directive 2000/60/EC (WFD). This aims to maintain or improve the physical and chemical quality of waterbodies within the EU by 2027. The key objectives of the WFD of relevance to this assessment are:

- To prevent deterioration and protect and enhance terrestrial ecosystems and wetlands directly depending on aquatic ecosystems;
- To establish a framework of protection of surface freshwater and groundwater; and
- To mitigate the effects of floods and droughts.

11.2.2 River Basin Management Plans (RBMPs), have been produced by the Scottish Environment

Protection Agency (SEPA) as a requirement of the WFD under which statutory objectives, based on ecological assessments and economic judgments, are set for Scottish waterbodies (e.g. rivers, lochs, lakes, estuaries, coastal waters and groundwater).

11.2.3 SEPA produce an annual WFD classification for waterbodies based on an aquatic classification system covering rivers (with catchments greater than 10 km²), lochs (bigger than 0.5 km²), estuaries, coastal waters (out to three nautical miles) and groundwater bodies. Waterbodies are classified according to set criteria relating to the chemistry, hydrology, morphology and ecology of the waterbody. Surface waterbodies are assessed as being of overall 'High', 'Good', 'Moderate', 'Poor' or 'Bad' status. Groundwater bodies are classified as being 'Good' or 'Poor'. In general, the classification describes how much their condition or status differs from natural conditions.

11.2.4 The EIA takes into account the requirements of the WFD, which has been transposed into law by the Water Environment & Water Services (Scotland) Act 2003, and of the Scotland River Basin District RMPB for 2015-2027.

Scottish Planning Policy

11.2.5 Scottish Planning Policy (SPP) sets out national planning policies which reflect Scottish Ministers' priorities for operation of the planning system and for the development and use of land. The key provisions of in relation to the water environment are to:

- Support development that will contribute to sustainable economic growth and to high quality sustainable places;
- Take into account the implications of development for water, air and soil quality;
- The natural environment and the sustainable use and enjoyment of it; and
- Manage flooding to reduce its economic and social consequences and safeguard services and infrastructure.

11.2.6 SPP and the Scottish Government's online Planning Advice on Flood Risk require that adequate protection against flooding from all sources exists or can be provided for the Proposed Development and that the development does not increase any existing flood risk to persons or property upstream and downstream.

Local Planning Policy

11.2.7 The Stirling Local Development Plan was adopted by Stirling Council in October 2018 and outlines local authority guidance on protection of the water environment, flooding, and drainage. Policies and supplementary guidance of relevance to the water environment include:

- Primary Policy (PP) 3: Provision of Infrastructure [Policy 3.2 – Site Drainage]
- PP5: Flood Risk Management;
- PP8: Conservation and Enhancement of Biodiversity;
- PP13: The Water Environment; and
- Flood Risk Management and the Water Environment Supplementary Guidance [Draft, June 2019]

11.2.8 The planning policy and supplementary guidance support the policies set out in SPP and provide information on local standards and requirements, which have been accounted for in this assessment.

Key Policies, Legislation and Guidance

11.2.9 Key policies, legislation and guidance in relation to the water environment are summarised in Table 11.1; this has been taken into account throughout this assessment.

Table 11.1 Guidance and Best Practice

Source	Guidance
Legislation	<ul style="list-style-type: none"> • The Water Framework Directive (2000/60/EC) (WFD) • Water Environment and Water Services (Scotland) Act 2003 • Dangerous Substances Directive (2006/11/EC) • Environmental Quality Standards Directive 2008/105/EC • The Water Environment (Controlled Activities) (Scotland) Regulations 2011
Scottish Government Guidance	<ul style="list-style-type: none"> • Scottish Planning Policy (SPP) 2014 • Scottish Executive River Crossings and Migratory Fish: Design Guidance • PAN 61 Planning and Sustainable Urban Drainage Systems • PAN 79 Water and Drainage
Local Development Policy	<ul style="list-style-type: none"> • Stirling Council, 2018. Local Development Plan • Flood Risk Management and the Water Environment Supplementary Guidance [Draft, June 2019]
SEPA	<ul style="list-style-type: none"> • SEPA Controlled Activities Regulations: A Practical Guide, Version 8.3 (2019) • SEPA Regulatory Method (WAT-RM-08) Sustainable Urban Drainage Systems • SEPA Supporting Guidance (WAT-SG-12) – General Binding Rules for Surface Water Drainage Systems • SEPA Supporting Guidance (WAT-SG-75)– Sector Specific Guidance: Construction Sites • SEPA Pollution Prevention Guidelines (PPGs) and replacement guidance series, Guidance for Pollution Prevention (GPPs): <ul style="list-style-type: none"> ○ PPG 1: Understanding your environmental responsibilities - good environmental practices ○ GPP 2: Above ground oil storage tanks ○ PPG 3: Use and design of oil separators in surface water drainage systems ○ GPP 5: Works and maintenance in or near water ○ PPG 6: Working at construction and demolition sites ○ PPG 7: Safe storage - The safe operation of refuelling facilities ○ GPP 8: Safe storage and disposal of used oils ○ GPP 13 Vehicle washing and cleaning ○ GPP 21: Pollution incident response planning ○ PPG 22: Incident response - dealing with spills ○ PPG 27 Installation, decommissioning and removal of underground storage tanks • SEPA Policy No. 19: Groundwater Protection Policy for Scotland (2009) • SEPA Guidance LUPS-GU31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems • SEPA Guidance LUPS-BP-GU2b: Planning Background Paper: Water Environment (2017)

Source	Guidance
Construction Industry Research and Information Association (CIRIA) Guidance	<ul style="list-style-type: none"> • C532 Control of Water Pollution from Construction Sites (2001) • C609 Sustainable Drainage Systems - Hydraulic, structural and water quality advice • C648 Control of Water Pollution from Linear Construction Projects. Technical Guidance (2006) • C649 Control of Water Pollution from Linear Construction Projects. Site guide (2006) • C698 Site Handbook for the Construction of SUDS (2007) • C741 Environmental Good Practice on Site, 4th Edition (2015) • C750 Groundwater Control - Design and Practice (2016) • C753 The SUDS Manual (2015) • C768 Guidance on the Construction of SUDS (2017) • X108 Drainage of development sites - a guide (2004)
Other Guidelines	<ul style="list-style-type: none"> • SUDS Working Party, Water Assessment and Drainage Assessment Guide (WADAG) • SUDS Working Party, SUDS for roads • Scottish Water, Sewers for Scotland, v4.0 • British Standards BS6031: 1981 Code of Practice for Earth Works • Good Practice Guide for Handling Soils (MAFF 2000) • Forestry Commission, Forests and Water, UK Forestry Guidelines, 2011

Consultation

11.2.10 Key stakeholders and consultees relating to the hydrological environment include:

- Stirling Council;
- SEPA;
- Scottish Natural Heritage (SNH); and
- Scottish Water.

11.2.11 Consultation responses relating to the hydrological environment are summarised in Table 11.2.

Table 11.2 Consultation Responses

Consultee	Consultee Comment	Response
SEPA 24 th Mar '20	<p><u>Generic Comments</u> We consider that the following key issues must be addressed in the Environmental Impact Assessment process. To avoid delay and potential objection the following information must be submitted in support of the application.</p> <ul style="list-style-type: none"> • <i>Flood risk [see Chapter 10]</i> • Waste water drainage • Surface water drainage • <i>Ecology [see Chapter 9]</i> • Pollution prevention and environmental management • Engineering activities in the water environment • Existing groundwater abstractions • Groundwater abstractions • <i>Space for waste management provision within site layout [see Chapter 17]</i> • <i>Air Quality [see Chapter 15]</i> • <i>Energy Statement [see Chapter 18]</i> 	See below for appropriate references to response under each detailed consultee comment.

Consultee	Consultee Comment	Response
<p>SEPA 24th Mar '20</p>	<p><u>Waste water drainage</u> Details of the waste water provision for your development should be provided in the EIA Report or planning submission, including consideration of options for waste water treatment facilities. Drainage is a material planning consideration and will be assessed as part of your planning application in line with PAN 79 Water and Drainage and the relevant policy of the Local Development Plan. Where there is a public sewerage system, waste water drainage from development within and close to the settlement envelope should be directed to that system. If the system has insufficient capacity, then early dialogue with Scottish Water will be required to determine if works are planned to overcome this problem, or what developer pro-rata contributions will be necessary to remove the constraint.</p> <p>If there is no or limited public sewerage infrastructure, given the scale of development we would still expect the development of strategic infrastructure to adoptable standards. Contact should be made with Scottish Water to determine the standards required to ensure adoption of new infrastructure. Please note that we are not likely to support proposals for private foul drainage systems for significant development (e.g. more than 25 houses) where development of public infrastructure is the sustainable long-term solution. An interim solution may be acceptable provided an appropriate upgrade has been agreed with Scottish Water and there will be no unacceptable impact on the water environment. For further guidance please refer to our Policy and Supporting Guidance on Provision of Waste Water Drainage in Settlements</p>	<p>Appendix 11.1: Drainage Design Strategy Report</p>
<p>SEPA 24th Mar '20</p>	<p><u>Surface water drainage</u> The treatment of surface water runoff by sustainable drainage systems (SUDS) is a legal requirement for most forms of development, however the location, design and type of SUDS are largely controlled through planning. We encourage surface water runoff from all developments to be treated by SUDS in line with Scottish Planning Policy (Paragraphs 255 and 268), PAN 61 Planning and Sustainable Urban Drainage Systems, PAN 79 Water and Drainage and the relevant policy of the Local Development Plan. SUDS help to protect water quality, reduce potential for flood risk and release capacity in the public sewerage network where the alternative is use of combined systems. Discharges to combined sewers should be avoided to free up capacity for waste water discharges.</p> <p>We expect surface water from all developments to be treated by SUDS in line with Scottish Planning Policy (Paragraph 268) and, in developments of this scale, the requirements of the Water Environment Controlled Activities Regulations (CAR). SUDS help to protect water quality and reduce potential for flood risk. Guidance on the design and procedures for an effective drainage system can be found in Scotland's Water Assessment and Drainage Assessment Guide.</p> <p>The proposed SUDS should accord with the SUDS Manual (C753) and the importance of preventing runoff from the site for the majority of small rainfall events (interception) is promoted. The applicant should use the Simple Index Approach (SIA) Tool to ensure the types of SUDS proposed are adequate.</p> <p>Construction phase SUDS should be used on site to help minimise the risk of pollution to the water environment. Further detail with regards construction phase SUDS is contained in Chapter 31 of SUDS Manual (C753).</p>	<p>Appendix 11.1: Drainage Design Strategy Report</p>

Consultee	Consultee Comment	Response
	<p>Comments should be requested from Scottish Water where the SUDS proposals would be adopted by them and, where appropriate, the views of your authority's roads department and flood prevention unit should be sought on the SUDS strategy in terms of water quantity and flooding issues.</p> <p>If >1000 car park spaces, SUDS will require a Simple CAR licence authorisation. If <1000 spaces, discharge will be covered under CAR GBR10.</p> <p>Are the ponds surface or groundwater fed? A habitat assessment should be undertaken to establish the pond's status and whether any habitat improvements can be made as part of the development. Existing ponds cannot be used as SUDS. Care should be taken not to contaminate the ponds during demolition and construction phases.</p> <p>The applicant alluded to a CHP/district heating project – depending on the size, this may require authorisation under PPC. If abstracting water from the river or a borehole for the system, a CAR authorisation may be required.</p>	
<p>SEPA 24th Mar '20</p>	<p><u>Pollution prevention and environmental management</u> One of our key interests in relation to major developments is pollution prevention measures during the periods of construction, operation, maintenance, demolition, and restoration. The construction phase includes construction of access roads, borrow pits and any other site infrastructure.</p> <p>We advise that the applicant should, through the EIA process or planning submission, systematically identify all aspects of site work that might impact upon the environment, potential pollution risks associated with the proposals and identify the principles of preventative measures and mitigation. This will establish a robust environmental management process for the development. A draft Schedule of Mitigation should be produced as part of this process. This should cover all the environmental sensitivities; pollution prevention and mitigation measures identified to avoid or minimise environmental effects. Please refer to the Pollution prevention guidelines.</p> <p>The development however require a Construction Site Licence as the site is >4ha. See SEPA's Sector Specific Guidance: Construction Sites (WAT-SG-75) for details. Site design may be affected by pollution prevention requirements and hence we strongly encourage the applicant to engage in pre-CAR application discussions with a member of the regulatory services team in your local SEPA office. The applicant should prepare a Pollution Prevention Plan, made available to all site contractors during demolition and construction phases. See Supporting Guidance WAT-SG-05</p>	<p>Paragraphs 11.4.43 to 11.4.46 (Potential Effects – Construction Phase)</p> <p>Paragraphs 11.4.51 to 11.4.56 (Additional Mitigation – Construction Phase)</p> <p>Table 11.11 (Schedule of mitigation)</p>
<p>SEPA 24th Mar '20</p>	<p><u>Engineering activities in the water environment</u> In order to meet the objectives of the Water Framework Directive of preventing any deterioration and improving the water environment, developments should be designed to avoid engineering activities in the water environment wherever possible. The water environment includes burns, rivers, lochs, wetlands, groundwater, and reservoirs. We require it to be demonstrated that every effort has been made to leave the water environment in its natural state. Engineering activities such as culverts, bridges, watercourse diversions, bank modifications or dams should be avoided unless there is no practicable alternative. Paragraph 255 of SPP deters unnecessary</p>	<p>Paragraph 11.1.15 (Effects scoped out of this assessment)</p>

Consultee	Consultee Comment	Response
	<p>culverting. Where a watercourse crossing cannot be avoided, bridging solutions or bottomless or arched culverts which do not affect the bed and banks of the watercourse should be used. Further guidance on the design and implementation of crossings can be found in our Construction of River Crossings Good Practice Guide. Other best practice guidance is also available within the water engineering section of our website. If the engineering works proposed are likely to result in increased flood risk to people or property, then a flood risk assessment should be submitted in support of the planning application and we should be consulted as detailed below. A site survey of existing water features and a map of the location of all proposed engineering activities in the water environment should be included in the EIA Report or planning submission. A systematic table detailing the justification for the activity and how any adverse impact will be mitigated should also be included. The table should be accompanied by a photograph of each affected water body along with its dimensions. Justification for the location of any proposed activity is a key issue for us to assess at the planning stage. Where developments cover a large area, there will usually be opportunities to incorporate improvements in the water environment required by the Water Framework Directive within and/or immediately adjacent to the site either as part of mitigation measures for proposed works or as compensation for environmental impact. We encourage applicants to seek such opportunities to avoid or offset environmental impacts. Improvements which might be considered could include the removal of redundant weirs, the creation of buffer strips and provision of fencing along watercourses. Fencing off watercourses and creating buffer strips both helps reduce the risk of diffuse water pollution and affords protection to the riparian habitat.</p>	
<p>SEPA 24th Mar '20</p>	<p><u>Ecology</u> <i>Pollution</i> To avoid contamination of aquatic habitats it is imperative that during the construction phase silt and any other pollutants such as oils and concrete are not allowed to enter watercourses, as they can cause significant ecological damage. Run-off of any contaminated water to drains or burns should be avoided by following carefully laid-out work procedures and following guidance provided in SEPA's Pollution Prevention Guidance. Timing of the construction phase should avoid periods of high rainfall to prevent siltation within the watercourses. Run-off of silt can be contained by the use of settlement lagoons, silt-traps and bunding. They should be situated away from watercourses. Soils and material dug for any ground works should not be stored on wetland areas and disturbed ground on or near sensitive habitats should be re-instated in the shortest possible time to avoid runoff issues. The dispersal of contaminated water should not be into any current areas of wetland.</p> <p><i>Groundwater Dependent Terrestrial Ecosystems (GWDTEs)</i> A preliminary ecology survey has been undertaken, which followed the extended Phase 1 Habitat Survey Methodology. Outline NVC communities were assigned to the main Phase I Habitat types on site based on the key species present in the habitats. The preliminary survey identified an area of rank marshy grassland to the north west of the car park in the northern site. The application also states that no GWDTEs were identified as part of this survey and given existing ground conditions, are not anticipated to be identified within, or in hydrogeological connection with, the proposed development.</p>	<p>Table 11.11 (Schedule of mitigation)</p> <p>Paragraph 11.4.13 (GWDTEs)</p>

Consultee	Consultee Comment	Response
	<p>We request further explanation regarding why the area of marshy grassland is not considered to be a potential GWDTE. We also request a copy of the Phase 1 Habitat Survey map, overlain by the proposed infrastructure. If at any stage any GWDTE is identified within 100m of the development area, mitigation measures should be put in place to maintain the functionality of the wetland.</p> <p>Biodiversity and habitats</p> <p>Two ponds are present on site. Pond 1 (221 m²) is located within the North Site, between the River Forth and existing parking. Pond 2 (414 m²) is located within the Central Site, on the eastern edge of the crag adjacent to the access road bordering the Crag. No reference is made to these being impacted by the development proposals. The small pond which lies in the west of the northern section of the site (Target Note 7) was choked with great reedmace and held little to no standing water at the time of survey. Wetland and pond habitats can bring many benefits and we would encourage these to be protected wherever possible.</p>	<p>Chapter 9: Biodiversity</p>
<p>SEPA 24th Mar '20</p>	<p>Existing groundwater abstractions</p> <p>Roads, foundations and other construction works associated with large scale developments can disrupt groundwater flow and impact on groundwater abstractions. To address this risk a list of groundwater abstractions both within and outwith the site boundary, within a radius of i) 100 m from roads, tracks and trenches and ii) 250 m from borrow pits and foundations) should be provided. If groundwater abstractions are identified within the 100 m radius of roads, tracks and trenches or 250 m radius from borrow pits and foundations, then either the applicant should ensure that the route or location of engineering operations avoid this buffer area or further information and investigations will be required to show that impacts on abstractions are acceptable.</p>	<p>Paragraph 11.1.15 (Effects scoped out of this assessment)</p> <p>Paragraphs 11.4.14 to 11.4.16 (Public and Private Water Supplies)</p>
<p>SEPA 24th Mar '20</p>	<p>Water abstraction</p> <p>Where water abstraction is proposed we request that the EIA Report, or planning submission, details if a public or private source will be used. If a private source is to be used the information below should be included. Whilst we regulate water abstractions under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended), we require the following information to determine if the abstraction is feasible in this location;</p> <ul style="list-style-type: none"> • Source e.g. ground water or surface water; • Location e.g. grid ref and description of site; • Volume e.g. quantity of water to be extracted; • Timing of abstraction e.g. will there be a continuous abstraction; • Nature of abstraction e.g. sump or impoundment; • Proposed operating regime e.g. details of abstraction limits and hands off flow; • Survey of existing water environment including any existing water features; • Impacts of the proposed abstraction upon the surrounding water environment. <p>If other development projects are present or proposed within the same water catchment then we advise that the applicant considers whether the cumulative impact upon the water environment needs to be assessed. The EIA Report or planning submission should also contain a justification for the approach taken.</p>	<p>None proposed</p>
<p>SNH 23rd Mar '20</p>	<p>The Rivers Teith and Forth are part of the River Teith Special Area of Conservation (SAC) designated for Atlantic salmon and brook, river and sea lamprey. The qualifying species require good water quality - the location of the proposed development</p>	<p>Table 11.11 (Schedule of mitigation)</p>

Consultee	Consultee Comment	Response
	<p>upstream from the SAC means that there is connectivity to the site through potential impact on water quality both during construction and once completed. Paragraph 10.6 of the screening and scoping report identifies that there are potential sources of pollution during both construction and operational phases, and that the temporary and permanent drainage and waste water treatment may both effect the surrounding hydrological environment. The key issues identified in paragraph 10.7 – ‘Effects on water quality’ associated with sediment-laden runoff or chemical pollution and ‘Effects on associated protected areas, freshwater ecology or water uses’ due to pollution, obstruction of watercourses, or changes in the hydrological regime – both identify issues which may detrimentally impact the River Teith SAC. We agree with the mitigation measures outlined in paragraphs 10.16 - 18. These should ensure that construction will not lead to a deterioration in water quality that would affect the qualifying features. The Environment Management Plan produced must be in accordance with SEPA guidance (available on the SEPA website) and include site specific measures to avoid the risk of impacts on the species for which the site is designated. These measures should ensure there is minimal direct disturbance of the qualifying features, and protect against adverse indirect impacts on important ecological requirements such as on water quality, water flow and/or river channel substrate.</p>	
<p>Stirling Council, Screening Opinion 17th Apr '20</p>	<p>The main issues arising from the screening opinion in relation to the Water Environment are as follows:</p> <ul style="list-style-type: none"> • Potential impact on Flood Risk, and • Potential impact on Drainage & Hydrology. <p>The site is located on a largely undeveloped site with exception of the office development. The site is located to the west of the M9. The proposed development may result in significant impacts in terms of water catchments and the nearby SAC. The potential for significant flooding is also possible. The site is located within the vicinity of the River Forth. It is considered that the proposed development may result in significant effects on the River Forth and the surrounding environment including River Teith SAC.</p> <p>The site sits near to the Kildean Business Park site, which is under development. The development is considered to be located a sufficient distance away from the Kildean Business Park to result in any significant impacts.</p>	<p>Table 11.12 (Assessment of Construction Effects) and Table 11.13 (Assessment of Operational Effects)</p> <p>Paragraph 11.4.59 - 11.4.59 (Cumulative Effects)</p>
<p>Stirling Council, Scoping Opinion 23rd Apr '20</p>	<p><u>Short Term Impacts</u></p> <p>The environmental report should assess impacts upon the surrounding area during the construction phase in terms of any potential for, inter alia, flooding, road congestion, noise, vibration and pollution. The consequence of construction works should be assessed and addressed by means of a method statement, environmental management plan, mitigation programme, reinstatement measures and monitoring regime. The effects of construction activities on water quality should be assessed, to avoid in particular, sedimentation and accidental spillages.</p>	<p>Table 11.12 (Assessment of Construction Effects)</p> <p>Table 11.11 (Schedule of mitigation)</p>
<p>Stirling Council, Scoping Opinion 23rd Apr '20</p>	<p>Any private water supplies should be protected during and after construction.</p>	<p>Paragraph 11.1.15 (Effects scoped out of this assessment)</p>
<p>Stirling Council, Scoping Opinion</p>	<p><u>Flooding and Drainage</u></p> <p>The Council's screening opinion identifies that there is a flood risk area within the proposed development site. It is noted that it is intended that Flooding and Drainage Issues will be considered within a submitted Flood Risk Assessment and within a specified</p>	<p>See Chapter 10: Flood Risk and Appendix 10.1: Flood Risk Assessment.</p>

Consultee	Consultee Comment	Response
23 rd Apr '20	chapter of the EIA Report, This approach is considered acceptable and details shall be included within the EIA Report which details how the development has been designed to address any identified flood risk constraint. Also take note of the SEPA and Council comment on this aspect.	

Establishing Baseline Conditions

11.2.12 Baseline conditions have been established via a desktop survey, supplemented by site surveys, in particular to:

- Describe catchment areas and identify all relevant water features, including groundwater;
- Identify WFD classifications, designated or protected sites and/or sensitive uses, including water abstractions and fisheries interests;
- Identify existing water quality on-site and downstream of the Proposed Development, along with existing catchment pressures (e.g. point source and diffuse pollution issues); and
- Identify existing hydromorphological conditions in surface waterbodies and any existing in channel engineering works or other pressures.

11.2.13 Information sources consulted for the baseline is outlined in Table 11.3. A site visit was carried out on the 2nd of December 2019 to verify and augment this information.

Table 11.3 Baseline Information Sources

Topic	Sources of Information
Surface Water Features	Ordnance Survey (OS) 1:50,000 raster and 1:10,000 vector mapping. Aspect Land & Hydrographic Surveys, 2019. Topographic Survey (Drawings G/WAF/1041, Sheets 1 - 16) Aspect Land & Hydrographic Surveys, 2019. River Cross Section Survey (Drawing A7208, Sheets 1 to 5) William Nimmo & Partners, 2019. Site Drainage Layout (Drawing 1878-26)
Groundwater Features	1:625,000 British Geological Society (BGS) Hydrogeology Map 1:50,000 BGS Geology of Britain Viewer (http://mapapps.bgs.ac.uk/geologyofbritain/home.html) 1:25,000 Soil Map of Scotland (partial cover) and Risk Maps (http://map.environment.gov.scot/Soil_maps)
Designated Sites, Protected Area and Water Uses	SNH Protected Areas Map (https://sitelink.nature.scot/map) Scotland's environment mapping https://map.environment.gov.scot/sewebmap/ Drinking Water Quality Regulator for Scotland (DWQR) Private Water Supply Map (http://dwqr.scot/private-supply/pws-location-map/) Scottish Water Asset Plans SEPA DataRequests@sepa.org.uk Stirling Council regulatoryservices@stirling.gov.uk Forth District Salmon Fishing Board (http://forthdsfb.org/)
Climate & Hydrology	SEPA Rainfall Data for Scotland (https://apps.sepa.org.uk/rainfall) Flood Estimation Handbook (FEH) Web Service (https://fehweb.ceh.ac.uk/)

Topic	Sources of Information
Water Quality & Hydromorphology	SEPA, 2011. River Forth Catchment Profile SEPA Water Classification Hub. (https://www.sepa.org.uk/data-visualisation/water-classification-hub/) SEPA Water Environment Hub.(https://www.epa.org.uk/data-visualisation/water-environment-hub/)
Modifying Influences	UK Climate Projections (UKCP18) – (https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index)

Predicting effects

11.2.14 The significance of the potential effects of the Proposed Development have been assessed with reference to two main factors; the sensitivity of the receiving environment and the potential magnitude should the effect occur.

11.2.15 Receptor sensitivity is derived from its baseline quality, importance of associated attributes and ability to absorb an effect. Whilst all water features do not have the same specific attributes, values have been assigned under the following headings: Hydrology, Water Quality and Hydromorphology (surface water only). The criteria utilised to define the sensitivity of the receiving environment is defined in Table 11.4.

Table 11.4 Sensitivity of Receiving Environment

Receptor value / sensitivity	Receptor type
High	<p>Receptor with a high quality and rarity at international scale, with limited potential for substitution.</p> <p>Hydrology: ‘High’ WFD hydrology status for surface water / ‘Good’ WFD status for groundwater bodies; no, or negligible alterations to natural drainage patterns and/or no, or negligible impoundments or abstractions; and/or hydrologic importance to internationally designated sensitive ecosystems and/or critical social and economic uses.</p> <p>Water Quality: ‘High’ overall WFD status for surface water / ‘Good’ WFD status for groundwater bodies; no, or a negligible number of, anthropogenic pressures and/or pollutant sources affecting the water feature; and/or water purity of importance to internationally designated sensitive ecosystems (e.g. SAC, SPA, where designation is based specifically on feature under consideration); and/or critical social and economic uses for recreation, amenity or water resources (e.g. abstraction for a public drinking water supply, private water supplies for populations exceeding 25 people, or large scale industrial/agricultural abstractions).</p> <p>Hydromorphology: ‘High’ WFD hydromorphology status; no, or negligible engineering works including watercourse crossings, straightened/re-aligned channels, artificial embankments, and/or impounding structures; and/or high biodiversity riparian vegetation of importance to internationally designated sensitive ecosystems (e.g. SAC, SPA, where designation is based specifically on feature under consideration).</p>
Medium	<p>Receptor with a high quality and rarity at a regional or national scale and limited potential for substitution.</p> <p>Hydrology: ‘Good’ WFD hydrology status for surface water / ‘Good’ WFD status for groundwater bodies; small amount of modification to natural drainage (i.e. some urbanisation) and/or small number of</p>

Receptor value / sensitivity	Receptor type
	<p>impoundments or abstractions that do not significantly alter natural runoff patterns and/or volumes; and/or hydrologic importance to nationally designated ecosystems and/ or locally important social and economic uses.</p> <p>Water Quality: ‘Good’ overall WFD status for surface and groundwater; a small number of anthropogenic pressures and/or pollutant sources that do not significantly affect the water feature WFD status; and/or drinking water abstractions sourcing private water supplies for populations less than 25 people; and/or water purity of importance to nationally designated ecosystems, and/or locally important social and economic uses for recreation or amenity.</p> <p>Hydromorphology: ‘Good’ WFD hydromorphology status; a small degree of engineering works such as watercourse crossings that do not significantly affect the water feature; and/or riparian vegetation of importance to nationally designated sensitive ecosystems.</p>
Low	<p>Receptor with a medium quality and rarity at a regional scale or good quality at local scale, with limited potential for substitution.</p> <p>Hydrology: ‘Moderate’ WFD hydrology status; likely to have deteriorated in status as a result of modifications to natural drainage (i.e. heavy urbanisation with poorly designed drainage) and/or impoundments or abstractions that alter natural runoff patterns and/or volumes; and/or some but limited hydrologic importance to sensitive ecosystems and/ or social and economic uses.</p> <p>Water Quality: ‘Moderate’ overall WFD status for surface water / ‘Good’ WFD status for groundwater bodies or not classified by SEPA. Likely to have deteriorated in water quality as a result of anthropogenic pressures and/or pollutant sources, Some but limited hydrologic importance to sensitive ecosystems and/or social and economic uses. Located within the vicinity of a mains water supply and/or supplies used only for local agricultural purposes.</p> <p>Hydromorphology: ‘Moderate’ WFD hydromorphology status; likely to have deteriorated in status as a result of engineering works in or near the waterbody; and/or some but limited riparian vegetation of importance to regionally sensitive ecosystems.</p>
Negligible	<p>Receptor with poor or variable quality and rarity at local scale with potential for substitution / replacement.</p> <p>Hydrology: ‘Poor/Bad’ WFD hydrology status / ‘Poor’ WFD status for groundwater bodies; highly likely to have deteriorated in status as a result of significant impoundments or abstractions that alter natural runoff patterns and/or volumes; and/or minimal hydrological importance to sensitive ecosystems and/ or social and economic uses.</p> <p>Water Quality: ‘Poor/Bad’ overall WFD status for surface water / ‘Poor’ WFD status for groundwater bodies. Highly likely to be affected by anthropogenic pressures and/or pollution sources. Minimal water purity importance to sensitive ecosystems and/or social and economic uses. Not used for water supplies, recreation or amenity value.</p> <p>Hydromorphology: ‘Poor/Bad’ WFD hydromorphology status; highly likely to have deteriorated in status as a result of engineering works in or near the waterbody. Heavily engineered or artificially modified features, including straightened/re-aligned channels, artificial embankments, impounding structures, and lack or riparian vegetation. Limited riparian vegetation of little to no biodiversity importance.</p>

11.2.16 The magnitude of an effect includes the probability, timing, scale, size, duration and/or frequency and reversibility of the potential effect. Effects can be adverse or beneficial. The criteria utilised to define the magnitude of effect are detailed in Table 11.5.

Table 11.5 Magnitude of impact

Magnitude	Description
High	<p>An effect, which completely removes sensitive characteristics i.e. total loss or major alteration to key elements from baseline (i.e. pre-development) conditions.</p> <p>Hydrology: A major shift away from baseline conditions due to major alterations in runoff patterns and/or significant impoundments or abstractions with a likely reduction in overall WFD class; potential loss or extensive change to associated designated site(s) or protected area(s).</p> <p>Water Quality: A major shift away from baseline conditions with a likely reduction in overall WFD class; potential loss or extensive change to associated designated site(s) or protected area(s).</p> <p>Hydromorphology: Major engineering works in or near the waterbody, impacting significant lengths of a watercourse. Works which are likely to significantly disturb the bed, banks or riparian vegetation (e.g. engineering works requiring a Complex Licence) and impact on associated designated site(s) or protected site(s), and/or are likely to cause a drop in hydromorphology WFD status.</p>
Medium	<p>An effect, which alters the character of the environment in a manner that is consistent with the existing and emerging trends, including partial loss or alteration to key elements from baseline conditions.</p> <p>Hydrology: A moderate shift away from baseline conditions due to moderate alterations in runoff patterns and/or minimal impoundments or abstractions with potential to result in a downgrade in overall WFD status.</p> <p>Water Quality: A moderate shift away from baseline conditions with potential to result in a downgrade in overall WFD status.</p> <p>Hydromorphology: Moderate level of engineering works in or near the waterbody. Works which have the potential to significantly disturb the bed, banks or riparian vegetation on a greater than local scale (e.g. engineering works requiring a Complex Licence) and/or have the potential to cause a drop in hydromorphology WFD status.</p>
Low	<p>An effect, which causes noticeable changes in the character of the environment without affecting its sensitivities i.e. minor shift away from baseline conditions.</p> <p>Hydrology: A minor shift away from baseline conditions due to minor alterations in runoff patterns unlikely to result in a downgrade in overall WFD status.</p> <p>Water Quality: A minor shift away from baseline conditions unlikely to result in a downgrade in overall WFD status.</p> <p>Hydromorphology: Little engineering works in or near the waterbody. Works which have a local impact only with some but minimal disturbance to the bed or banks, e.g. crossing covered by a Simple Licence or numerous crossings covered by GBRs.</p>
Negligible	<p>An effect capable of measurement but without noticeable consequences, i.e. very slight or no alteration from baseline, insufficient magnitude to affect use/integrity.</p> <p>Hydrology: No measurable change in runoff patterns and/or no risk due to appropriate implementation of SUDs to achieve greenfield runoff rates.</p>

Magnitude	Description
	<p>Water Quality: No measurable change in water quality and/or no risk.</p> <p>Hydromorphology: Little or no engineering works in or near the waterbody. Works which have a local impact only with minimal to no disturbance to the bed and banks.</p>

11.2.17 The sensitivity of the receiving environment together with the magnitude of the effect defines the significance of the effect, as detailed in Table 11.6. A higher level of significance is attached to all effects on highly sensitive receptors, whilst a high magnitude effect on a low sensitivity receptor is generally considered to be of less significance. Significance is, however, not absolute and selection is based on professional judgement defined in relation to individual assets, their context and location.

Table 11.6 Level of effect

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

11.2.18 Potential effects are concluded to be of Major, Moderate, Minor or Negligible. Effects considered as being Moderate or Major are considered significant in terms of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations').

11.3 North Site (Detailed Application) Assessment

Assumptions and Limitations

11.3.1 The information presented in this assessment is based on desk studies and a site survey carried out on the 2nd of December 2019. The assessment of effects has been made on the basis of the detailed application layout for the North Site, with the assumption that there will be no movement of infrastructure into higher impact areas.

Baseline conditions

11.3.2 Baseline conditions in relation to the water environment are fully detailed for the Site as a whole in Section 11.4. The following provides a summary of conditions as they pertain to the North Site, as shown in Figure 10.1 (Volume 2).

Surface Water

11.3.3 The River Forth forms the western boundary of the North Site and all surface water runoff from this area is directed to this watercourse, see Figure 10.1 (Volume 2). This reach of the River Forth (Goodie Water to River Teith Confluence – ID 4701) is classified with an overall Good WFD status and discharges to the River Teith Special Area of Conservation (SAC), which commences beyond the confluence of the River Teith, approximately 0.5 km downstream. The SAC is designated for Atlantic salmon and brook, river and sea lamprey. Full details on the WFD classification and associated designations are provided in Table 11.7 and Table 11.8 in Section 11.4.

11.3.4 A small pond (221 m² in area) was also identified in the North Site, shown on 1:10k OS mapping, between the River Forth and existing parking. This was confirmed on site as a SuDS basin, which appears to receive surface water drainage from adjacent parking areas and provides

treatment prior to discharge to the River Forth.

Hydrology & Runoff

- 11.3.5 The latest (2017) WFD classification is High for the overall hydromorphology of this reach of the River Forth (ID 4701). Catchment descriptors classify the wider River Forth catchment as semi-permeable, with a Standard Percentage Runoff (SPR) of 42.16%. This suggests that just under one half of rainfall during a precipitation event will contribute to overland flow. As the North Site is partially urbanised, with existing office buildings and a large carpark, this has the potential to result in locally elevated runoff volumes, controlled by existing drainage systems. The western extent of the North Site is currently undeveloped and identified as being overlain by predominantly lowly permeable soils (Paragraphs 11.4.7 to 11.4.33). The 1:25,000 Soil Map of Scotland (partial cover) and Risk Maps identifies the area as having a moderate soil runoff risk, with soils expected to reach saturation under some circumstances, leading to runoff.

Water Quality

- 11.3.6 The latest overall WFD classification (2017) for this reach of the River Forth (ID 4701) is Good, with a chemistry status of Pass (last classified 2012) and an ecological status of Good. This is largely a result of the predominantly rural nature of the River Forth catchment upstream of the River Teith confluence and associated limited pollutant sources. Given the hydrology of the area, a significant volume of water runs overland, with the potential to provide a direct pathway for pollutants to surface waterbodies.

Hydromorphology

- 11.3.7 The latest (2017) WFD classification is Good for the overall hydromorphology of this reach of the River Forth (ID 4701), as a result of the natural physical condition of this watercourse and limited in channel engineering works. Engineering works along this reach of the Forth include the Old Drip Bridge (used as a pedestrian crossing) and the A84 road bridge. These crossing structures have only a localised impact on the bed and banks of the watercourse.

Groundwater

- 11.3.8 The North Site is underlain by the Sheriffmuir Sandstone Member, which is classified as a moderately productive aquifer with flow virtually all through fractures and other discontinuities. Two overlapping groundwater bodies are defined below the North Site - the Teith and Forth Valley Groundwater Body (GWB) and the Callander GWB. An area of rank marshy grassland has been identified to the north-west of the car park in the North Site (Chapter 9: Biodiversity) which has the potential to be a GWDTE. However, an analysis of topographic survey data and hydraulic modelling data for the adjacent River Forth indicates that this marshy grassland is surface water fed and can be discounted as a GWDTE (Paragraph 11.4.13).

Hydrology & Infiltration

- 11.3.9 The bedrock within the North Site is overlain by raised tidal flat deposits of Holocene age, comprising significant thicknesses of silt and clay. The Soil Map of Scotland (partial cover) classifies the majority of the North Site as poorly drained non-calcareous gleys, defined as deep soils with low permeability due to medium to fine textured subsoils or thick organic surface layers. As such, groundwater is likely to receive minimal recharge within the North Site.

Water Quality

- 11.3.10 The latest overall WFD classifications (2017) for the Teith and Forth Valley GWB (ID 150809), and Callander GWB (ID 150674) are Good. The Soil Map of Scotland (partial cover) classifies Site soils as having low soil leaching potential (L), in which potential pollutants are unlikely to move down through the soil due to low permeability. These lowly permeable gleys provide a

level of protection to the underlying bedrock aquifer.

Water Resources

11.3.11 No water abstractions were identified within a 1 km buffer of the North Site by SEPA or Stirling Council. The Drinking Water Quality Regulator for Scotland (DWQR) identified the nearest PWS as being over 1 km south, upstream, of the Proposed Development. A single distribution main was identified by Scottish Water running along the A84 to the north of the Site, beyond the North Site boundary, with a single branch entering the North Site immediately west of Craigforth Roundabout.

Receptor Sensitivity

11.3.12 Following establishment of the baseline conditions for the water environment; key identified receptors are assigned a sensitivity in regards hydrology, water quality, and/or hydromorphology (as appropriate) in Table 11.10 in Section 11.4, alongside justification for this categorisation based on the criteria outlined in Table 11.4.

11.3.13 Those receptors of relevance to the North Site are classified as follows:

- **River Forth**
 - Hydrology: High
 - Water Quality: High
 - Hydromorphology: Medium
- **Groundwater**
 - Hydrology: Medium
 - Water Quality: Medium

Changes likely to occur over time in the absence of developing the project

11.3.14 Hydrological systems are constantly varying due largely to climate patterns, which impact primarily rainfall patterns, and land use, which in turn impacts runoff and infiltration patterns. Climate change is likely to result in drier summers and wetter winters, with potential for more intense summer storms (Paragraphs 11.4.40 to 11.4.41). This has the potential to lead to more extreme flow values with consequential flooding and water quality issues.

Potential effects

11.3.15 The potential effects of the Proposed Development on identified receptors in the North Site from activities during the construction and operational phases are the same as those identified for the Site as a whole – these are fully detailed in Section 11.4. The following summarises level of potential effect for the North Site, during construction and operation of the Proposed Development (Detailed Application).

Construction Phase

11.3.16 The range of potential construction effects identified are summarised in Table 11.12 (Section 11.4), alongside the expected magnitude of effect defined based on the methodology outlined in Table 11.5. Although the construction phase of the project will be short term compared to the operational phase, the risk of pollution and adverse effects to drainage and hydrology during this phase can be high due to the levels of activity onsite. However, these effects are likely to be temporary in nature and, as a result, the magnitude of effect has been assessed as Low. The significance or level of predicted effects was determined by comparing the magnitude of change with the sensitivity of receptor. The level of pre-mitigation effect has, therefore, been assessed as **Minor to Moderate** (due to Low magnitude effects on Medium to High sensitivity receptors).

Operational Phase

- 11.3.17 Site operation will represent a permanent change to the baseline environment. During this phase, effects of the Proposed Development are long term and so have the potential to have a greater significance of effect on environmental receptors. This can include an increased risk of pollution due to increased onsite pollutant sources and permanent changes in catchment behaviour due to increases in impermeable surfaces. However, the design of the Proposed Development (Detailed Application) has taken into account identified potential effects and good practice will be employed and design standards adhered to in the detailed design to fully avoid or minimise potential adverse effects during the operational phase.
- 11.3.18 The range of potential operational effects identified are summarised in Table 11.13 (Section 11.4), alongside the expected magnitude of effect. With consideration of inherent mitigation, potential operational effects on drainage and hydrology will be avoided, prevented, reduced or offset – as a result, the level of effect has been assessed as **Negligible**.

Additional mitigation

- 11.3.19 An Environmental Management Plan (EMP) will be produced and submitted to SEPA for approval prior to the commencement of construction. The EMP will detail best practice measures and site specific method statements to avoid or minimise potential adverse effects during the construction phase. The schedule of mitigation (Table 11.11 in Section 11.4) provides full details of the measures which will be employed during the construction phase, to be incorporated into the EMP.

Residual effects

- 11.3.20 By undertaking an appropriate mitigation strategy (Table 11.11 in Section 11.4), it is anticipated that the effect of the Proposed Development on drainage and hydrology will be **Negligible** for both construction and operational phases – as detailed in Table 11.12 and Table 11.13 (Section 11.4).

Cumulative effects

- 11.3.21 Existing and proposed developments within the vicinity of the Proposed Development are discussed in Chapter 19. No change in the level of effect would be expected when considering the cumulative effect of the Proposed Development.

11.4 Masterplan (PPiP) Assessment

Assumptions and Limitations

- 11.4.1 The information presented in this assessment is based on desk studies and a site survey carried out on the 2nd of December 2019. The assessment of effects has been made on the basis of the masterplan layout, with the assumption that the detailed design envelope will not result in the movement of infrastructure into higher impact areas.

Baseline conditions

Site Catchments and Water Features

River Forth (Goodie Water to River Teith Confluence)

- 11.4.2 The Site is situated approximately 0.5 km upstream of the River Teith confluence, at which point the Forth drains an area of around 444 km². This major watercourse flows towards the north, forming the western boundary of the Site. This receives the majority of Site runoff – via the Raploch Burn (Paragraph 11.4.4), land drainage (Paragraph 11.4.5) and direct surface

water runoff. This watercourse crosses below the A84, north of the Site, at which point it runs between a travelling peoples site and a garden centre (to the east) and agricultural centre (to the west) prior to the confluence of the River Teith.

River Forth (Below River Teith Confluence)

- 11.4.3 The River Forth turns to the east following its confluence with the River Teith (0.5 km north-west of the Site), then runs adjacent to the A84 and northern Site Boundary, becoming tidal approximately 0.6 km north-east of the Site as the crow flies, or 2.15 km downstream following the route of the watercourse. The presence of the A84 and M9 prevent direct runoff from the Site entering this reach of the River Forth, with the majority of runoff being directed either west to the upper reach of the Forth (Paragraph 11.4.2) or east and south to the Raploch Burn (Paragraph 11.4.4). Any runoff directed to the north-east will be intercepted by drainage associated with the existing development and with the A84 and M9. Downstream of the Site the river runs through the communities of Raploch, Cornton and Cambuskenneth, skirting the northern edge of the City of Stirling.

Raploch Burn

- 11.4.4 The Raploch Burn drains a total area of 6 km² and receives runoff from the southern part of the Site, and from the eastern face of the crag. It is sourced on Gillies Hill, in Broomiebrae Wood to the south of Cambusbarron, approximately 2.7 km south of the Site, and drains the village of Cambusbarron and the western fringes of the City of Stirling. South of the village the watercourse flows north-east across agricultural land, crossing below Kersebonny Road and Dumbarton Road, before crossing to the east of the M9. The watercourse is then directed north for approximately 0.35 km, turning west and re-crossing the M9 on the eastern boundary of the Site. The burn flows through the South Site, running along the southern boundary, and discharges to the River Forth approximately 0.9 km south-west of the western boundary. This watercourse receives runoff from the majority of the South Site, as well as the eastern reaches of the Central Site and the majority of the Crag. A heavily straightened tributary channel (shown on 1:25k OS mapping) runs from the north-east and is culverted below the M9 and adjacent farmland, discharging to the Raploch Burn within the Site area. Historic mapping suggests that this is a natural watercourse, which has been artificially straightened for the purposes of land drainage.

Land Drainage

- 11.4.5 A land drain was identified on 1:25k OS mapping, running from south to north along the western boundary of Craigforth Crag, within the South Site. During the site visit, a defined drain was not identified due to heavy growth of vegetation. However, topographic analysis suggests that runoff from the steep western face of the crag will be directed to this point and be routed north to discharge to the River Forth on the western boundary of the Site, see Figure 10.1 (Volume 2).

Standing Water

- 11.4.6 A pond (Pond 1) covering 221 m² was identified in the North Site, shown on 1:10k OS mapping, between the River Forth and existing parking, see Figure 10.1 (Volume 2). This was confirmed on site as a SuDS basin, which receives surface water drainage from adjacent parking areas and provides treatment prior to discharge to the River Forth. This has been found to be choked with vegetation, holding little to no standing water at the time of ecological surveys (Chapter 9: Biodiversity). A pond (Pond 2) was also identified in the Central Site covering 414 m², shown on 1:25k OS mapping, on the eastern edge of the crag adjacent to the access road around the crag, see Figure 10.1 (Volume 2). This feature was found to be choked with vegetation with

little to no standing water at the time of the site visit. This pond is likely sourced from surface water runoff and lacks connectivity to other waterbodies in the wider area. This feature is fully assessed in Chapter 9: Biodiversity.

Groundwater

- 11.4.7 British Geological Society (BGS) mapping indicates that Craigforth Crag comprises the Clyde Plateau Volcanic Formation, consisting of Carboniferous basaltic rock (see Chapter 12: Ground Conditions). The BGS 1:625,000 hydrogeology map classifies this as a lowly productive aquifer with flow virtually all through fractures and other discontinuities. This is considered to contain only small amounts of groundwater in the near surface weathered zone and secondary fractures. A fault line is identified running through the Site, from west to east immediately north of the crag. This may provide a local flow pathway for groundwater.
- 11.4.8 To the north of this fault, the bedrock comprises the Sheriffmuir Sandstone Member, consisting of Devonian age sandstone. To the east of the crag, bedrock comprises the Clyde Sandstone Formation, consisting of Carboniferous age sandstone, siltstone and mudstone, and in the south-east, the Ballagan Formation, consisting of Carboniferous age argillaceous rock, dolostone and sandstone (see Chapter 12: Ground Conditions). These sedimentary rocks are classified as moderately productive aquifers with flow virtually all through fractures and other discontinuities and potential to yield moderate amounts of groundwater locally.
- 11.4.9 Under the WFD, GWBs are defined as a distinct volume of groundwater within an aquifer or aquifers. The way these aquifers are defined reflects key groundwater flow characteristics which are, in turn, the main drivers for differences in groundwater management approaches. Three overlapping groundwater bodies are defined below the Site - the Teith and Forth Valley GWB extends across the entire Site, with the Callander GWB extending into the North and Central Site and the Carron and Touch GWB extending into the Central and South Site.

WFD Classification and Protected Sites

- 11.4.10 The most recent WFD classification (2017) of Site waterbodies are detailed in Table 11.7 alongside identified pressures and proposed measures to alleviate these pressures, as well as any associated protection type or designation. Note that the Raploch Burn falls below the threshold for classification under the WFD.
- 11.4.11 Protected areas can include waterbodies used for the abstraction of drinking water, areas designated to protect economically significant aquatic species, recreational waters, nutrient sensitive areas, sites of scientific interest (SSSI), special areas of conservation (SACs) and special protected areas (SPAs) for habitats or species. Groundwater Dependent Terrestrial Ecosystems (GWDTes) are also specifically protected under the Water Framework Directive. Further details on protected areas or resources are provided in the following paragraphs.

Table 11.7 WFD Classification and Associated Protected Areas

ID	Waterbody	Overall Status (2017)	Water body information sheet (2012)		Associated Protected Areas
			Pressures	Measures	
4701	River Forth (Goodie Water to River Teith Confluence)	<p>Good</p> <p>Hydrology: High Chemistry: Pass* Ecology: Good Hydromorphology: Good</p> <p>*2012, not defined for 2017</p>	Diffuse source pollution – Arable Farming	None identified	River Teith SAC
4700	River Forth (below River Teith Confluence)	<p>Moderate</p> <p>Hydrology: Good Chemistry: Pass Ecology: Moderate Hydromorphology: Good</p>	Point source pollution – Sewage disposal (Doune and Deanston Waste Water Treatment works)	Increase treatment; Reduce at source	River Teith SAC
.	Raploch Burn	Not classified	N/A	N/A	River Teith SAC
150809	Teith and Forth Valleys GWB	Good	None identified	None identified	Drinking Water Protected Area (Groundwater)
150674	Callander GWB	Good	None identified	None identified	Drinking Water Protected Area (Groundwater)
150598	Carron and Touch GWB	Good	None identified	None identified	Drinking Water Protected Area (Groundwater)

Designations

11.4.12 Designated and / or protected sites within the vicinity of the Proposed Development of relevance to hydrological receptors are detailed in Table 11.8.

Table 11.8 Designated and / or Protected Sites

Site Name	Designation	Proximity (km)	Qualifying Feature
River Teith	SAC	Applies to the entirety of the River Teith, upstream of its confluence with the River Forth, and to the section of the River Forth immediately downstream of this confluence, extending as far as the Stirling to Perth railway main line (approximately 2.3 km east of the Site). Located 0.2 km north of the Site at its closest point	Atlantic salmon, Brook lamprey, River lamprey and Sea lamprey
Teith and Forth Valleys / Callander / Carron and Touch GWBs	Drinking Water Protected Area (Groundwater)	Within the Site area	The entirety of Scotland's River Basin District is defined as a Drinking Water Protected Area in relation to groundwater.

GWDTes

11.4.13 An area of rank marshy grassland has been identified to the north-west of the car park in the North Site (Chapter 9: Biodiversity) which has the potential to be a GWDTE. However, an analysis of topographic survey data indicates that this area consists of low lying riparian land, immediately adjacent to the River Forth, with levels at or just above the right bank of the River Forth. The western extent is likely a paleo-channel of the river, with a natural berm evident along part of the right bank of the existing river channel. The mean annual flood flow (QMED) at this location has been assessed as 116 m³/s, and hydraulic modelling indicates that out of bank flow occurs at this location at flows of less than 50 m³/s (see Chapter 10: Flood Risk). This indicates that the area is frequently inundated by the river. Surrounding ground also slopes towards the marshy grassland area, which will – consequently – receive surface water runoff from the surrounding area during rainfall events, in addition to frequent inundation from the River Forth. On this basis, it is concluded that this marshy grassland is surface water fed and can be discounted as a GWDTE. No other GWDTEs were identified as part of this survey and, given existing ground conditions (see Paragraph 11.4.33), are not anticipated to be identified within, or in hydrogeological connection with, the Proposed Development.

Public Water Supplies

11.4.14 Water resources are important within the Forth catchment, with lochs and reservoirs serving important functions in the supply of drinking water. However, these water supplies are all located upstream of the Proposed Development. It is noted that water distribution lines are present within the Proposed Development area, related to existing office operations and properties. These include the following:

- A trunk main crosses the M9 and enters the Central Site in the north-east, running south-south-west, bounding the eastern edge of the crag, and crossing the Raploch Burn on the southern boundary of the South Site.
- A distribution main enters the South Site along the approximate route of Kersebonny Road. A branch from this mainline is directed north-west, crossing Kersebonny Road and directing supplies to Kaimes Farm and Cottage (on the western boundary). The mainline swerves east immediately following this branch, running along the southern edge of the crag and then continuing north to follow the trunk main along the eastern edge of crag.

This extends as the bellmouth junction, which provides access to Craigforth House.

- A distribution main also runs along the A84 to the north of the Site, outside the North Site boundary, with a single branch entering the North Site immediately west of Craigforth Roundabout.

Private Water Supplies

11.4.15 The Drinking Water Quality Regulator for Scotland (DWQR) provides information documenting private water supplies in Scotland. The nearest PWS identified by the DWQR is over 1 km south, upstream, from the Proposed Development; with no PWS located within or downstream of the Site area. SEPA and Stirling Council were also contacted regarding the presence of water supplies both within the Site Boundary and within a 1 km buffer area. These information sources identified no water abstractions within this search area.

11.4.16 Based on available information it is assumed that no surface water supplied PWS is at risk from the Proposed Development. SEPA Guidance (LUPS-GU31) requires that all groundwater abstractions within 100 m radius of excavations less than 1 m in depth and within 250 m of excavations deeper than 1 m be identified in order to assess risk. Given that all identified PWS fall outside this search area, there is assumed to be no risk to groundwater supplied PWS.

Fisheries and Recreational Uses

11.4.17 The Forth District Salmon Fishing Board is responsible, under the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003, for the protection of stocks of Salmon and Sea Trout in the River Forth catchment. Fishing is managed by Stirling Council from the Teith confluence as far east as Cambuskenneth. The River Teith itself and the River Forth, upstream of this confluence, are privately managed within the vicinity of the Proposed Development. The River Forth is also used recreationally, predominantly by kayakers and rowers at present. However, a new pontoon was constructed in 2019 at Shore Road in Stirling, with eventual plans to develop a river taxi network through the city. These recreational users tend to use the lower reaches of the Forth, downstream of the Site.

Hydrology & Runoff

11.4.18 Catchment runoff and watercourse hydrology is directly related to precipitation patterns, as well as topography, geology, soil characteristics and land use – with urbanisation having the potential to significantly alter natural catchment hydrology.

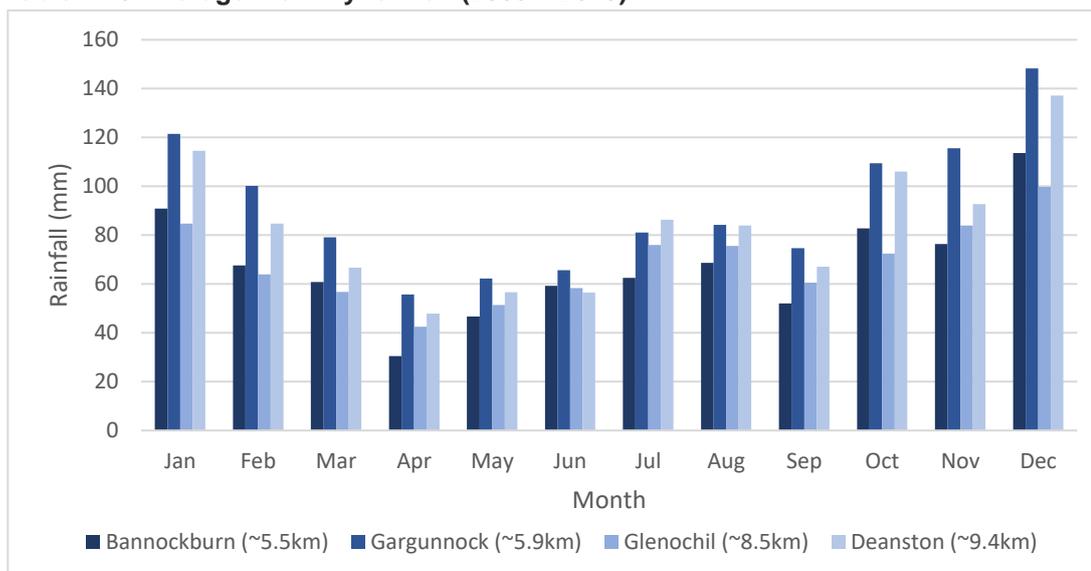
Precipitation

11.4.19 The Site is situated in central Scotland where rainfall tends to be associated with convection or Atlantic depressions, the latter of which results in the majority of rain falling in autumn and winter. The nearest publically available rainfall data is shown in Table 11.9. This is sourced from four SEPA rain gauges located within close proximity to the Proposed Development:

- Bannockburn, approximately 5.5 km south-east of the Site at NGR 281161 690814;
- Gargunock, approximately 5.9 km west of the Site at NGR 271411 695258;
- Glenochil, approximately 8.5 km east of the Site at NGR 285815 696073; and
- Deanston, approximately 9.4 km north-west of the Site at NGR 271200 701900.

11.4.20 The gauge data indicates that, at all four gauges, the lowest average monthly rainfall occurs in April (30.42 to 55.66 mm) and the highest in December (99.76 to 148.2 mm). These gauges record an average annual rainfall of between 812 mm (at Bannockburn) and 1,097 mm (at Gargunock) for the period 2009 – 2019.

Table 11.9 Average monthly rainfall (2009 – 2019)



Catchment Characteristics

11.4.21 Catchment descriptors can provide a good indication of the nature of runoff within the catchment. Descriptors for the River Forth catchment (upstream of its confluence with the River Teith) and the Raploch Burn were extracted from the FEH Web Service. The standard average annual runoff (SAAR) for the River Forth is higher than recorded by rain gauges; with a reported 1,580 mm. This is likely a result of heavier rainfall in the western and upland reaches of this catchment and is considered less representative of precipitation at the Site. The SAAR for the local Raploch Burn is more comparable to SEPA rain gauges, with a reported value of 1,033 mm.

11.4.22 The Urban Extent Index (URBEXT) is a measure of the urban and suburban land cover. Where this is greater, runoff volumes tend to be larger and peak fluvial flows greater. The URBEXT for the River Forth catchment is small (0.0026), reflecting the predominantly rural nature of this catchment. The URBEXT for the Raploch Burn is larger (0.0845), reflecting the proportionally larger volume of urbanisation in this catchment (upstream of the Site). The Base Flow Index (BFI) is a measure of the proportion of a catchment's long-term runoff that is derived from stored sources, with the BFI ranging from 0.1 in relatively impermeable clay catchments to 0.99 in highly permeable catchments. The BFI for the River Forth catchment is 0.437 and the Raploch Burn is 0.464 indicating that a little under a half of these catchment's long term run-off is derived from stored sources. The Standard Percentage Runoff (SPR) represents the percentage of rainfall that is likely to contribute to runoff. The SPR for the River Forth catchment is 42.16% and the Raploch Burn is 33.76%, indicating that between approximately one half and one third of the rainfall during a precipitation event contributes to runoff.

11.4.23 These descriptors show that the Site is located within semi-permeable catchments. However, these are averaged across the entire catchment and do not necessarily accurately represent conditions at the Site itself. The Site specific geology and soil characteristics are outlined in Paragraphs 11.4.33 to 11.4.33, with the Site identified as being overlain by predominantly lowly permeably soils. The Soil Runoff Risk map identifies the Site as having a moderate soil runoff risk, with soils expected to reach saturation under some circumstances, leading to runoff. Additionally, as significant parts of the North and Central Areas contain existing development, including large office buildings and extensive car parking, natural runoff rates are modified by existing surface water drainage systems, which direct surface water runoff to the River Forth

via a number of separate outlets. Conversely, the portion of the Raploch Burn catchment which falls within the Site comprises predominantly agricultural land and portions of the undeveloped Crag. As such, runoff patterns are expected to reflect more natural conditions in the portion of the Site drained by this catchment.

Water Quality

11.4.24 Water quality is largely related to catchment land-use, as well as geology and soil characteristics (outlined in Paragraphs 11.4.7 to 11.4.9 and 11.4.33 to 11.4.33). SEPA's (2011) River Forth Catchment Profile indicates that land-use across the wider Forth catchment is predominantly rural, comprising managed forests and farmland. The Loch Lomond and Trossachs National Park covers a significant portion of the upper reaches of the catchment. In the lower-lying reaches, a greater degree of urbanisation can be seen with the City of Stirling and surrounding villages, interspersed with agricultural holdings.

11.4.25 The capacity of soil to store rainfall and allow water to infiltrate affects the risk of water flowing overland (as runoff) and carrying potential pollutants into watercourses. In the wider catchment the SPR is a little under half (Paragraph 11.4.22), indicating that a significant volume of water runs overland, with the potential to provide a direct pathway for pollutants to surface waterbodies. As detailed in Paragraph 11.4.23, the Site itself has lowly permeable soils and the Soil Runoff Risk map identifies a moderate soil runoff risk.

11.4.26 Water quality also has the potential to be impacted by the erosion of bare soil by water under intense or prolonged rain, which can result in silt laden water entering watercourses downstream. The Soil Erosion Risk map classifies the majority of the Site as having a low erosion risk as a result of almost level to gentle slopes. The steeper slopes of the crag are classified as having a moderate to high erosion risk; however, as these are protected by existing woodland the likelihood of erosion occurring is low.

River Forth (Goodie Water to River Teith Confluence)

11.4.27 The latest overall WFD classification (2017) for this reach of the River Forth (ID 4701) is Good, with a chemistry status of Pass (last classified 2012) and an ecological status of Good. This is largely a result of the predominantly rural nature of the River Forth catchment upstream of the River Teith confluence and associated limited pollutant sources.

11.4.28 SEPA's (2014) Water body information sheet for water body 4701 in Forth notes that this watercourse is subjected to diffuse source pollution from arable farming; however, this is not of a magnitude considered severely detrimental to the current water quality status. Existing development within the Site area represents the greatest urbanisation along the main river reach. Additional urban areas are limited to the village of Gargunnoch, drained by the Gargunnoch Burn tributary, and Cambusbarron, Torbex and the western fringes of the City of Stirling, drained by the Raploch Burn (Paragraph 11.4.31). Sewage discharges can also impact on water quality and SEPA were consulted to identify any discharges authorised under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR). A total of six sewage discharges were identified discharging to surface water within this catchment area. Discharge consents were also identified for seven surface water sewer outlets from existing parking areas within the Site and for sewage effluent from the remote IT suite in the South Area and existing buildings in the North Area. These discharges represent existing pressures on water quality.

River Forth (Below River Teith Confluence)

11.4.29 The latest overall WFD classification (2017) for this reach of the River Forth (ID 4700) is

Moderate, with a chemistry status of Pass and an ecological status of Moderate. This remains of sufficient quality to support SAC qualifying species (detailed in Table 11.7). This reach of the Forth drains a greater urban area than the upper catchment, which contributes to a degradation in water quality.

- 11.4.30 SEPA's (2014) Water body information sheet for water body 4700 in the River Forth specifically notes that this watercourse is subjected to point source pollution from sewage disposal at Doune and Deanston Waste Water Treatment Works and identifies a requirement to increase treatment levels at this facility. This is located on the banks of the River Teith, over 6 km upstream of the Forth, and so it is the inflow of polluted waters of the Teith which primarily contributes to the reduction in water quality immediately downstream of this confluence. The dilution of Teith waters by higher quality water from the upper reach of the River Forth (Paragraph 11.4.26) partially offset existing degradation in this downstream reach.

Raploch Burn

- 11.4.31 The Raploch Burn is not classified under the WFD; however, this watercourse has a number of potential pressures on existing quality as a large proportion of the catchment drains the villages of Cambusbarron, Torbex and the western fringes of the City of Stirling and this watercourse is likely to be heavily interconnected with associated surface water sewer systems (Paragraph 11.4.37). Additionally, two of the six sewage discharges identified within the vicinity of the Site are located in this sub-catchment. A large proportion of the catchment also comprises arable farmland, which has the potential to be a source of diffuse organic pollution. During the Site visit, this watercourse was found to be heavily discoloured and turbid – indicating existing siltation and pollution (see Photograph 11.7 to Photograph 11.12). Despite potential pressures, water quality is not sufficiently degraded to significantly influence downstream receptors, as this discharges to the River Forth (Goodie Water to River Teith Confluence), currently classified as Good (Paragraph 11.4.27).

Groundwater

- 11.4.32 The latest overall WFD classifications (2017) for the Teith and Forth Valley GWB (ID 150809), Callander GWB (ID 150674) and Carron and Touch GWB (ID 150598) are Good. These groundwater bodies extend to the north, east and south of the Site, located below predominantly rural surface catchments with minimal sources of pollution. It is noted that one authorised sewage discharge to groundwater was identified from Kaimes Farm on the western boundary of the Site, which represents an existing local pressure on these waterbodies.
- 11.4.33 With the exception of the Crag (on which BGS maps identify no superficial deposits) the bedrock within the Site is overlain by raised tidal flat deposits of Holocene age, comprising significant thicknesses of silt and clay. The Soil Map of Scotland (partial cover) classifies the majority of the Site as poorly drained non-calcareous gleys, defined as deep soils with low permeability due to medium to fine textured subsoils or thick organic surface layers that can absorb or prevent contaminants from infiltrating. As such, these soils are classified as having low soil leaching potential (L), in which potential pollutants are unlikely to move down through the soil due to low permeability. These lowly permeable gleys cover all three development zones and provide a level of protection to the underlying bedrock aquifer (see Chapter 12: Ground Conditions).

Hydromorphology

- 11.4.34 The hydromorphological character of identified waterbodies is related primarily to their physical character, in relation to the interaction between river flows and channel form. This is critical to associated ecosystems and is most commonly degraded by in channel engineering activities.

River Forth (Goodie Water to River Teith Confluence)

11.4.35 The latest (2017) WFD classification is Good for the overall hydromorphology of this reach of the River Forth (ID 4701), as a result of the natural physical condition of this watercourse and limited in channel engineering works. The river channel meanders naturally along the western boundary of the Site, varying generally between 25 and 35 m in width (Photograph 11.1 and Photograph 11.2). The water is deep and slow flowing along this reach and there is abundant bankside cover provided by riparian woodland (Chapter 9: Biodiversity). Engineering works along this reach of the Forth include the Drip Old Bridge (used as a pedestrian crossing) adjacent to the north-western corner of the Site (Photograph 11.3). This comprises a five arch stone bridge, carrying the former line of the A84 public road over the River Forth and currently used as a pedestrian crossing. The current A84 is bridged over the Forth approximately 35 m further downstream (Photograph 11.4). These crossing structures have only a localised impact on the bed and banks of the watercourse. As detailed in Table 11.8, the River Teith and the River Forth immediately downstream of the Teith confluence, as it extends eastwards along the north of the Site, are designated as a SAC for Atlantic salmon and lamprey populations. However, due to the minimal engineering works there are no physical barriers preventing the dispersal of SAC qualifying species moving upstream into this section of the River Forth – although there is a lack of spawning gravel and marginal fine sediment required to support these species (Chapter 9: Biodiversity).



Photograph 11.1 Naturally meandering channel (looking upstream)



Photograph 11.2 Naturally meandering channel (looking downstream)



Photograph 11.3 Drip Old Bridge (looking downstream)



Photograph 11.4 A84 Road Bridge (from Drip Old Bridge)

River Forth (Below River Teith Confluence)

11.4.36 The latest (2017) WFD classification is Good for the overall hydromorphology of this reach of the River Forth (ID 4700), as a result of the natural physical condition of this watercourse and

limited in channel engineering works. The river channel continues in a similar vein downstream of the confluence of the Teith, with broad meanders migrating across the natural floodplain. With the influx of flows from the River Teith, the Forth significantly increases in size – varying from 60 to 70 m in width in the vicinity of the Site, with deep and slow moving waters. Engineering works along this reach include the bridging of the M9 across the River Forth, approximately 0.2 km to the north-east of the Site (Photograph 11.5). A tidal weir is also located on the river, immediately downstream of the M9 (Photograph 11.6). This marks the Forth estuary's upper tidal limit and once supplied power to a series of mills on the southern bank. The existing physical conditions of this reach of the River Forth are suitable to support the River Teith SAC qualifying species.



Photograph 11.5 M9 Bridge



Photograph 11.6 Tidal Weir

Raploch Burn

11.4.37 The Raploch Burn is not classified under the WFD; however, this watercourse appears to be largely modified from its natural physical condition, with numerous in channel engineering works in the form of culverted and artificially straightened reaches. The headwaters of the Raploch Burn appear natural; mapped as an open channel situated in an incised valley draining Gillies Hill. However, this becomes heavily modified as it enters Cambusbarron, with numerous culverted and artificially straightened reaches, and it is likely that this is heavily interconnected with the surface water sewer system for the village. The watercourse drains agricultural land downstream, between Cambusbarron and the Site. Here the channel has again been artificially straightened along field boundaries and culverted below fields and roads. Downstream of Dumbarton Road the watercourse resumes a more natural route, with the exception of culverted reaches along the route of the M9.

11.4.38 Immediately upstream of the Site, the watercourse is bridged below the M9 (Photograph 11.7); however, on entering the South Site this resumes its natural form, varying generally between 2.0 and 2.5 m in width and flowing through an increasingly incised shallow valley form (Photograph 11.8 and Photograph 11.9) before discharging to the River Forth approximately 250 m south-west of the Site Boundary (Photograph 11.10). Engineering works along this reach comprise an agricultural track crossing (Photograph 11.11) and a crossing facilitating Kersebonny Road (Photograph 11.12). A heavily modified tributary channel is culverted below the M9 and part of the South Site. The outlet of this culvert is located on the main Raploch Burn, adjacent to the agricultural track crossing (Photograph 11.13).



Photograph 11.7 M9 Crossing (looking upstream)



Photograph 11.8 Incised shallow valley form on eastern boundary (looking downstream into Site)



Photograph 11.9 Incised valley form on western boundary (looking upstream into Site)



Photograph 11.10 Tributary junction



Photograph 11.11 Track crossing



Photograph 11.12 Kersbonny Road Crossing



Photograph 11.13 Outlet of culverted tributary

Receptor Sensitivity

11.4.39 Following establishment of the baseline conditions for the water environment in the study area; key identified receptors are assigned a sensitivity in regards hydrology, water quality, and/or hydromorphology (as appropriate) in Table 11.10, alongside justification for this categorisation based on the criteria outlined in Table 11.4.

Table 11.10 Receptor Sensitivity

Receptor	Sensitivity	Justification
River Forth <i>(Goodie Water to River Teith Confluence)</i>		
Hydrology	High	High hydrology WFD status in 2017; inherent connectivity to the River Teith SAC downstream with water volumes in this watercourse being of importance to these species.
Water Quality	High	Good overall WFD status in 2017; inherent connectivity to the River Teith SAC downstream with water quality in this watercourse being of importance to these species.
Hydromorphology	Medium	Good hydromorphology WFD status in 2017 with limited historical engineering works in the reach adjacent to the Site.
River Forth <i>(below River Teith Confluence)</i>		
Hydrology	High	Good hydrology WFD status in 2017; forms part of the River Teith SAC and water volumes in this watercourse are of importance to these species.
Water Quality	High	Moderate overall WFD status in 2017 but forms part of the River Teith SAC and water quality is of importance to these species.
Hydromorphology	Medium	Good hydromorphology WFD status in 2017 with limited historical engineering works in the reach adjacent to the Site.
Raploch Burn		
Hydrology	Medium	WFD status not classified by SEPA; no, or negligible alterations to natural drainage patterns within the Site although significantly modified in the upper catchment.
Water Quality	Medium	WFD status not classified by SEPA but expected to be heavily interconnected with surface water sewer systems and appeared heavily discoloured and turbid during the site visit. Tributary has inherent connectivity to the River Teith SAC downstream and water quality in this watercourse is of some but limited (due to dilution by the River Forth) importance to these species.
Hydromorphology	Medium	WFD status not classified by SEPA. Appears to be largely modified from its natural physical condition, with numerous in channel engineering works in the form of culverted and artificially straightened reaches. However, resumes a more natural form within the Site.
Groundwater		
Hydrology	Medium	Good overall WFD status; no identified GWDTEs or groundwater abstractions within the vicinity of the Site.
Water Quality	Medium	Good overall WFD status, with a single identified sewage discharge within the vicinity of the Site from an agricultural property. No identified GWDTEs or abstractions.

Changes likely to occur over time in the absence of developing the project

11.4.40 Hydrological systems are constantly varying due largely to climate patterns, which impact primarily rainfall patterns, and land use, which impact runoff and infiltration patterns. Information regarding climate change was obtained from the UK Climate Projections (UKCP18) website. UKCP18 is a climate analysis tool which features comprehensive projections for different regions of the UK. For Central Scotland, under a high emissions scenario, UKCP18 predicts that, by the 2070s, winter temperatures will increase by 3.9 °C and summer temperatures will increase 4.2 °C. Precipitation is more difficult to predict, with projections indicating that winter mean precipitation could be between 3 % drier and 12 % wetter, and summer mean precipitation could be between 40 % drier and 8 % wetter by the 2070s.

11.4.41 These predictions indicate that the Site could experience an increase in rainfall and reduction in snowfall in winter months. UKCP18 also suggests future increases in the intensity of heavy summer rainfall events and this may lead to increased surface water runoff and more extreme flow values during and immediately following such events. These trends have the potential to adversely affect existing hydrology and water quality in watercourses on and adjacent to the Site, due to increased overland flow and associated increased pressure on existing surface water drainage systems. If climate change leads to drier summers there is also the potential for increased pressures on habitats supporting sensitive species, such as the River Teith SAC, as well as increased demand from downstream water users.

Potential effects

11.4.42 This section summarises the potential effects of the Proposed Development on identified receptors from activities during the construction and operational phases, taking into account any inherent mitigation designed into the project.

Construction Phase

11.4.43 Although the construction phase of the project will be short term compared to the operational phase, the risk of pollution and damage to the water environment during this phase can be high due to the levels of activity onsite. No in channel engineering works are proposed and all elements of the Proposed Development incorporate a minimum 25 m buffer from adjacent watercourses, this will allow all construction activities to be set back from the River Forth and the Raploch Burn, thereby reducing potential construction phase. However, activities carried out across the Site can represent a risk to the water environment. These include:

- Movement and use of plant and other construction vehicles;
- Establishment of welfare facilities;
- Material handling, storage, stockpiling and disposal;
- Earthworks including soil stripping, manipulation of ground levels, and re-engineering of existing made ground as necessary;
- Installation of temporary and permanent infrastructure and roads;
- Excavation and construction of foundations;
- Construction of residential and commercial buildings;
- Construction of drainage and utilities duct runs; and
- Formation of public spaces, restoration and landscaping.

11.4.44 These activities can lead to the following potential effects:

- Pollution risk from spills/leaks of fuel, oil, concrete or other construction material;
- Pollution risk from welfare facilities;
- Disturbance and mobilisation of physical contaminants (e.g. dust and sediment);

- Soil erosion due to topsoil removal and generation of silt-laden runoff from disturbed ground and excavations during rainfall events;
- Creation of new pollutant pathways i.e. to groundwater through excavations and/or to surface water through the formation of temporary or permanent drainage channels;
- Soil compaction from vehicle movements, potentially resulting in reduced infiltration and alteration of groundwater recharge; and
- Alteration of surface water runoff patterns, impacting on catchment hydrology and potentially influencing hydromorphology via associated changes in flow velocities i.e. increasing erosion or sedimentation of the watercourse and / or impacting on bed and bank stability.

11.4.45 Spillages and mobilised sediments have the potential to affect the physical, chemical and biological quality of identified surface and ground waterbodies, via surface water runoff and/or infiltration. This can lead to direct loss or indirect disturbance of dependent ecological receptors, impacting on designated or protected habitats/species and fisheries interests.

11.4.46 The range of potential construction effects identified for the Site are summarised in Table 11.12, alongside the expected magnitude of effect (defined based on the methodology outlined in Table 11.5). Although potential effects on drainage and hydrology during the construction phase are likely, these are expected to be temporary in nature – as a result, the magnitude of effect has been assessed as Low. The significance or level of predicted effects was determined by comparing the magnitude of effect with the sensitivity of receptor. The level of pre-mitigation effect has, therefore, been assessed as **Minor to Moderate** (due to Low magnitude effects on Medium to High sensitivity receptors).

Operational Phase

11.4.47 Site operation will represent a permanent change to the baseline environment. At this phase effects of the Proposed Development are long term and so have the potential to have a greater significance of effect on environmental receptors. Changes with the potential to effect the water environment include:

- Increase in onsite pollutant sources e.g. increase in onsite traffic, foul sewer drainage, residents (i.e. littering, fly tipping, etc.);
- Increase in impermeable areas; and
- Permanent alteration to greenfield drainage, catchment runoff and infiltration patterns.

11.4.48 These changes can lead to the following potential effects:

- Increased risk of pollutant spillage;
- Increased risk of pollutants reaching surface water feature due to flushing of contaminants from impermeable surfaces;
- Increased risk of foul water contamination of the water environment; and
- Increased surface water runoff rates; impacting on catchment hydrology and potentially influencing hydromorphology via associated changes in flow velocities i.e. increasing erosion or sedimentation of the watercourse and / or impacting on bed and bank stability.

11.4.49 The design of the Proposed Development has taken into account identified potential effects and good practice will be employed and design standards adhered to in the detailed design to fully avoid or minimise potential adverse effects during the operational phase. As such, the Proposed Development incorporates inherent mitigation to protect the water environment – as follows:

- **Siting and Design:** The siting and design of the Proposed Development have been

informed by identified receptors, thereby, minimising potential adverse effects. The Proposed Development footprint takes into account SEPA guidance (LUPS-BP-GU2b) on buffer strips adjacent to waterbodies. A buffer strip between a built development and the boundary of a watercourse allows space for natural fluvial processes to occur, provides natural habitats which promote biodiversity, aids in the stabilisation of banks and reduces soil erosion, reduces pollution from surface water run off by allowing space for natural settlement and filtration of contaminants, and contributes to green networks. The Proposed Development incorporate a minimum 25 m buffer from adjacent watercourses.

- **Surface Water Drainage Scheme:** The surface water runoff from the Proposed Development has been assessed in Appendix 11.1: Drainage Design Strategy Report. The outline surface water drainage design has been prepared based on SUDS principles, and so restricts post development flows to the equivalent greenfield runoff rate whilst also providing pollution mitigation. The implementation of this drainage strategy will mimic natural catchment hydrology, preventing excessive flows (in comparison to baseline) from being discharged to adjacent watercourses and providing appropriate treatment to prevent the Proposed Development adversely affecting water quality. The proposed surface drainage solution for the site is outlined in Drawings 120369/8005 to 8008 in Appendix 11.1, and includes:
 - Permeable paving, swales, filter trenches, SUDS basins and underground cellular storage tanks to limit the rate of runoff from the site, associated flood risk and risk to water quality;
 - Adherence to design standards and good practice guidance, including The SUDS Manual;
 - Management of vegetation within basins and drains through grass cutting, pruning of any marginal vegetation (as appropriate to the SUDS component) and removal of any nuisance plants;
 - Regular inspection of inlets, outlets, banksides, structures and pipework for any blockage and/or structural damage and remediate where appropriate;
 - Regular removal of accumulated sediment, litter and debris from inlets, outlets, drains and basins to avoid sub-optimal operation of SUDS; and
 - Adherence to the maintenance plans specific to SUDS component type as detailed within The SUDS Manual.
- **Foul Water Drainage Strategy:** The foul water from the Proposed Development has also been assessed in Appendix 11.1: Drainage Design Strategy Report. The foul water network has been designed in accordance with Scottish Water guidelines and is proposed to discharge to an existing Scottish Water Waste Water Pumping Station in the Central Area. This design will prevent foul water discharge from adversely affecting the surrounding water environment. The proposed foul drainage solution for the site is outlined in Drawings 120369/8001 to 8004 in Appendix 11.1.

11.4.50 Potential operational effects identified for the Site are summarised in Table 11.13, alongside the expected magnitude of effect. With consideration of inherent mitigation, potential operational effects on drainage and hydrology will be avoided, prevented, reduced or offset – as a result, the level of effect has been assessed as **Negligible**.

Additional mitigation

Construction Phase

11.4.51 An EMP will be produced and submitted to SEPA for approval prior to the commencement of construction. The EMP will detail best practice measures and site specific method statements to avoid or minimise potential adverse effects during the construction phase. This will include the following:

- Pollution Prevention Plan (PPP);
- Pollution Incident Response Plan (PIP); and
- Water Quality Monitoring Plan (WQMP).

11.4.52 The schedule of mitigation (Table 11.11) provides full details of the measures which will be employed during the construction phase, to be incorporated into the EMP.

Controlled Activities

11.4.53 As the Proposed Development area exceeds 4 ha, the management of surface water runoff from the construction site will be regulated under the Water Environment (Controlled Activities) Regulations 2011 (as amended) – CAR – by a construction site licence (CSL). The PPP is required to be produced and submitted to SEPA for approval as part of CSL authorisation, including details of:

- How to minimise, control and treat site runoff;
- Maintenance and monitoring regimes; and
- General site management to prevent pollution.

11.4.54 This ensures that steps are taken to prevent pollution arising from the Site, and that the potential effects of that pollution and methods (and alternative methods) of preventing environmental harm occurring have been adequately considered. Mitigation item M11.1 in the schedule of mitigation (Table 11.11) requires that the PPP form part of the overall EMP.

11.4.55 The exact level of authorisation for all activities will be determined during detailed design, in consultation with SEPA. The relevant CAR General Binding Rules will be complied with in regards all relevant low risk activities not requiring authorisation, including construction of surface water drainage system outfalls.

Monitoring

11.4.56 As part of the CSL a threshold will be set for the concentration of Total Suspended Solids (TSS) in Site discharges. In order to aid compliance with the CSL, a programme of water quality monitoring will be carried out to establish a robust baseline dataset, characterising natural concentrations of TSS within the Site watercourse. The same monitoring methods will then be employed for the duration of the construction phase to demonstrate compliance with the CSL and provide a mechanism for proactively managing water quality and ensuring the effectiveness of mitigation measures. Mitigation item M11.1 in the schedule of mitigation (Table 11.11) requires that a WQMP form part of the overall EMP. Monitoring requirements are detailed under mitigation item M11.7.

Operational Phase

11.4.57 Inherent mitigation realises the benefits of measures to mitigate potential effects through the initial scheme design and removes the need for additional measures to be implemented for the operational phase.

Table 11.11 Schedule of Mitigation

Mitigation Item	Description	Purpose	Timing
M11.1	<p>EMP: The appointed Contractor will be required to prepare an Environmental Management Plan (EMP) prior to commencement of construction which will be adhered to for the duration of the construction phase, this will incorporate, but not be limited to, mitigation items M11.2 to M11.7 and contain the following supplementary documents:</p> <ul style="list-style-type: none"> • Pollution Prevention Plan (PPP), written in accordance with SEPA's Sector Specific Guidance: Construction Sites (WAT-SG-75) • Pollution Incident Response Plan (PIP), detailing emergency measures, contacts and responsible persons - to be complied with in the event of a pollution incident • Water Quality Monitoring Plan (WQMP), written in accordance with M11.9 	To mitigate construction effects on the water environment	Pre-Construction & Construction
M11.2	<p>Construction site runoff and sedimentation: The appointed Contractor will adhere to SEPA GPPs/ PGGs and other good practice guidance, and implement appropriate measures which will be detailed in a Pollution Prevention Plan to be prepared prior to the commencement of construction (M11.1). This will include, but may not be limited to:</p> <ul style="list-style-type: none"> • installation of temporary drainage systems / SUDS systems (or equivalent) as appropriate, including pre-earthworks drainage, with appropriate outfalls in place prior to any earthworks activities to control the rate of flow before water is discharged into a receiving waterbody. The temporary drainage design will include / take into account the following: <ul style="list-style-type: none"> - Incorporation of sediment and pollution management measures, including temporary SUDs basins (sized according to CIRIA & SEPA guidance) to separate clean and dirty water, to help reduce effects on the hydrological environment. Measures will depend on the nature of construction activities occurring in particular areas across the site, and will include silt fences, check dams, settlement lagoons, soakaways, geotextile silt mats and other sediment trap structures as appropriate. - The ability of clean stone and silt traps to effectively treat runoff will depend upon the volume of runoff within the drainage channel, the type of material used and the frequency of monitoring and replacement of the measures. Appropriate consideration will be given to these factors during the design and operation of the measures to ensure their optimal performance. - Control measures will be regularly inspected, and recorded (so they are available for review), and maintained as necessary, particularly after prolonged heavy rainfall. • avoiding unnecessary stockpiling of materials and exposure of bare surfaces, limiting topsoil stripping to areas where bulk earthworks are immediately programmed • protecting soil stockpiles using bunds, silt fencing and peripheral cut-off ditches, and locating stockpiles at distances >10 m from water features and in areas not liable to flood • restoration of bare surfaces (seeding and planting) throughout the construction period as soon as possible after the work has been completed or protecting exposed ground with geotextiles if to be left exposed • minimising the use of heavy plant on wet ground, which may disrupt the topsoil leading to the 	To mitigate impact of construction site runoff on water quality, hydromorphology and flood risk	Pre-Construction & Construction

Mitigation Item	Description	Purpose	Timing
	<p>generation of silt laden waters, by restricting plant movements and using geotextile matting</p> <ul style="list-style-type: none"> avoiding undertaking major construction works during heavy precipitation events 		
M11.3	<p>Oil / fuel leaks and spillages: The appointed Contractor will adhere to SEPA GPPs / PPGs and other good practice guidance and implement appropriate measures which will be detailed in the CEMP and supporting documents (M11.1). This will include, but may not be limited to the following:</p> <ul style="list-style-type: none"> where practicable, refuelling of vehicles and machinery will be carried out in designated areas at a low risk of flooding and >10 m from any watercourse, on an impermeable surface with spill kits available refuelling will be carried out by designated trained and competent operatives only stationary plant will be fitted with drip trays which will be emptied regularly plant machinery will be regularly inspected for leaks with maintenance as required only emergency maintenance to construction plant will be carried out on site, in designated areas, on an impermeable surface well away from any watercourse or drainage, unless vehicles have broken down necessitating maintenance at the point of breakdown, where extra precaution will be taken spillage kits will be stored at key locations on-site and detailed within the CEMP construction activities will comply with the PiP 	To mitigate the risk of pollution on water quality	Construction
M11.4	<p>Chemical storage, handling and reuse: The appointed Contractor will adhere to SEPA GPPs / PPGs and other good practice guidance, and implement appropriate measures which will include, but may not be limited to:</p> <ul style="list-style-type: none"> chemical, fuel and oil storage will be undertaken within a designated area, which will be located on stable ground, at a low risk of flooding and >10 m from any watercourse chemical, fuel and oil stores will be stored in locked tanks of sufficient structural integrity, sited on impervious bases within a secured bund of 110% of the storage capacity 	To mitigate the risk of pollution on water quality	Construction
M11.5	<p>Concrete, cement and grout: The appointed Contractor will adhere to SEPA GPPs / PPGs and other good practice guidance, and implement appropriate measures which will include, but may not be limited to:</p> <ul style="list-style-type: none"> concrete mixing and washing areas will: <ul style="list-style-type: none"> be located in areas a low risk of flooding and >10 m from any watercourse have settlement and re-circulation systems for water reuse have a contained area for washing out and cleaning of concrete batching plant or ready-mix lorries wash-water will not be discharged to the water environment and will be disposed of appropriately either to the foul sewer (with permission from Scottish Water), or through containment and disposal to an authorised site if concrete pouring is required within a channel, a dry working area will be created if concrete pouring is required within 10 m of a water feature or over a water feature, appropriate protection will be put in place to prevent spills entering the channel (e.g. isolation of working area, protective sheeting) 	To mitigate the risk of pollution on water quality	Construction

Mitigation Item	Description	Purpose	Timing
	<ul style="list-style-type: none"> quick setting products (cement, concrete and grout) will be used for structures that are in or near to watercourses 		
M11.6	<p>Sewage from welfare facilities: The appointed Contractor will ensure sewage is disposed of appropriately either to a foul sewer (with the permission of Scottish Water) or via appropriate treatment and discharge agreed with SEPA in advance of construction and in accordance with 'GPP04 Treatment and Disposal of Sewage'.</p>	To mitigate the risk of pollution on water quality	Construction
M11.7	<p>Water Quality Monitoring: A programme of monitoring will be implemented in the Raploch Burn and River Forth to minimise effects on existing water quality downstream of the proposed development, this will be fully detailed in a WQMP, produced as part of the requirements of the EMP (M11.1). This will involve monitoring of surface water quality parameters including, but not limited to, total suspended solids (TSS) in line with the requirements of the CSL. It is recommended that additional appropriate chemical suites be included for the detection of relevant contaminants and/or as environmental quality indicators. The monitoring programme will include:</p> <ul style="list-style-type: none"> surface water quality monitoring in the lower reaches of the Raploch Burn, in the River Forth immediately upstream and downstream of the Raploch Burn confluence and downstream of the site, and at control locations in the Raploch Burn and River Forth Burn upstream of the site a period of pre-construction water quality monitoring to establish baseline conditions (preferably monthly sampling over a 12 month period as a minimum) water quality monitoring for the duration of the construction period (comprising monthly sampling and regular visual inspections of watercourses as a minimum) a period of post-construction water quality monitoring to ensure the effectiveness of permanent site drainage / SUDS <p>During construction and post-construction monitoring results will be compared with baseline data and used – alongside details of antecedent weather conditions, site activity logs and visual observations at the time of sampling – to identify any degradation in water quality as a result the proposed development. This will allow mitigation measures to be assessed and improved as required.</p>	To maximise the effectiveness of mitigation measures and ensure that there are no long term effects on the water environment	Pre-Construction, Construction & Operation

Residual effects

11.4.58 By undertaking appropriate mitigation in Table 11.11, it is anticipated that the effect of the Proposed Development on drainage and hydrology will be **Negligible** for both construction and operational phases – as detailed in Table 11.12 and Table 11.13.

Cumulative effects

11.4.59 Existing and proposed developments within the vicinity of the Proposed Development are discussed in Chapter 19.

11.5 Summary

11.5.1 This chapter assess potential effects of the Proposed Development on the drainage and hydrology; in terms of hydrology, water quality and hydromorphology. The assessment of effects is summarised in Table 11.12 (Construction) and Table 11.13 (Operation).

11.5.2 Although potential effects on hydrology and drainage during the construction phase are likely, these are expected to be temporary in nature and can be avoided or minimised through the application of appropriate additional mitigation measures, as outlined in the schedule of mitigation. The residual (post-mitigation) level of construction effects has, therefore, been identified as Negligible. With consideration of inherent mitigation embedded within the design – including a surface water drainage design based on SUDS principles, which will restrict runoff to the equivalent Greenfield runoff rate whilst also providing pollution mitigation – the level of potential operational effects on the water environment has also been assessed as Negligible.

11.5.3 Overall, **no significant effects** have been identified on the water environment.

Table 11.12 Assessment of Construction Effects

Receptor	Receptor Sensitivity	Potential Effect	Magnitude of Effect	Level of Effect	Additional Mitigation	Residual Magnitude of Effect	Residual Significance of Effect
Hydrology							
River Forth (Goodie Water to River Teith Confluence)	High	Temporary alterations of surface water runoff patterns. Soil compaction from vehicle movements, potentially resulting in reduced infiltration and alteration of groundwater recharge.	Low	Moderate	Mitigation Items: M11.1 & M11.2.	Negligible	Negligible
River Forth (below River Teith Confluence)	High		Low	Moderate		Negligible	Negligible
Raploch Burn	Medium		Low	Minor		Negligible	Negligible
Groundwater	Medium		Low	Minor		Negligible	Negligible
Water Quality							
River Forth (Goodie Water to River Teith Confluence)	High	Temporary pollution risk from: <ul style="list-style-type: none"> spills/leaks of fuel/oil/concrete/other construction material; welfare facilities; and silt-laden runoff generated from disturbed ground. Potential to alter chemical and biological quality in identified receptors via surface water runoff and/or via infiltration.	Low	Moderate	Mitigation Items: M11.1 to M11.7	Negligible	Negligible
River Forth (below River Teith Confluence)	High		Low	Moderate		Negligible	Negligible
Raploch Burn	Medium		Low	Minor		Negligible	Negligible
Groundwater	Medium		Low	Minor		Negligible	Negligible
Hydromorphology							
River Forth (Goodie Water to River Teith Confluence)	Medium	Temporary alterations to runoff patterns and works adjacent to watercourses have potential to alter the hydromorphology of site watercourses by: <ul style="list-style-type: none"> increasing erosion and/or sedimentation of the watercourse; changing bed and bank stability; and changing flow velocities. 	Low	Minor	Mitigation Items: M11.1 & M11.2	Negligible	Negligible
River Forth (below River Teith Confluence)	Medium		Low	Minor		Negligible	Negligible
Raploch Burn	Medium		Low	Minor		Negligible	Negligible

Table 11.13 Assessment of Operational Effects

Receptor	Receptor Sensitivity	Potential Effect (with inherent mitigation)	Magnitude of Effect	Level of Effect	Additional Mitigation	Residual Magnitude of Effect	Residual Significance of Effect
Hydrology							
River Forth (Goodie Water to River Teith Confluence)	High	With consideration of inherent mitigation, potential operational effects on hydrology, such as: <ul style="list-style-type: none"> Increased surface water runoff rates and total runoff volumes in site watercourses due to an increase in impermeable areas; and Alteration in groundwater flow patterns as a result of alterations to site levels. will be avoided, prevented, reduced or offset.	Negligible	Negligible	Not Required	Negligible	Negligible
River Forth (below River Teith Confluence)	High		Negligible	Negligible		Negligible	
Raploch Burn	Medium		Negligible	Negligible		Negligible	
Groundwater	Medium		Negligible	Negligible		Negligible	
Water Quality							
River Forth (Goodie Water to River Teith Confluence)	High	With consideration of inherent mitigation, potential operational effects on pollution risk from: <ul style="list-style-type: none"> Increased onsite pollutant sources and foul water infrastructure and associated increased risk of pollutant spillage to all identified receptors; and Increased risk of pollutants reaching watercourses due to flushing of contaminants from impermeable surfaces. will be avoided, prevented, reduced or offset.	Negligible	Negligible	Not Required	Negligible	Negligible
River Forth (below River Teith Confluence)	High		Negligible	Negligible		Negligible	
Raploch Burn	Medium		Negligible	Negligible		Negligible	
Groundwater	Medium		Negligible	Negligible		Negligible	
Hydromorphology							
River Forth (Goodie Water to River Teith Confluence)	Medium	With consideration of inherent mitigation, potential operational effects on hydromorphology as a result of alterations to runoff patterns and new drainage outfalls which can: <ul style="list-style-type: none"> increase erosion and/or sedimentation of the watercourse; alter bed and bank stability; and alter flow velocities. will be avoided, prevented, reduced or offset.	Negligible	Negligible	Not Required	Negligible	Negligible
River Forth (below River Teith Confluence)	Medium		Negligible	Negligible		Negligible	
Raploch Burn	Medium		Negligible	Negligible		Negligible	
Groundwater	High		Negligible	Negligible		Negligible	

11.6 References

- Aspect Land & Hydrographic Surveys, 2019. Topographic Survey (Drawings G/WAF/1041, Sheets 1 - 16)
- Aspect Land & Hydrographic Surveys, 2019. River Cross Section Survey (Drawing A7208, Sheets 1 to 5)
- BGS 1:625,000 Hydrogeology Map
- BGS 1:50,000 Geology of Britain Viewer
(<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>)
- Drinking Water Quality Regulator for Scotland (DWQR) Private Water Supply Map
(<http://dwqr.scot/private-supply/pws-location-map/>)
- Forth District Salmon Fishing Board (<http://forthdsfb.org/>)
- Ordnance Survey (OS) 1:50,000 raster and 1:10,000 vector mapping.
- Scotland's environment mapping (<https://map.environment.gov.scot/sewebmap/>)
- SEPA Rainfall Data for Scotland (<https://apps.sepa.org.uk/rainfall>)
- SEPA Water Classification Hub. (<https://www.sepa.org.uk/data-visualisation/water-classification-hub/>)
- SEPA Water Environment Hub (<https://www.sepa.org.uk/data-visualisation/water-environment-hub/>)
- SEPA, 2011. River Forth Catchment Profile
- SEPA, 2012. Water body information sheet for Callander GWB
- SEPA, 2012. Water body information sheet for Ochills North GWB
- SEPA, 2012. Water body information sheet for Teith and Forth Valleys GWB
- SEPA, 2014. Water body information sheet for water body 4700 in Forth (River Forth, below R. Teith confluence)
- SEPA, 2014. Water body information sheet for water body 4701 in Forth (River Forth, Goodie Water to River Teith Confluences)
- SEPA, 2017. Guidance LUPS-GU31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems
- SEPA, 2019. Controlled Activities Regulations: A Practical Guide, Version 8.4
- Scottish Planning Policy (SPP), 2014
- Scottish Water Asset Plans
- SNH Protected Areas Map (<https://sitelink.nature.scot/map>)
- Soil Map of Scotland (partial cover) 1:25,000 and Risk Maps
(http://map.environment.gov.scot/Soil_maps)
- Stirling Council, 2018. Local Development Plan
- Stirling Council, 2019. Flooding Risk Management and the Water Environment Supplementary Guidance [Draft]
- UK Climate Projections (UKCP18) –
(<https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index>)
- William Nimmo & Partners, 2019. Site Drainage Layout (Drawing 1878-26)

11.7 Assessor information

- 11.7.1 The EIA Report has been prepared under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations'). EIA Regulation 5.(b) requires that an outline of relevant expertise or qualifications of contributors accompanies an assessment. The relevant information for the team is provided below for each of the EIA Report chapters.
- 11.7.2 This assessment has been carried out by a suitably qualified hydrologist with over seven years' experience in assessing impacts on the water environment, and reviewed by a chartered consultant with over ten years' experience in delivering EIA reports.

12 Ground Conditions

12.1 Introduction

12.1.1 This chapter of the Environmental Impact Assessment Report (EIA Report) assesses the effect of the Proposed Development at Craigforth Campus, Stirling (hereafter referred to as the Site) with regard to the Ground Conditions. This assessment has been undertaken by Fairhurst.

Overview

12.1.2 The Site covers a total area of approximately 54 hectares (ha), located in the Stirling Council local authority area, centred on Craigforth Crag to the west of Stirling City. Craigforth Crag is a natural rampart, comprising a crag and tail created by the glacial erosion of a volcanic plug of very hard igneous rock, and surrounded by relatively flat, low-lying ground. The Site is situated on the south-west corner of Junction 10 of the M9 and is accessible from the A84 to the north and from Dumbarton Road, via Kersebonny Road, to the south. It is bounded by a meandering section of the River Forth to the west, the A84 to the north, the M9 to the east and the Raploch Burn and agricultural land to the south.

12.1.3 The Proposed Development comprises an office led mixed use development including hotel, leisure, retail, healthcare and residential with new access, servicing, parking, open space and associated infrastructure. This is made up of the following:

- **North Sub-Area (8.2 ha):** This is separated from the wider Site by a narrow vehicular and pedestrian route. It comprises two buildings (Lomond View) and a large carpark, and borders the A84 to the north.
- **North Site (2.4 ha):** A detailed planning application is being made for new office buildings and parking areas comprising 2.4 ha of this area, with associated access roads and a new access point from the A84.
- **Craigforth Crag (15.4 ha):** The crag is predominantly covered by trees, categorised as ancient and semi-natural woodland, with some sheer rock faces. An existing track / footpath runs around the crag and no development is proposed within this area.
- **Central Sub-Area (10.5 ha):** Prudential Corporate Property's existing office operations wrap round the north side of the crag. This area also comprises Craigforth House, a traditional, B-Listed stately home, and two modern bungalows. A mixed use development is proposed within the central area of the Site including residential apartments, leisure and retail facilities, a nursery, and a hotel.
- **South Sub-Area (18.7 ha):** This comprises undeveloped farmland wrapping around the south side of the crag, with a single storey remote IT suite to the west. A mixed use development is proposed for this area, consisting of residential properties, care home supported living housing and community facility.
- **South Access (1.3 ha):** This extends to the south along Kersebonny Road.

12.1.4 This chapter supports the Proposed Development (PPiP Masterplan) application for the full Site and the Proposed Development (Detailed Application) for the North Site.

12.1.5 Full details of the Proposed Development are provided in Chapter 4: Description of Proposed Development.

Scope of Assessment

12.1.6 Due to the government guidelines relating to Covid-19, it has not been possible to undertake any form of Ground Investigation works to support the submission of the Masterplan (Proposed

Development (PPiP Masterplan) or the North Site (Proposed Development (Detailed Application)). As such, it has been agreed with Stirling Council, during a meeting on 29th April 2020, that we will submit full details of the Ground Investigation works once these have been undertaken. A technical Geo-Environmental Desk Study Report has been undertaken to assess the likely impact of the Proposed Development and is submitted as Technical Appendix 12.1.

12.1.7 This report sets out the anticipated ground conditions, the type and location of the physical ground investigation works and the proposed laboratory testing to verify the anticipated findings, details of which are given below:

Effects to be assessed

12.1.8 The following receptors have been identified that require to be assessed as part of the study:

- The risk to human health, the built development and proposed landscaping from contaminants within any made ground;
- The risk to human health and the built development from soil gas emissions;
- The risk to building materials from any sulphates within any made ground; and
- The temporary risk to on-site surface waters, and those immediately adjacent, associated with surface water runoff during construction.

Proposed Works

12.1.9 The following works are proposed to establish the effects of the above identified receptors:

- 15 no. Continuous Percussive Boreholes to depths of between 5.00m and 10.00m;
- 30 no. Machine Excavated Trial Pits to depths in the order of 4.50m;
- 6 no. Groundwater and gas monitoring standpipe installations within boreholes;
- In-situ Standard Penetration Testing within the boreholes;
- Collection of geotechnical and environmental samples;
- Post site works groundwater and gas monitoring (6 visits);
- Collection of groundwater and surface water samples; and
- Geo-Environmental testing.

12.1.10 The proposed works are currently being undertaken and from the point of submission should be available within 10 to 15 weeks of the submission, on the assumption that COVID-19 related lockdown measures are not re-introduced.

12.1.11 Following on from the Geo-Environmental Desk Top Study Report (Technical Appendix 12.1), the physical ground conditions surveys will be submitted to the Council to verify the anticipated ground conditions. Any changes in ground conditions that are identified from the anticipated position set out in the Geo-Environmental Desk Top Study Report (Technical Appendix 12.1) will be clearly set out with additional mitigation measures proposed where necessary.

Table 12.1 Proposed Ground Investigation Programme

Item	Description	Duration Estimate (weeks)
1.0	Preliminary Ground Investigation Site Works for Baseline Conditions	12
1.1	Mobilisation period	2
1.2	Site Works (TBC be currently due to start)	2
1.3	Issue of Draft Engineering Logs	0.3
1.4	Test Scheduling	1
1.5	Laboratory Testing (Soils/Monitoring)	4
2.0	Reporting	3
2.1	Chapter 12 of Environmental Impact Assessment Production	3

13 Traffic and Transport

13.1 Introduction

- 13.1.1 This chapter examines the environmental impacts with regard to Access, Traffic and Transport for the Proposed Development at Craigforth, Stirling.
- 13.1.2 The data underpinning this assessment is based principally on that contained within the supporting Transport Assessment (TA) report, prepared by Sweco, attached at Technical Appendix 13.1 of the EIA Report.
- 13.1.3 The assessment considers the potential impacts on traffic and transportation associated with the Proposed Development on the Site. It takes account of the current operation of the Craigforth campus. It considers the Proposed Development (Detailed Application) in the North Site which is subject to a detailed planning application and an opening year of 2022, and the Proposed Development (PPiP Masterplan) in the central and southern part of the Site, which is subject to a planning application in principle (PPiP) and with an indicative opening year of 2026 (for the purpose of this assessment only).
- 13.1.4 During the construction period of the Proposed Development, traffic levels associated with the construction activities will typically be a lot less than when the Site becomes occupied, therefore, the assessment of environmental impacts focuses specifically on when the development is fully occupied which represents the worst case in terms of traffic increases on the road network. With respect to the routing of the construction vehicles, this will be agreed with Transport Scotland and Stirling Council. Notwithstanding this, the Site benefits from its proximity to the trunk road network, offering the opportunity for construction traffic to utilise routes independent of built up urban areas. This will include the M9(T), A84(T) routes and the M9(T) Junction 10 roundabouts. Construction traffic management plans will be provided to support the construction phase of the Proposed Development (Detailed Application) and Proposed Development (PPiP Masterplan) at the appropriate stage.

13.2 Legislation, Policy and Guidance

- 13.2.1 A review of the relevant transport policy forms part of the TA. The relevant policies and a short summary are provided below:
- Scottish Planning Policy (SPP)¹;
 - Planning Advice Note (PAN) 75 – Planning for Transport²;
 - Transport Assessment Guidance (TAG)³;
 - Stirling Local Development Plan⁴; and
 - Stirling's Local Transport Strategy⁵.
- 13.2.2 The review of the prevailing transport planning policy set out above identifies consistent policy objectives which seek to provide efficient, safe and sustainable movement of people to and from new development by encouraging sustainable transport options (walking, cycling and

¹ Scottish Government, (2014), 'Scottish Planning Policy', Available [online] at: <http://www.scotland.gov.uk/Resource/0045/00453827.pdf>

² Scottish Executive, 2005. PAN 75: Planning for Transport. Edinburgh: Scottish Executive.

³ Transport Scotland, 2012. Transport Assessment Guidance.

⁴ Stirling Council, 2018, Local Development Plan 2018.

⁵ Stirling Council, 2017. Stirling's Local Transport Strategy.

public transport) and providing improvement to the local road network to accommodate the new development.

13.2.3 The Proposed Development complies with the criteria set out within Scottish Planning Policy as it is located within proximity of walking, cycling and public transport infrastructure. A Travel Plan Framework has been developed to encourage sustainable travel practice.

13.2.4 The TA has been prepared in accordance with the Scottish Government's document 'Transport Assessment Guidance', with specific reference to the guidance on walking and cycling journey times. The Proposed Development can promote and prioritise sustainable travel through its proximity to walking and cycling links and bus facilities.

13.3 Scope and Consultation

13.3.1 The assessment considers the potential impacts on the road network of interest, as defined during the TA scoping meetings held with Stirling Council and Transport Scotland.

13.4 Assessment Methodology and Significance Criteria

13.4.1 The environmental impacts of the traffic generated by the Proposed Development have been assessed with reference to the 'Guidelines for the Environmental Assessment of Road Traffic'⁶ 1 (EART), published by the Institute of Environmental Assessment (IEA).

13.4.2 In accordance with this guidance, impacts associated with the Proposed Development including traffic generation, severance, driver delay, pedestrian amenity, fear and intimidation, accidents and road safety have been considered.

13.4.3 The assessment of the environmental effects of road traffic on noise and air quality can be found in Chapters 14 and 15 of the EIA Report, respectively.

13.4.4 For evaluation purposes, the significance of the environmental effects associated with the Proposed Development generated traffic are categorised as outlined within Table 13.1.

Table 13.1 Traffic Assessment Significance Criteria

Significance Rating	Description of Significance
Major	Where the impact leads to serious and lasting disruption (e.g. a 90% increase in baseline traffic) and permanent mitigation measures are required.
Moderate	Where the impact is of a temporary nature, leading to disruption (e.g. a 60% increase in baseline traffic) and short-term mitigation measures are required.
Slight	Where the impact exceeds industry standard design thresholds, or a traffic increase of above 30%, but does not lead to disruption. No mitigation measures are required.
Insignificant	No perceivable impact. No mitigation measures are required.
Positive	Where the proposals result in an improvement to current conditions.

13.5 Baseline Conditions

Surrounding Road Network

13.5.1 The road network in the vicinity of the Site comprises the A84(T) and the M9(T). Access to the Proposed Development will be from the A84(T) and this is discussed in more detail within later

⁶ Institute of Environmental Assessment, 2003. Guidelines for the Environmental Assessment of Road Traffic.

sections.

- 13.5.2 The A84(T) forms the northern boundary of the Site and runs from Raploch to the east of the Site to various towns to the west. The A84(T) is a two-way single-carriageway road subject to the national speed limit north of the Site. It forms the eastern and western arms of Craigforth Roundabout.
- 13.5.3 The M9(T) is located directly to the east of the Site. It is a two-way dual carriageway motorway that forms part of the strategic road network in central Scotland. It offers connections to the M8(T), M80(T), M876(T), M90(T) and various A-roads and is subject to a 70mph speed limit. The northbound on and off slip roads connect to the M9 Junction 10 Craigforth Roundabout, directly east of the Site. The southbound on and off slip roads connect to the M9 Junction 10 Kildean Roundabout to the east of the M9(T).
- 13.5.4 The A84, to the east of the M9(T) Junction 10 Kildean Roundabout is part of the local road network and is the main signed route to Stirling City Centre. It is a two-way single carriageway road and in the vicinity of the roundabout it is subject to a 40mph speed limit.
- 13.5.5 Drip road is located to the east of M9 Junction 10 Kildean Roundabout provides a secondary route towards Stirling and is the main vehicle route through Raploch. It is a two-way single-carriageway road subject to a 30mph speed limit upon entry from either side and a 20mph limit is enforced in the centre of the road which contains shared use features.
- 13.5.6 The supporting TA reviewed accessibility to the Site by sustainable modes including existing pedestrian facilities, cycle facilities and public transport facilities. The key highlights for each mode are summarised below.

Walking

- 13.5.7 The majority of pedestrian trips currently generated by the Craigforth campus are internal to the campus. A network of footways exists through the Site and connects to external footways towards Stirling. These are available to the north via an uncontrolled crossing on the A84(T) west approach to the Craigforth Roundabout and to the south via a footway running along the south side of A811 Dumbarton Road.

Cycling

- 13.5.8 National Cycle Route (NCR) 765 is located east of Craigforth and can be accessed at the Customs Roundabout east of Drip Road, approximately 2.5km (8-minute) cycle from the Site. NCR 765 provides access to Dunblane to the north and to Stirling to the south. In Stirling, NCR 765 connects NCR 76 which provides access from various surrounding towns such as Alloa, Clackmannan and Kincardine and further into Edinburgh and Fife. Other cycle routes such as NCR 767 and 768 also connect with NCR 76.

Public Transport

- 13.5.9 Bus services currently enter the Site providing direct links with Stirling city centre and Stirling railway station. They also provide commuter services from the towns and settlements within the Stirling area. In addition to the available onsite services, the closest bus stops to the Site are located on the A84(T) on the northern boundary of the Site. These stops are served by approximately two buses per hour during weekday, one bus per hour on Saturdays and one bus every two hours on Sundays. First Bus service 59 offers a connection between Callander and Stirling and First Bus service c.11 provides a connection between Aberfoyle and Stirling (please note these are based on pre-COVID19 timetables).
- 13.5.10 The closest railway station is Stirling, which can be accessed within a 15 minute cycle to the south east of the Site or via the campus shuttle buses. The railway station is on ScotRail's

Central Belt line, offering services to and from Edinburgh and Glasgow.

Baseline Traffic Flows

13.5.11 It was agreed with Stirling Council and Transport Scotland during the pre-application process that the traffic impact assessment within the TA needs to consider the following junctions:

- A84(T) / Chalmerston Road;
- A84(T) / Dobbies entrance;
- M9(T) Junction 10 (Craigforth Roundabout);
- M9(T) Junction 10 (Kildean Roundabout);
- Drip Road / Dougal Graham Road;
- A84 / Castlevie Park and Ride entrance;
- Back O' Hill Road / Raploch Road;
- A84 / Raploch Road;
- A811 / Raploch Road / Dumbarton Road.

13.5.12 For the purposes of the assessment within this chapter, the network of interest has been derived from the extent of the assessment within the TA. Figure 13.1 shows the extent of the network of interest with each key link numbered for reference.



Figure 13.1: Link Locations

13.5.13 Background traffic flows were obtained from automatic traffic counters (ATC) and classified turning counts undertaken by Nationwide Data Collection Ltd on Tuesday 29th October 2019. The following network peak hours were identified:

- AM peak hour: 08:00 to 09:00; and
- PM peak hour: 16:30 to 17:30.

13.5.14 The 2019 background traffic flows (two-way) for both peak hours and the annual average daily traffic (AADT) for the network of interest are summarised in

13.5.15 Table 13.1.

Table 13.1 2019 Background Peak Hour and AADT Traffic Flow Data

Link Location		2019 Two-way Flows*		
		AM Peak	PM Peak	AADT
1	A84 - West of Dobbies Entrance	924	1037	10590
2	A84 – East of Dobbies Entrance	975	1113	12503
3	A84 – over M9	1778	2189	17009
4	M9 Northbound On-Slip*	281	557	4096
5	M9 Northbound Off-Slip*	1351	580	6976
6	M9 Southbound Off-Slip*	927	351	4169
7	M9 Southbound On-Slip*	916	1432	7326
8	A84 North of Castleview Park & Ride	1769	1687	15778
9	A84 – west of A84/Raploch Rd roundabout	1050	1254	14759
*One-way traffic flows on the M9 slip roads				

13.6 North Site (The Proposed Development (Detailed Application)) Assessment

Assumption and Limitations

- 13.6.1 The Proposed Development (Detailed Application) will see a reduction in office space from 31,219m² to 16,038m², with the workforce moving towards more agile working practices and a reduction in car parking to 538 parking spaces.
- 13.6.2 The Proposed Development (Detailed Application) will be served from a new vehicle entry only slip road on the A84(T), with a one-way system in operation through the North Site, exiting onto the Craigforth Roundabout. As part of the Proposed Development (Detailed Application), car parking provision and a bus facility will be provided onsite. Active travel provision will be introduced throughout the North Site and which will link the Proposed Development (Detailed Application) to the wider Masterplan Site and planned and existing infrastructure in the surrounding area. This includes connections to the A84(T) westbound bus stop, to the existing uncontrolled crossing on the A84(T) eastbound approach to the Craigforth Roundabout and links to the south through the Masterplan Site to connect with routes along Dumbarton Road and planned provision under the M9(T).

Baseline conditions

- 13.6.3 The baseline conditions are presented in section 13.5.

Changes likely to occur over time in the absence of developing the project

- 13.6.4 In the absence of the Proposed Development (Detailed Application), it is likely that there would continue to be high reliance on the private car.

Potential Effects

Traffic Impacts

- 13.6.5 In terms of assessing the environmental effects of traffic generated by the Proposed Development (Detailed Application) the assessment firstly identifies a Baseline Scenario, as per Table 13.2, which considers the road network presuming the Proposed Development (Detailed Application) is not progressed.
- 13.6.6 In order to account for the baseline traffic flows for the assessment year of 2022, observed background traffic flows have been combined with agreed future year committed development traffic flows and takes account of the current travel demands associated with the existing office operation, as described in the TA. National Road Traffic Forecasts (NRTF) Central Growth is applied.
- 13.6.7 An Assessment Scenario is also considered, whereby the Proposed Development (Detailed Application) is fully implemented, as proposed. The assessment considers the observed background traffic flows, the committed development traffic flows combined (2022 Baseline Flows) with the net increase in traffic flows as a result of the Proposed Development (Detailed Application) (2022 Assessment Flows). Identification of the respective traffic impacts and environmental effects of the Proposed Development (Detailed Application) has been made based on the relative differences from each scenario.
- 13.6.8 The AM and PM peak hour and AADT traffic flows, for each scenario, are presented in Table 13.3. The percentage increase above the Baseline Scenario is also included within the Assessment Flow figures.

Table 13.2 2022 Peak Hour and AADT Traffic Flow Data

<i>Link Location</i>		<i>2022 Baseline Flows</i>			<i>2022 Assessment Flows</i>		
		<i>AM Peak</i>	<i>PM Peak</i>	<i>AADT</i>	<i>AM Peak</i>	<i>PM Peak</i>	<i>AADT</i>
1	A84 - West of Dobbies Entrance	968	1087	11042	978	1072	11061 (0.2%)
2	A84 – East of Dobbies Entrance	1019	1165	13017	1392	1203	14233 (9.3%)
3	A84 – over M9	1997	2322	18000	1812	2059	17235 (-4.3%)
4	M9 Northbound On-Slip*	296	600	4331*	283	561	4176 (-3.6%)
5	M9 Northbound Off-Slip*	1440	620	7435*	1219	621	7366 (-0.9%)
6	M9 Southbound Off-Slip*	977	371	4398*	965	367	4363 (-0.8%)
7	M9 Southbound On-Slip*	957	1527	7832*	936	1255	7630 (-2.6%)
8	A84 North of Castleview Park & Ride	1921	1830	16868	1791	1731	16421 (-2.6%)
9	A84 – west of A84/Raploch Rd roundabout	1106	1344	15816	1226	1320	15368 (-2.8%)
* One-way traffic flows on the M9 slip roads							

- 13.6.9 From Table 13.3 it can be seen that the volume of anticipated traffic generated by the Proposed Development (Detailed Application) in 2022 will result in a net decrease in traffic across the study area AM, PM and AADT scenarios, with the exception of Links 1 and 2.

13.6.10 Table 13.3 shows that the anticipated increase on Links 1 and 2 is less than 30% and with no mitigation required, the Proposed Development (Detailed Application) is anticipated to have an insignificant impact on these links.

13.6.11 Overall a positive impact is expected on the road network as a result of the Proposed Development (Detailed Application).

13.6.12 The Proposed Development (Detailed Application) traffic will comprise less than 5% HGV traffic and will therefore have an insignificant impact on the traffic impact. Table 13.4 shows the total number of HGVs (AADT – two-way) on each link for the Baseline and the Assessment scenarios.

Table 13.3 2022 HGV Traffic Flows (AADT Two-way)

<i>Link Location</i>		<i>Baseline</i>	<i>Assessment</i>
			<i>t</i>
1	A84 - West of Dobbies Entrance	433	450
2	A84 – East of Dobbies Entrance	375	459
3	A84 – over M9	562	535
4	M9 Northbound On-Slip*	75	70
5	M9 Northbound Off-Slip*	294	300
6	M9 Southbound Off-Slip*	95	97
7	M9 Southbound On-Slip*	297	294
8	A84 North of Castlevie Park & Ride	843	838
9	A84 – west of A84/Raploch Rd roundabout	275	265
* One-way traffic flows on the M9 slip roads			

Severance

13.6.13 Severance refers to the level of crossing difficulty for pedestrians and cyclists, which may be caused by the introduction of additional traffic.

13.6.14 There will be a positive impact on traffic levels as a result of the Proposed Development (Detailed Application). Most pedestrian movements will be internal to the North Site.

13.6.15 EART guidance notes that when determining severance, important issues include road width, traffic flow and composition, traffic speeds, the availability of crossing facilities and the number of movements that are likely to cross the affected route.

13.6.16 As a result of the Proposed Development (Detailed Application) minimal pedestrian activity is expected on Link 2, with no pedestrian activity on any other link. An existing uncontrolled crossing exists on Link 2 on its approach to the Craigforth Roundabout.

13.6.17 Given the findings of the assessment, the impact on Severance is considered to be Insignificant, as defined in **Error! Reference source not found.**

Driver Delay

13.6.18 EART notes that driver delay to existing road users can occur at site accesses, due to parked or turning vehicles. However, specific to this Proposed Development (Detailed Application) the most likely impact on driver delay is due to any potential increase in congestion on the road

network as a result of the proposals.

13.6.19 Given the findings of the TA, the potential impact on Driver Delay is considered to be insignificant or positive as defined in **Error! Reference source not found..**

Pedestrian Delay

13.6.20 Within the context of the North Site and the surrounding road network, Pedestrian Delay is considered to be triggered due to reduced opportunity for pedestrians to cross the road, within the gaps in traffic. It is also dependent on the scale of Severance impact identified earlier.

13.6.21 The Proposed Development (Detailed Application) will see a net decrease in traffic and therefore the impact on Pedestrian Delay is considered to be Insignificant, as defined in **Error! Reference source not found..**, with no identified requirement for mitigation.

Pedestrian Amenity, Fear and Intimidation

13.6.22 Pedestrian amenity, fear and intimidation are affected by the perceived traffic flow, traffic composition, footway width and its separation away from the carriageway. It can also include perceived exposure to noise and air pollution, although those elements are not considered within this Chapter.

13.6.23 EART states that a tentative threshold for judging changes in pedestrian amenity would be a doubling of traffic flow or its HGV component. It is also noted that the perceived impact is greatest when there is a lack of protection caused by such factors as narrow footways.

13.6.24 The Proposed Development (Detailed Application) will see a net decrease in traffic and therefore the potential impact on Pedestrian Amenity, Fear and Intimidation is considered to be Insignificant, as defined in **Error! Reference source not found..**

Accidents and Road Safety

13.6.25 The number and severity of accidents that have occurred on the surrounding road network since 2015 are considered to be relatively low with no discernible accident pattern. This enables a conclusion to be drawn that there are no historical road safety issues associated with the road network surrounding the Proposed Development (Detailed Application).

13.6.26 The resultant impact from the Proposed Development (Detailed Application) traffic on Accidents and Road Safety has been assessed to remain as Insignificant, as defined in Table 13.1.

Additional mitigation

13.6.27 No additional mitigation is required to support the Proposed Development (Detailed Application).

Residual effects

13.6.28 There will be a beneficial effect on the operation of the surrounding transport network as a result of the Proposed Development (Detailed Application), given there will be a reduction in office use from current levels.

Cumulative effects

13.6.29 The cumulative effects of the traffic and transport impacts from the proposals, alongside those from other developments being progress in the local area, have been considered by means of inclusion of committed development traffic within the scope of the assessment. Committed development traffic flows and its distribution on the network of interest have been agreed with Stirling and Transport Scotland during the preparation of the supporting TA.

Table 13.5 summarises the significance of potential impacts as a result of the Proposed Development (Detailed Application).

Table 13.5 Summary of Impacts

<i>Description of Effect</i>	<i>Significance of Potential Impact</i>	<i>Mitigation Measure</i>	<i>Significance of Residual Impact</i>
Traffic Impacts	Positive	Implementation of a Framework Travel Plan to support sustainable travel. Liaison with public transport operators to provide improved service offering	Positive
Severance	Insignificant	Impact on Link 2. No mitigation proposed.	Insignificant
Driver Delay	Insignificant	No mitigation proposed	Insignificant
Pedestrian Delay	Insignificant	No mitigation proposed.	Insignificant
Pedestrian Amenity, Fear and Intimidation	Insignificant	No mitigation proposed.	Insignificant
Accidents and Road Safety	Insignificant	No mitigation proposed.	Insignificant

13.7 Masterplan Assessment (The Proposed Development (PPiP Masterplan))

Assumption and Limitations

13.7.1 The Proposed Development (PPiP Masterplan) will see the introduction of a mixed-use development comprising residential and employment uses. The Proposed Development (PPiP Masterplan) will provide the opportunity to live and work in the same area, offering jobs, facilities and local amenities in close proximity to a new residential area. This will reduce the need to travel and will be underpinned by high quality active travel infrastructure. Parking provision will be in line with the relevant Council parking standards.

13.7.2 The Proposed Development (PPiP Masterplan) will be served via the current access arrangements with the Craigforth Roundabout. The Proposed Development (PPiP Masterplan) will be linked to the Proposed Development (Detailed Application), in the North Site, via active travel routes. The roads through the Proposed Development (PPiP Masterplan) will be designed to accommodate bus services.

Baseline conditions

13.7.3 The baseline conditions are presented in section 13.5.

Changes likely to occur over time in the absence of developing the project

13.7.4 In the absence of the Proposed Development (PPiP Masterplan), it is likely that there would continue to be high reliance on the private car.

Potential Effects

Traffic Impacts

13.7.5 In terms of assessing the environmental effects of traffic generated by the Proposed Development (PPiP Masterplan), the assessment firstly identifies a Baseline Scenario, as per Table 13.2, which considers the road network presuming the Proposed Development (PPiP

Masterplan) proposals are not progressed.

13.7.6 In order to account for the baseline traffic flows for the assessment year of 2026, observed background traffic flows have been combined with agreed future year committed development traffic flows including the Proposed Development (Detailed Application) and takes account of the current travel demands associated with the existing office operation, as described in the TA. NRTF Central Growth is applied.

13.7.7 An Assessment Scenario is also considered, whereby the Proposed Development (PPiP Masterplan) is fully implemented, as currently proposed. The assessment considers the observed background traffic flows, the committed development traffic flows combined (2026 Baseline Flows) with the net increase in traffic flows as a result of the proposed development (PPP Masterplan) (2026 Assessment Flows). Identification of the respective traffic impacts and environmental effects of the Proposed Development (PPiP Masterplan) has been made based on the relative differences from each scenario.

13.7.8 The AM and PM peak hour and AADT traffic flows, for each scenario, are presented in Table 13.6. The percentage increase above the Baseline Scenario is also included within the Assessment Flow figures.

Table 13.6 2026 Peak Hour and AADT Traffic Flow Data

<i>Link Location</i>		<i>2026 Baseline Flows</i>			<i>2026 Assessment Flows</i>		
		<i>AM Peak</i>	<i>PM Peak</i>	<i>AADT</i>	<i>AM Peak</i>	<i>PM Peak</i>	<i>AADT</i>
1	A84 - West of Dobbies Entrance	993	1142	11463	1037	1068	11807 (3%)
2	A84 – East of Dobbies Entrance	1453	1273	14708	1453	1273	15052 (2.3%)
3	A84 – over M9	2227	2582	17882	2227	2582	22766 (27.3%)
4	M9 Northbound On-Slip*	307	721	4332*	307	721	4449 (2.7%)
5	M9 Northbound Off-Slip*	1376	797	7631*	1376	797	9382 (22.9%)
6	M9 Southbound Off-Slip*	1008	392	4522*	1008	392	4638 (2.6%)
7	M9 Southbound On-Slip*	1082	1588	7908*	1082	1588	9640 (21.9%)
8	A84 North of Castleview Park & Ride	2048	2032	17020	2048	2032	19567 (15%)
9	A84 – west of A84/Raploch Rd roundabout	1167	1426	15929	1167	1426	18476 (16%)

* One-way traffic flows on the M9 slip roads

13.7.9 From Table 13.6 it can be seen that the volume of anticipated traffic generated by the Proposed Development (PPiP Masterplan) in 2026 will result in an increase in traffic across the study area AM, PM and AADT scenarios.

13.7.10 Table 13.6 shows that the anticipated increase on all links ranges from between 2% and 27%.

13.7.11 On this basis an insignificant impact is expected on the road network as a result of the Proposed Development (PPiP Masterplan).

13.7.12 The Proposed Development (PPiP Masterplan) traffic will comprise less than 5% HGV traffic and will therefore have an insignificant impact on the traffic impact. Table 13.7 shows the total

number of HGVs (AADT – two-way) on each link for the Baseline and the Assessment scenarios.

Table 13.7 2026 HGV Traffic Flows (AADT Two-way)

	<i>Link Location</i>	<i>Baseline</i>	<i>Assessment</i>
1	A84 - West of Dobbies Entrance	449	460
2	A84 – East of Dobbies Entrance	423	470
3	A84 – over M9	558	682
4	M9 Northbound On-Slip*	75	74
5	M9 Northbound Off-Slip*	302	352
6	M9 Southbound Off-Slip*	98	100
7	M9 Southbound On-Slip*	300	346
8	A84 North of Castleview Park & Ride	851	914
9	A84 – west of A84/Raploch Rd roundabout	278	341
* One-way traffic flows on the M9 slip roads			

Severance

13.7.13 Severance refers to the level of crossing difficulty for pedestrians and cyclists, which may be caused by the introduction of additional traffic.

13.7.14 EART guidance notes that when determining severance, important issues include road width, traffic flow and composition, traffic speeds, the availability of crossing facilities and the number of movements that are likely to cross the affected route.

13.7.15 As a result of the Proposed Development (PPiP Masterplan) minimal pedestrian activity is expected on Link 2, with no pedestrian activity on any other link. The majority of pedestrian movements are expected to be generated within the Proposed Development (PPiP Masterplan). An existing uncontrolled crossing exists on Link 2 on its approach to the Craigforth Roundabout.

13.7.16 It is likely that cyclist movements will occur external to the site and the Proposed Development (PPiP Masterplan) will tie in with existing and planned routes to the east and south, providing connections to Stirling.

13.7.17 Given the findings of the assessment, the impact on Severance is considered to be Insignificant, as defined in **Error! Reference source not found.** and is based upon planned external routes being delivered.

Driver Delay

13.7.18 EART notes that driver delay to existing road users can occur at site accesses, due to parked or turning vehicles. However, specific to the Proposed Development (PPiP Masterplan) the most likely impact on driver delay is due to any potential increase in congestion on the road network as a result of the proposals.

13.7.19 At this stage, the TA has tested the operation of the M9 Junction 10 as a result of the Proposed Development (PPiP Masterplan). However, this will be revisited at the Proposed Development (Detailed Application) stage. Based on the potential increase in traffic, the potential impact on

Driver Delay is considered to be Insignificant as defined in **Error! Reference source not found.**

Pedestrian Delay

13.7.20 Within the context of the Site and the surrounding road network, Pedestrian Delay is considered to be triggered due to reduced opportunity for pedestrians to cross the road, within the gaps in traffic. It is also dependent on the scale of Severance impact identified earlier.

13.7.21 The Proposed Development (PPiP Masterplan) will see an increase in traffic and therefore the impact on Pedestrian Delay is considered to be Insignificant, as defined in **Error! Reference source not found.**, with no identified requirement for mitigation identified at this stage.

Pedestrian Amenity, Fear and Intimidation

13.7.22 Pedestrian amenity, fear and intimidation are affected by the perceived traffic flow, traffic composition, footway width and its separation away from the carriageway. It can also include perceived exposure to noise and air pollution, although those elements are not considered within this chapter.

13.7.23 EART states that a tentative threshold for judging changes in pedestrian amenity would be a doubling of traffic flow or its HGV component. It is also noted that the perceived impact is greatest when there is a lack of protection caused by such factors as narrow footways.

13.7.24 With respect to external pedestrian and cycle trips associated with the Proposed Development (PPiP), there will be a demand towards the nearest education facilities to the south and east. As part of the detailed stage, consideration will be given to the provision of pedestrian / cycle crossing facilities and connections towards education facilities.

13.7.25 Notwithstanding the above, the Proposed Development (PPiP Masterplan) will result in less than a 30% increase in traffic and therefore the potential impact on Pedestrian Amenity, Fear and Intimidation is considered to be Insignificant, as defined in **Error! Reference source not found.**

Accidents and Road Safety

13.7.26 The number and severity of accidents that have occurred on the surrounding road network since 2015 are considered to be relatively low with no discernible accident pattern. This enables a conclusion to be drawn that there are no historical road safety issues associated with the road network surrounding the Site.

13.7.27 The resultant impact from the Proposed Development (PPiP Masterplan) traffic on Accidents and Road Safety has been assessed to remain as Insignificant, as previously defined.

Additional mitigation

13.7.28 No additional mitigation is required to support the Proposed Development (PPiP Masterplan) at this stage. Where required, mitigation will be addressed at the detailed stage.

Residual effects

13.7.29 With respect to the Proposed Development (PPiP Masterplan), it is anticipated that the impacts will be Insignificant. Where required, mitigation will be required at the detailed application stage, including potential improvements to the external active travel network to the south, but it is not envisaged to change from an Insignificant impact.

Cumulative effects

13.7.30 The cumulative effects of the traffic and transport impacts from the proposals, alongside those from other developments being progress in the local area, have been considered by means of

inclusion of committed development traffic within the scope of the assessment. Committed development traffic flows and its distribution on the network of interest have been agreed with Stirling and Transport Scotland during the preparation of the supporting TA.

Table 13.8 summarises the significance of potential impacts as a result of the Proposed Development (PPiP Masterplan). Any required mitigation associated with the Proposed Development (PPiP Masterplan) will be considered at the detailed application stage.

Table 13.8 Summary of Impacts

<i>Description of Effect</i>	<i>Significance of Potential Impact</i>	<i>Mitigation Measure</i>	<i>Significance of Residual Impact</i>
Traffic Impacts	Insignificant	Implementation of a Framework Travel Plan to support sustainable travel. Liaison with public transport operators to provide improved service offering. Linked trips within The Proposed Development.	Insignificant
Severance	Insignificant	Impact on Link 2. No mitigation proposed.	Insignificant
Driver Delay	Insignificant	No mitigation proposed	Insignificant
Pedestrian Delay	Insignificant	No mitigation proposed.	Insignificant
Pedestrian Amenity, Fear and Intimidation	Insignificant	No mitigation proposed.	Insignificant
Accidents and Road Safety	Insignificant	No mitigation proposed.	Insignificant

13.8 Summary

- 13.8.1 This Access, Traffic and Transport chapter has evaluated the potential environmental impacts resulting from the addition of the Proposed Development generated traffic on to the existing road network.
- 13.8.2 In accordance with the prevailing guidance, the environmental impacts including: traffic impact, severance, driver delay, pedestrian amenity, fear and intimidation, accidents and road safety, associated with the Proposed Development have been assessed.
- 13.8.3 Tables 13.5 and 13.8 summarise the significance of potential impacts for each assessed environmental effect. It is predicted that the Proposed Development (Detailed Application) will offer a betterment. The predicted impacts associated with the Proposed Development (PPiP Masterplan) will be considered in further detail as part of the future Proposed Development (Detailed Application) for the North Site element of the Craigforth campus.

13.9 References

- 1 Design Manual for Roads and Bridges, various authors, Department for Transport, 2019.

13.10 Assessor information

The EIA Report has been prepared under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations'). EIA Regulation 5.(b) requires that an outline of relevant expertise or qualifications of contributors accompanies an assessment. The relevant information for the team is provided below for each of the EIA Report chapters.

Consultant	Company	Experience	Qualifications
Ruth Mustard Technical Director	Sweco	20 years' experience in transport planning for the private sector covering transport input to EIAs and the Transport Assessments	MEng Civil & Environmental Engineering MSc Transport Planning and Engineering MCHIT

14 Noise & Vibration

14.1 Introduction

14.1.1 Noise from the existing environment may affect future residents and other noise sensitive uses within the Proposed Development. Sources of existing noise include road traffic on the M9 to the east and on the A84 to the north of the Proposed Development. Noise from the proposed commercial and retail activities also have the potential to affect adjacent noise sensitive uses e.g. noise from the proposed food and drink Pub/Restaurant or early morning deliveries to the retail unit may affect residents in the adjacent apartments.

Potential Adverse Effects

14.1.2 Transport noise and commercial activities have the potential to adversely affect the health and amenity of future noise sensitive receptors within the Proposed Development. Noise from the M9 has the potential to affect the proposed nursery.

14.1.3 Preliminary consultation with Stirling Council has confirmed that the Council's Environmental Health Officers have advised that environmental noise should be considered as part of the planning application.

Scope of Assessment

14.1.4 Baseline surveys have been conducted to quantify the existing ambient sound levels affecting the Proposed Development Site. These surveys were conducted in October 2019. The proposed methods and approach were submitted in advance to the local authority (Stirling Council). This assessment takes account of the noise criteria proposed in the Technical Advice Note (TAN)¹ which forms part of the Scottish Government's Planning and Noise Advice 1/2011². This report describes the potential noise impacts likely to arise from the proposal, reviews the assessment criteria that have been used to consider the impacts, and reports the results of baseline surveys. Noise levels from road traffic have been predicted across the development area. These impacts have been assessed against appropriate environmental noise criteria intended to protect human health and residential amenity.

14.1.5 The proposed scheme will generate additional road traffic on local roads. The increase in road traffic is <20% on the A84 nearest to existing residential receptors. This is well below the threshold that would normally require a quantitative assessment at receptors off-site.³ The impact of road traffic noise at receptors off-site has therefore not been considered further.

Difficulties in Assessment

14.1.6 These applications are based on a detailed office development North Site (The Proposed Development (Detailed Application)) set within a wider conceptual Masterplan (PPiP Application). The assessment has therefore been conducted on an largely indicative layout, save for the detailed office development. Accordingly, this assessment aims to identify constraints from noise generating activities that could affect health or amenity, to ensure that these are taken into account when determining the proposed site layout.

¹ Scottish Government 2011. Technical Advice Note. Assessment of Noise

² Scottish Government 2011. Planning Advice Note 1/2011 Planning and Noise

³ IEMA 2014. (Version 1.2). Guidelines for Environmental Noise Impact Assessment. An increase of 33% above baseline road traffic is typically associated with an increase of ~1dBA, which is usually regarded as being of negligible or slight adverse significance.

14.2 Assessment method

Planning Advice Note

- 14.2.1 PAN 1/2011 Planning and Noise provides advice to planning authorities in Scotland on how they must seek to minimise the adverse impact of noise on new housing. This Guidance is not prescriptive with respect to specific noise standards and is mainly concerned with the advising on good practice for environmental noise assessment. The noise impact assessment method set out in PAN 1/2011 Technical Guidance states: *"The choice of appropriate criteria noise levels and relevant time periods are the responsibility of the local authority. Although this may lead to inconsistencies between different local authorities and, indeed, across areas within a given local authority, it does provide flexibility, allowing particular circumstances to be taken into account and the use of the latest guideline values to be included where appropriate."*
- 14.2.2 The Technical Advice Note (TAN)⁴ issued to accompany the PAN for the assessment of noise proposes a methodology where the existing ambient noise affecting a new residential area is compared to a Target Noise Level. The ambient noise level is used to determine the magnitude of the impact, as described in Tables 14.1 and 14.2 below. This assessment uses the external daytime noise levels published by the World Health Organisation (WHO) intended to protect amenity in gardens, and the night-time noise levels inside bedrooms, as being the relevant Target Levels for residential (highly sensitive) use.
- 14.2.3 This assessment assumes that the Target Noise Levels are 55 dB LA_{eq} 07:00 – 23:00 in gardens during the daytime and 45 dB L_{night} outside bedrooms at night.

Table 14.1 Magnitude of Noise Impacts – Daytime (07:00 – 23:00)

(Existing – Target) Noise Level dB LA _{eq T}	Magnitude	Significance
$X \geq 10$	Major adverse	Large/Very Large
$5 \leq X < 10$	Moderate adverse	Moderate/Large
$3 \leq X < 5$	Minor adverse	Slight/Moderate
$0 \leq X < 3$	Negligible adverse	Slight
$X < 0$	No Adverse Impact	Neutral

Table 14.2 Magnitude of Noise Impacts – Night-time (23:00 – 07:00)

(Existing – Target) Noise Level dB LA _{eq T}	Magnitude	Significance
$X \geq 15$	Major adverse	Large/Very Large
$10 \leq X < 15$	Moderate adverse	Moderate/Large
$5 \leq X < 10$	Minor adverse	Slight/Moderate
$0 \leq X < 5$	Negligible adverse	Slight
$X < 0$	No Adverse Impact	Neutral

Noise from Commercial and Retail Activity Affecting Proposed Residential Development

- 14.2.4 The Planning and Noise TAN does not propose a specific assessment framework for noise from industrial, commercial, and retail activities affecting a proposed residential development. This assessment therefore uses BS 4142 to consider the potential adverse impacts from the proposed commercial and retail activities on noise sensitive development. This is within the scope of para 1.2(3) of BS 4142.

⁴ Scottish Government 2011. Technical Advice Note Assessment of Noise.

BS 4142:2014 + A1:2019

- 14.2.5 British Standard BS 4142:2014 + A1:2019 'Methods for rating and assessing industrial and commercial sound' describes methods for determining sound from industrial and commercial operations from fixed installations, and from the loading and unloading of goods and materials at industrial and commercial premises. The Standard includes procedures for quantifying noise from tonal, intermittent, and impulsive noise. According to BS 4142, sound during the daytime should be based on a 1 hour average exposure⁵. The Standard also includes a procedure to determine the significance of the rated sound from an installation where, typically, the greater the difference between the background sound level and the specific sound, the greater the magnitude of the impact.
- 14.2.6 According to the Standard: an increase of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context; an increase of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and the lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
- 14.2.7 The BS 4142 method requires the assessor to identify a typical baseline sound level at sensitive receptors. The construction of the Proposed Development is likely to affect the background sound level. One of the limitations of this method is that there is no established method for predicting future background sound levels. This assessment therefore assumes that the potential impacts must therefore be assessed using existing typical background levels. These should be assessed as part of the detailed design stage in accordance with a protocol to be agreed with the local planning authority.

BS 5228:2009 - Control of Noise from Construction Sites

- 14.2.8 Noise impacts from construction and open sites may be predicted and assessed using BS 5228:2009. BS 5228 provides base data for noise emissions from a variety of plant and operations and a methodology for the prediction of noise levels at receptors. The annoyance from construction site noise is likely to depend on a number of factors such as site location, existing ambient noise levels, and duration of operations. As with all aspects of noise, the time of day and duration of the event are significant, as is the extent to which noise from the activity exceeds the existing background (LA_{90}) or ambient noise levels (LA_{eq}). The current version of the Standard includes an assessment framework for assessing the significance of impacts, where daytime levels < 65 dB $LA_{eq} (07:00 - 19:00)$ are deemed to be insignificant.⁶ BS 5228 acknowledges that stricter standards should apply to some forms of construction operations where these are likely to last for more than six months.

World Health Organisation Guidelines

- 14.2.9 WHO has published Environmental Noise Guidelines to protect human health from road traffic noise, where the principal concern is the effects on sleep disturbance at night. This recommends that night-time noise from road traffic should not exceed 45 dB $L_{night, outside}$,⁷ averaged over a period of 1 year, where night is usually defined as being between 23:00 and 07:00 hours. The $L_{night, outside}$ criterion used by WHO is based on the index adopted by the

⁵ According to both BS 4142:2014 and World Health Organisation (WHO), night-time is defined as between 23:00 and 07:00 hours.

⁶ This category also applies to construction operations that are planned on Saturdays between 07:00 and 13:00. Stricter limits would apply outwith these hours.

⁷ WHO 2018. Environmental Noise Guidelines for the European Region

European Noise Directive.⁸ The $L_{\text{night, outside}}$ is an annual exposure limit and calculation of exposure should take account of prevailing meteorological conditions.

14.2.10 WHO has previously published Guidelines for Community Noise.⁹ These Guidelines advise that noise impacts within dwellings include annoyance and speech interference. The 1999 WHO Guidance recommended that noise inside bedrooms should not exceed 30 dBA for continuous noise and 45 dB LA_{max} for single sound events. This forms the basis of the internal levels recommended in Table 4 of BS 8233. The 1999 WHO Guidance also recommended that noise levels in outdoor living areas (e.g. gardens) should not exceed 55 dB $LA_{\text{eq 07:00 - 23:00}}$. The 1999 criteria for outdoor living areas have been used in preference to the L_{DEN} criterion, as the L_{DEN} index includes night-time periods, which are not relevant when considering impacts on outdoor living areas which are only used during the daytime. The relevant WHO assessment criteria are summarised in Table 14.3 below.

Table 14.3 Summary of WHO Environmental Noise Criteria¹⁰

Environment	Critical Effect	Sound Level dB $LA_{\text{eq T}}$	Time
Outdoor living areas	Annoyance	50 - 55	16 hours
Road traffic noise outside dwellings	Sleep disturbance	45	Night-time averaged over 1 year
Outside dwellings	Sleep disturbance	45	Night-time 8 hours
Inside dwellings	Speech intelligibility	35	Daytime 16 hours
Bedrooms	Sleep disturbance	30	Night-time 8 hours
Schools	Outdoor Learning	55	During play

Noise Assessment Criteria

14.2.11 The following assessment criteria have been adopted to help determine the significance of the environmental noise impacts. These criteria are mainly based on relevant WHO criteria. These criteria are set out in Table 14.4 below.

Table 14.4 Environmental Noise Assessment Criteria

Predicted Noise Level	Justification
55 dB $LA_{\text{eq 16 hour}}$	WHO criteria propose a daytime limit at houses and outdoor living areas to protect amenity (for transport noise). This level may also be used to assess impacts on outdoor learning areas in schools.
45 dB $LA_{\text{eq 8 hour}}$	WHO night-time noise criterion for outside dwellings.
45 dB L_{night}	WHO criterion at dwellings based on the long-term average outdoor road traffic noise level. This is the predicted or measured level at the façade of any exposed elevation, but not taking the effect of that façade into account. This standard is intended to prevent sleep disturbance and to protect human health. The design of

⁸ Official Journal of the European Communities 25th June 2002. DIRECTIVE 2002/49/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 June 2002 relating to the assessment and management of environmental noise. Annex 1 of the Directive defines the method by which L_{night} should be calculated. The night-time noise indicator L_{night} is the incident A-weighted long-term average sound level as defined in ISO 1996-2: 1987, determined over all the night periods of a year; in which: the night is eight hours, a year is a relevant year as regards the emission of sound and an average year as regards the meteorological circumstances and where the incident sound is considered, which means that no account is taken of the sound that is reflected at the façade of the dwelling under consideration.

⁹ World Health Organisation Geneva 1999. Guidelines for Community Noise.

¹⁰ <http://www.who.int/mediacentre/factsheets/fs258/en/>

Predicted Noise Level	Justification
	the new development should take this standard into account where practicable.
60 dB LA _{max}	In addition to the average noise level, WHO criteria propose a night-time limit for short-term peak noise at the façade of houses to prevent sleep disturbance.
30 dB LA _{eq} 1 hour	Critical noise level to prevent sleep disturbance inside bedrooms, based on WHO criteria.
45 dB LA _{max}	Critical noise level to prevent sleep disturbance inside bedrooms, based on WHO criteria.
Background sound level + 5dB	To assess the impacts of new commercial and retail development on noise sensitive receptors, based on BS 4142.
55 dB LA _{eq} T	During play for schools (including nursery school)

14.3 North Site (The Proposed Development (Detailed Application)) Assessment

14.3.1 The noise from the proposed North Site (Office HQ) has been assessed as part of the wider assessment of commercial and retail activities. This indicates that noise from proposed new activities and the erection of the north site Office HQ are unlikely to significantly affect existing noise sensitive receptors.¹¹

14.4 Masterplan Assessment (The Proposed Development (PPiP Masterplan))

Assumption and Limitations

14.4.1 The assessment considers how noise from road traffic may affect the Proposed Development and how the noise from commercial and retail activity may affect future residential uses. Two road traffic noise scenarios have been assessed:

- Scenario 1 – Baseline traffic 2019, based on the survey conditions reported by SWECO and DoT. The predictions from this Scenario have been compared to the measured baseline levels. This indicates that the model predictions are robust and slightly conservative; and
- Scenario 2 – Which considers the combined impacts from road traffic for the year 2026, with the scheme fully in place.

Baseline conditions

14.4.2 A baseline survey was conducted in October 2019 to quantify existing noise from road traffic. Two surveys were located at the Site Boundary adjacent to the M9 (baseline sites 1 and 2). A further survey was located adjacent to the A84 (baseline site 3). The locations of the baseline sites are shown in Figure 14.1. Further details on the baseline noise survey are presented in the Technical Noise Appendix in Volume 3.

14.4.3 The ambient noise levels at Baseline Sites 1 and 2, adjacent to the M9 are virtually identical throughout the 48 hours of the survey, where the noise from the motorway reduces at night and increases during the daytime. The baseline survey data is summarised in Table 14.5 below.

Table 14.5 Summary of Baseline Noise 2019 (Sites 1 – 3)

Site	Date Start	Date End	Duration (hours)	Daytime 07:00 – 23:00	Night-time 23:00 – 07:00

¹¹ The worst-case predicted daytime noise at the nearest dwelling is <35 dB LA_{eq} 1 hour.

1	28-Oct-2019	30-Oct-2019	48	71	67
2	28-Oct-2019	30-Oct-2019	48	70	66
3	29-Oct-2019	31-Oct-2019	12	71	N/A

N.B. Units = dB LAeq τ

Changes likely to occur over time in the absence of developing the project

- 14.4.4 The acoustic environment in the study area is unlikely to change significantly between 2020 and 2026.

Potential effects

- 14.4.5 The predicted daytime and night-time noise levels from road traffic with the scheme fully in place (Scenario 2) are plotted in Figures 14.2 and 14.3. These contours indicate the areas where noise from road traffic is likely to require mitigation. These predictions take account of the screening effect of local topography and the introduction of new buildings.
- 14.4.6 The contour plot shown in Figure 14.2 indicates that daytime noise is predicted to comply with WHO criteria for outdoor living areas at all proposed dwellings with private gardens. This assessment assumes that any outdoor living areas (including balconies) associated with the proposed apartments to the north will be confined to areas where the predicted daytime noise is <55 dB LAeq 07:00 – 23:00.
- 14.4.7 The daytime and night-time road traffic noise contour plots indicate that most of the residential area to the west of Craig Forth is unaffected by road traffic, with the exception of the most exposed the east and south-facing elevations. These contour plots are at a height of 1.5m above local ground level, so do not necessarily represent exposure at proposed dwellings above ground floor level. The extent of the areas where noise mitigation is required is presented in more detail in the Noise Technical Appendix in Volume 3.
- 14.4.8 A significant portion of the housing to the west of Craig Forth is affected by road traffic noise at first floor level. Some mitigation is therefore required at the proposed dwellings to ensure that noise levels inside dwellings are acceptable. This is likely to include the use of good quality double glazing and acoustic trickle vents.
- 14.4.9 The proposed apartments to the north flats are more affected by noise from road traffic and these apartments will also require acoustic insulation to ensure compliance with the noise criteria set out in Tables 14.3 and 14.4.

Noise from Commercial and Retail Activities

- 14.4.10 The predicted daytime noise from proposed commercial and retail activities is plotted in Figure 14.4. This indicates that noise from proposed new activities and the erection of the north site Office HQ are unlikely to significantly affect existing noise sensitive receptors.¹²
- 14.4.11 The noise contours shown in Figure 14.4 indicates that there a risk that some of the proposed apartments may be exposed to elevated noise from commercial activities. These potential impacts can be reduced by the design and layout of the scheme, including buffer zones with intervening less noise-generating activities, careful siting of noise generating activities, procurement specifications for fixed plant and restrictions in hours of operation. These measures shall be considered further at detailed planning stage.

Additional mitigation

- 14.4.12 The following measures are proposed to reduce impacts at new noise sensitive receptors:

¹² The worst-case predicted daytime noise at the nearest dwelling is <35 dB LAeq 1 hour.

Relocation of the proposed nurseway away from the M9 to ensure that the facility has suitable, quiet outdoor play areas. The careful layout of the Proposed Development to protect the amenity of proposed residential areas from road traffic noise, including the adoption of appropriate mitigation measures in housing layout where private gardens shall be located on the sheltered elevations of buildings, to protect residential amenity. This shall be considered further at detailed planning stage; The incorporation of acoustic insulation in proposed houses to ensure that noise levels from road traffic inside habitable rooms comply with the levels set out in Table 4 of BS 8233. This is likely to require closed windows with trickle vents on some exposed elevations. This shall be considered further at detailed planning stage; Conducting a further acoustic assessment at detailed design stage to include a review of the potential adverse impacts from commercial and retail activities on adjacent noise sensitive uses. This shall include a review of the design and layout of the scheme, with appropriate buffer zones, careful siting of noise generating activities, procurement specifications and where necessary, restrictions in hours of operation e.g. for deliveries to retail and commercial premises; and Procurement specifications for all fixed plant to ensure that noise from residential space heating systems (e.g. heat pumps) and commercial and retail activities does not exceed the background sound + 5dB and where all fixed plant is free from tonal, impulsive or intermittent characteristics.

Construction Noise

14.4.13 Noise during the demolition of existing buildings and construction has the potential to cause annoyance to existing noise sensitive receptors. The following procedures shall be adopted to ensure that noise impacts from construction operations are minimised, to protect local amenity: Prior to the commencement of each phase of demolition, site clearance and construction, the appointed contractors shall prepare a method statement. This shall include an assessment of potential noisy operations and outline the noise mitigation measures proposed. The construction noise impact assessment shall be used to help inform the development of the detailed construction methods; The contractors shall be required to select the quietest item of suitable plant available for all site operations. The work programme on site shall also be phased to reduce the combined impacts arising from several noisy construction operations, to reduce adverse impacts. Where practicable, noise from fixed plant and equipment shall be contained within suitable acoustic enclosures or behind acoustic screens; Any plant and equipment required for operation at night (23:00 – 07:00) e.g. for dewatering and security lighting shall be mains electric powered where practicable; The site contractors shall conduct all site operations in accordance with accredited documented procedures. This shall include a complaint investigation procedure; and All sub-contractors appointed by the main contractor shall be formally required through contract to comply with all noise conditions.

Residual effects

14.4.14 The noise from transport sources in the area designated for proposed residential use on the South Sub-Area (houses with private gardens) is predicted to be of slight adverse significance or less in terms of the Scottish Government's TAN assessment framework.

14.4.15 Noise from transport is predicted to exceed the WHO's 45 dB $L_{\text{night outside}}$ criterion across most of the proposed development site, when exposure at 1st floor level is considered.

14.4.16 Noise levels are predicted to comply with the WHO's outdoor living area criterion of 50 - 55 dB $L_{\text{Aeq 07:00 - 23:00}}$ across most of the proposed development site designated for residential use (other than apartments).

14.4.17 Noise shall be adopted to ensure that noise inside dwellings comply with the levels set out in Table 4 of BS 8233. This is likely to require closed windows and trickle vents on some exposed

elevations.

- 14.4.18 The noise from transport sources in the area designated for proposed apartments in the Central Sub-Area of the site is predicted to be of Major Adverse significance in terms of the Scottish Government's TAN assessment framework set out in Tables 14.1 and 14.2. The incorporation of appropriate acoustic mitigation including good quality glazing and acoustic trickle vents should ensure that noise levels inside dwellings are acceptable in terms of WHO noise criteria set out in Table 14.3.
- 14.4.19 Noise from transport is predicted to exceed with the WHO's 45 dB $L_{\text{night outside}}$ criterion at exposed elevations at some of the apartment blocks in the Central Sub-Area. The incorporation of appropriate acoustic mitigation including good quality glazing and acoustic trickle vents should ensure that noise levels inside dwellings are acceptable in terms of WHO sleep disturbance criteria set out in Table 14.3.
- 14.4.20 Noise levels are predicted to exceed the WHO's outdoor living area criterion of 50 - 55 dB LA_{eq} 07:00 – 23:00 at some of these proposed apartments. The proposed detailed design shall ensure that any outdoor living areas for apartments (including balconies) shall not exceed 55 dB LA_{eq} 07:00 – 23:00.
- 14.4.21 This assessment indicates that there is some limited potential for noise from commercial and retail activities to affect some of the nearest proposed residential apartments in the Central Sub-Area. The potential impacts will be considered at detailed design stage to protect residential amenity. This shall include a further assessment of background sound level in accordance with a protocol to be agreed with the local planning authority.
- 14.4.22 The proposed nursery will be located in an area where the ambient noise is predicted to be <55 dBA.

Cumulative effects

- 14.4.23 The Noise assessment considers the contribution from the combined impacts from local traffic growth and the proposed retail and commercial activities. The environmental noise impacts from the proposed scheme with the mitigation in place are of negligible or slight adverse significance.

14.5 Summary

- 14.5.1 Noise from the existing environment may affect future residents and other noise sensitive uses within the Proposed Development. The main noise sources are road traffic on the M9 and the A84. These noise sources have the potential to adversely affect the health and amenity of future residents within the Proposed Development. Baseline noise surveys have been conducted at three locations to help quantify existing ambient noise levels from road traffic. Noise from road traffic has been predicted in accordance with the Department of Transport approved method, Calculation of Road Traffic Noise, using a computer-based noise prediction model. Noise impacts have been assessed in accordance with the Scottish Government's Technical Advice Note (TAN) for Planning and Noise. The noise impacts from transport sources across the proposed development site are of slight adverse significance or less in terms of the Scottish Government's TAN assessment framework, subject to the effective implementation of the proposed mitigation. Noise from road traffic is likely to exceed the World Health Organisation's (WHO) 45 dB $L_{\text{night outside}}$ criterion across a substantial part of the South Sub-Area proposed for residential use, when exposure is considered at first floor level and above. Noise from road traffic is predicted to comply with the WHO's outdoor living area criterion of 50

- 55 dB LA_{eq} 07:00 – 23:00 across most of the land zoned for residential use, with the exception of the proposed apartments to the north of Craig Forth. Noise mitigation measures will need to be incorporated to ensure that noise inside dwellings complies with World Health Organisation Guidelines. This is likely to require the use of good quality double glazing with closed windows fitted with acoustic trickle vents.

14.5.2 Noise from the proposed commercial and retail uses in the Central Sub-Area has the potential to adversely affect proposed adjacent residential receptors in the South Sub-Area. These potential impacts will be considered further at detailed design stage.

14.5.3 The assessment identifies zones where mitigation measures are required to protect residential amenity. Mitigation measures will include: use of buffer areas to separate noise sensitive development from noisy activities, use of layout and design to reduce noise in private gardens, and use of acoustic glazing and acoustic trickle vents to ensure that noise inside dwellings will comply with appropriate criteria.

14.5.4 The proposed nursery will be located to ensure that the facility has a suitably quiet area for outdoor leaning and play.

14.6 References

14.6.1 Scottish Government 2011. Technical Advice Note. Assessment of Noise

14.6.2 Scottish Government 2011. Planning Advice Note 1/2011 Planning and Noise

14.6.3 IEMA 2014. (Version 1.2). Guidelines for Environmental Noise Impact Assessment.

14.6.4 Scottish Government 2011. Technical Advice Note Assessment of Noise

14.6.5 WHO 2018. Environmental Noise Guidelines for the European Region

14.6.6 Official Journal of the European Communities 25th June 2002. Directive 2002/49/EC of The European Parliament and of the Council of 25 June 2002 Relating To The Assessment And Management of Environmental Noise.

14.6.7 World Health Organisation Geneva 1999. Guidelines for Community Noise.

14.7 Assessor information

14.7.1 This noise assessment has been conducted by Steve Fraser BSc MPhil CEnv MICWM MIoA who has more than 35 years of professional experience as an environmental consultant, Environmental Health Officer and Environmental Protection Officer. The baseline surveys were conducted by Jon Champion BSc who has an Institute of Acoustics Certificate of Competence for Measurement of Environmental Noise and a Diploma in Acoustics and Noise Control with more than 10 years practical experience in noise survey fieldwork.

15 Air Quality

15.1 Introduction

- 15.1.1 The Proposed Development will generate additional road traffic associated with the proposed uses. A Transport Assessment (TA) has been conducted for the Proposed Development by SWECO, the transport consultants acting for the Applicant and the findings are reported in Chapter 13.
- 15.1.2 The scope of the TA and the extent of the study area were agreed between Stirling Council and SWECO. The TA included surveys and traffic simulation modelling for peak hour flows, to assess junction capacity. The road traffic flows from the TA have subsequently been extended to predict the 24 hour flows generated by the Proposed Development.
- 15.1.3 Preliminary consultation with Stirling Council has confirmed that the Council's Environmental Health Officers have advised the air quality impacts from the increase in road traffic generated by the Proposed Development should be considered as part of the Proposed Development (Detailed Application) and Proposed Development (PPiP Masterplan).
- 15.1.4 The TA indicates that the increase in 24 hour flows will exceed 500 Annual Average Daily Traffic (AADT) on the A84 to the east of the Proposed Development. An increase in road traffic >500 AADT is the threshold that normally triggers the requirement for a quantitative air quality impact assessment (AQIA) outwith an air quality management area (AQMA).¹ The baseline and Proposed Development flows within the study area are summarised in Table 15.1 below. This assessment compares the impacts from the Proposed Development against baseline flows for the year 2026.

Table 15.1 – Summary of Traffic Flows (Vehicles per 24 hour AADT 2026)

No.	Description	Baseline	Proposed	Increase
1	A84 west of Garden Centre	11342	11807	464
2	A84 east of Garden Centre	13391	15052	1661
3	A84 over M9	18216	22766	4550
4	M9 northbound On-Slip	4387	4449	62
5	M9 northbound Off-Slip	7471	9382	1910
6	M9 southbound Off-Slip	4465	4638	173
7	M9 southbound On-Slip	7847	9640	1793
8	A84 north of park and ride	16898	19567	2669
9	A84 south of park and ride	15807	18476	2669
10	M9 south of A84	38962	39135	173
12	M9 north of A84	38962	39024	62

Potential Adverse Effects

- 15.1.5 Air pollution from road traffic can affect human health through the inhalation of toxic gases and particles. The main pollutants of concern in the study area are likely to be long-term exposure to NO₂ and airborne particles e.g. PM₁₀ and PM_{2.5}.

¹ Institute of Air Quality Management, May 2017. Land-Use Planning & Development Control: Planning For Air Quality. This suggests that an AQIA should be conducted where traffic is predicted to increase by >500 AADT or by >100 within or adjacent to an AQMA.

Scope of Assessment

- 15.1.6 This Chapter considers the effects on local air quality of the increased traffic from the Proposed Development within the study area, based on the available traffic data. The aim is to assess the impacts of changes in traffic on existing and future local residents and other sensitive receptors within the study area. This Chapter presents the main findings of the AQIA. More detailed information of the AQIA is presented in a separate Technical Appendix in Appendix 15.4.
- 15.1.7 This assessment is principally concerned about potential impacts from road traffic emissions on local air quality. The potential air quality impacts of dust from groundworks and construction operations associated with the Proposed Development have not been assessed quantitatively. Mitigation measures to control potential adverse impacts during construction are set out in Appendix 2.

15.2 Assessment method

Air Quality and Land Use Planning

- 15.2.1 The Scottish Government has issued Guidance on how air quality issues should be considered within the planning system.² This emphasises that local authorities need to understand the links between air quality and land use planning policies if the planning system is to contribute to the improvement of air quality.
- 15.2.2 This Guidance should be considered in conjunction with Planning Advice Note (PAN) 51: Planning and Environmental Protection.³ PAN 51 advises on the policies and practices that should be adopted by planning authorities and others involved in planning new developments and redevelopments.

Environment Act 1995

- 15.2.3 Part IV of the Environment Act 1995 requires local authorities to review and assess local air quality. The local authority is obliged to take any potential exceedance of Air Quality Objectives into account. Where the Air Quality Objectives are likely to be exceeded then the relevant local authority must declare an Air Quality Management Area. Under the Guidance to local authorities published by the Scottish Government, local authorities are required to carry out a staged assessment of local air quality. The most recent Technical Guidance to local authorities for the review and assessment of air quality was issued in 2018.⁴ This Guidance (TG16) sets out the methods to be used to determine if the Air Quality Objectives are likely to be achieved.

Air Quality Objectives

- 15.2.4 The UK Government has published an Air Quality Strategy⁵ which sets out how the Government proposes to fulfil the UK's obligations under the Air Quality Directive. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland sets out the policy, targets and objectives for air pollutants. Further details on Scottish Government policy are set out in

² Scottish Executive 2004. Air Quality and Land Use Planning.

³ Scottish Executive 2006. Planning Advice Note 51 Planning and Environmental Protection

⁴ The Scottish Government 2018. Local Air Quality Management Technical Guidance (TG16).

⁵ DEFRA & Scottish Executive 2007. UK Air Quality Strategy Vols. 1 & 2

Policy Guidance.⁶ The Air Quality Limit Values (Scotland) Regulations⁷ set annual mean and short-term (99.79%ile) Limit Values for exposure to Nitrogen Dioxide (NO₂). The Scottish Government has enacted separate legislation which imposes stricter limits for exposure to particles. This imposes an annual mean objective of 18 ug/m³ for PM₁₀.⁸

- 15.2.5 The World Health Organisation (WHO) has published air quality guidelines for particles.⁹ This proposes guidelines and interim guidelines for a range of pollutants including PM₁₀ and PM_{2.5}, where the recommended annual mean exposure to PM₁₀ and PM_{2.5} is less than 20 ug/m³ and 10 ug/m³ respectively. These guidelines state that when assessing impacts from particles the use of PM_{2.5} is preferred, due to the effects of ultrafine particles on human health. The Scottish Government has set an annual mean objective of 10 ug/m³ for PM_{2.5}, based on the WHO guideline. The proposed regulatory change for PM₁₀ (increasing the annual mean objective from 18 ug/m³ to 20 ug/m³) has been delayed to allow for the establishment of a PM_{2.5} monitoring network.¹⁰
- 15.2.6 Stirling Council has conducted numerous reviews of air quality¹¹ and developed Action Plans which set out measures intended to help reduce air pollution from road traffic. There are no AQMAs within Stirling Council's area. There are no local authority air quality monitoring sites in the study area.¹²
- 15.2.7 The road traffic vehicle movements for the Proposed Development are predicted to exceed the Institute of Air Quality Management (IAQM) threshold that triggers the requirement for an AQIA along the A84 towards the A811. This report assesses the potential impacts within the study area for which road traffic estimates are available. The extent of the study area is shown in Figure 15.1.

Sensitive Receptors

- 15.2.8 Air Quality Objectives should apply to all locations where members of the public may be reasonably likely to be exposed to air pollution for the duration of the relevant objective. Thus, short term standards such as the 1 hour objective for NO₂ should apply to locations which may be frequented by the public even for a short period of time.
- 15.2.9 Longer term objectives such as the 24 hour or annual mean for NO₂ and PM₁₀ should apply only at houses or other sensitive locations which the public can be expected to occupy on a continuous basis. These objectives do not apply to exposure at the workplace.

IAQM/EPUK Guidance

- 15.2.10 The IAQM/EPUK Guidance¹ on the assessment of air quality impacts proposes an assessment framework for combustion air pollutants (including road traffic). These are described in Table 15.2 below. The IAQM Guidance recommends that PM_{2.5} should be used to assess the impacts from exposure to particulates rather than PM₁₀. This reflects the advice in the 2005 WHO Guidance discussed above.

⁶ Scottish Government March 2016. Policy Guidance PG(S) (16)

⁷ HMSO 2003. No. 428 ENVIRONMENTAL PROTECTION The Air Quality Limit Values (Scotland) Regulations 2003.

⁸ Scottish Statutory Instrument 2000 No. 97. Air Quality (Scotland) Regulations 2000 (as amended).

⁹ WHO Europe, 2005. Air Quality Guidelines

¹⁰ Scottish Statutory Instrument 2016 No. 162. Environmental Protection. The Air Quality (Scotland) Amendment Regulations 2016

¹¹ Stirling Council June 2019. Air Quality Annual Progress Report

¹² <http://www.scottishairquality.scot/latest/diffusion-sites> The nearest air quality monitoring sites are at the junction of Port Street/Dumbarton Road approximately 3km from the Proposed Development site and well outwith the agreed study area.

Assessment Criteria

- 15.2.11 The assessment criteria used in this study are set out in Table 15.2 below. These are based on UK statutory Limit Values and the current Scottish Objectives.

Table 15.2 – Summary of Assessment Criteria

Pollutant	Assessment Level	Justification
PM ₁₀	18 ug/m ³ annual mean	Scottish Air Quality Objective
PM _{2.5}	10 ug/m ³ annual mean	Scottish Air Quality Objective
NO ₂	40 ug/m ³ annual mean	UK Limit Value

- 15.2.12 The criteria used to assess the significance of the impacts are set out in Table 15.3 below. The significance criteria in Table 15.3 are for annual mean concentrations only. These assessment criteria are based on non-statutory professional Guidance.

Table 15.3 – Definition of Impact (EPUK IAQM 2017)

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

N.B. A predicted change of 0% (i.e. <0.5%) is considered to be of negligible significance.

15.3 North Site (The Proposed Development (Detailed Application)) Assessment

Assumption and Limitations

- 15.3.1 This assessment considers the baseline and cumulative impacts from all aspects of the Proposed Development including the North Site (The Proposed Development (Detailed Application)) and the overall Masterplan Site (The Proposed Development (PPiP Masterplan)). The air quality impacts from the North Site have therefore not been assessed separately. This approach is consistent with overall findings of the AQIA.

15.4 Masterplan Assessment (The Proposed Development (PPiP Masterplan))

Assumption and Limitations

- 15.4.1 The AIQA considers the baseline and Proposed Development conditions in the year 2026 as described in Chapter 13. Further details on the assessment methodology are presented in the Air Quality Technical Appendix.

Baseline conditions

- 15.4.2 Estimates of background pollution of particles (PM₁₀) and oxides of nitrogen (NO_x and NO₂) have been obtained from the Scottish Government sponsored air quality archive.¹³ The baseline data for PM_{2.5} are based on DEFRA estimates.¹⁴ Further details on baseline conditions are presented in the Air Quality Technical Appendix in Volume 3.

Changes likely to occur over time in the absence of developing the project

- 15.4.3 This assessment assumes that background air pollution levels within the study area will not reduce after 2020. This is intended to be pessimistic, to take account of uncertainties in future predictions of background air pollution. In practice it is likely that levels of air pollution from road traffic will decline due to the introduction of less polluting vehicles and the replacement of older more polluting road vehicles.

Potential effects

- 15.4.4 The two Scenarios used for prediction are Scenario 1 (Baseline 2026) and Scenario 2 (full Masterplan implementation). The predicted levels of NO₂ for Scenarios 1 and 2 are plotted in Figures 15.2 – 15.3 respectively. The annual mean NO₂ for Scenario 1 is predicted to range from 10 - 15 ug/m³ at receptors within the study area, where the highest predicted levels are at The River House Restaurant (R11), north of the A84 roundabout access to Castle Business Park. The predicted increase (Scenario 2) in NO₂ is 2% at this receptor location when compared to the statutory Limit Value of 40 ug/m³. The predicted increase in NO₂ is of negligible significance in terms of the IAQM assessment framework set out in Table 15.3. The NO₂ annual mean is predicted to comply with the statutory UK annual mean Limit Value at all sensitive receptors considered within the study area with the Proposed Development in place.
- 15.4.5 The annual mean PM₁₀ for the baseline is predicted to range from 11.2 – 12.0 ug/m³ within the study area, where the highest predicted levels are at The River House Restaurant (R11), north of the A84 roundabout access to Castle Business Park. The annual mean PM₁₀ is predicted to increase by 1% at this location when compared to the annual mean Objective of 18 ug/m³. The impact from the predicted change in PM₁₀ is of negligible significance at all receptors

¹³ <http://www.scottishairquality.scot/data/mapping?view=data>

¹⁴ <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017>

considered within the study area in terms of the IAQM assessment framework set out in Table 15.3.

- 15.4.6 The annual mean PM_{2.5} is predicted to increase by 1% at the worst case receptor. This is of negligible significance.

Assessment against Criteria

- 15.4.7 This assessment predicts air quality impacts using the detailed dispersion modelling methods set out in the current Technical Guidance. The worst case predicted levels within the study area are summarised in Table 15.4 below.

Table 15.4 – Predicted Air Pollution (worst case receptor)

Pollutant	2026 Baseline	2026 Proposed Development	Change	Significance
NO ₂	14.6	15.3	2%	Negligible
PM ₁₀	12.0	12.1	1%	Negligible
PM _{2.5}	6.4	6.5	1%	Negligible

N.B. Units = ug/m³ annual mean (includes 2020 background and 2020 emission factors)

- 15.4.8 The predicted impacts from exposure to NO₂ as a consequence of the Proposed Development are of negligible significance at all sensitive receptors considered within the study area in terms of the IAQM assessment framework set out in Table 15.3. The predicted levels of NO₂ are below the statutory UK annual mean Limit Value.
- 15.4.9 Impacts from exposure to particles as PM₁₀ and PM_{2.5} are predicted to be of negligible significance at all receptors considered within the study area in terms of the IAQM assessment framework set out in Table 15.3.

Additional mitigation

- 15.4.10 The methods for controlling dust impacts during construction are presented in the Air Quality Technical Appendix in Volume 3.

Residual effects

- 15.4.11 Air quality impacts from the Proposed Development are predicted to be of negligible significance.

Cumulative effects

- 15.4.12 The air quality assessment considers the contribution from the combined impacts from local traffic growth and other developments. The air quality impacts from cumulative impacts are predicted to be of negligible significance.

15.5 Summary

- 15.5.1 The overall Proposed Development will generate additional road traffic. A Transport Assessment (TA) has been conducted for the proposed Proposed Development by SWECO, the transport consultants acting for the Applicant, based on a study area agreed between Stirling Council and SWECO. The TA includes surveys and traffic simulation modelling. The TA indicates that the 24 hour flows will exceed 500 AADT on the A84 to the east of the Proposed Development. An increase in road traffic >500 AADT is the threshold that normally triggers the requirement for a quantitative AQIA. This assessment compares the impacts from the Proposed Development against baseline flows for the year 2026.

15.5.2 Air pollution from road traffic can affect human health through inhalation of toxic gases and particles. The main pollutants of concern in the study area are likely to be long-term exposure to NO₂ and airborne particles e.g. PM₁₀ and PM_{2.5}. An atmospheric dispersion model (ADMS Roads 5) has been used to predict levels of air pollution. Two road traffic Scenarios have been used to assess local air quality:

- Baseline traffic for 2026, based on the results of recent traffic surveys, factored for growth and including committed development from other Proposed Developments; and
- Baseline and Proposed Development for 2026 including the full implementation of the development traffic.

15.5.3 A model sensitivity analysis has been conducted to assess the significance of meteorological variability, surface roughness and Monin-Obuhkov (M-O) length. The worst case one year in five has been used to predict air quality impacts. The predictions assume no reduction in background air pollution or reductions in vehicle exhaust emissions after 2020 arising from the replacement of older, more polluting vehicles and are therefore likely to be pessimistic. Impacts have been assessed in accordance with the non-statutory guidance published by IAQM and EPUK.

15.5.4 The results from Stirling Council's continuous monitor at the Craigs roundabout in Stirling City Centre indicate that levels of NO₂ and PM₁₀ have been consistently below the UK's statutory annual mean Limit Value for NO₂ and that levels of PM₁₀ and PM_{2.5} have been consistently below the Scottish Government's annual mean Objectives for in recent years.

15.5.5 The predicted impacts from exposure to NO₂ as a consequence of the Proposed Development are of negligible significance at all sensitive receptors considered within the study area in terms of the IAQM/EPUK assessment framework. NO₂ in the study area is predicted to continue to remain below the UK's statutory annual mean Limit Value. The predicted impacts from exposure to particles as PM₁₀ and PM_{2.5} are of negligible significance at all receptors considered within the study area in terms of the IAQM/EPUK assessment framework.

Table 15.5 - Predicted Air Pollution 2026 (worst case receptor)

Pollutant	Baseline Scenario 1	Proposed Development Scenario 2	Change	Significance
NO ₂	14.6	15.3	2%	Negligible
PM ₁₀	12.0	12.1	1%	Negligible
PM _{2.5}	6.4	6.5	1%	Negligible

N.B. Units = ug/m³ annual mean (includes 2020 background and 2020 emission factors)

15.6 References

- 15.6.1 Institute of Air Quality Management, May 2017. Land-Use Planning & Development Control: Planning For Air Quality.
- 15.6.2 Scottish Executive 2006. Planning Advice Note 51 Planning and Environmental Protection
- 15.6.3 The Scottish Government 2018. Local Air Quality Management Technical Guidance (TG16).
- 15.6.4 DEFRA & Scottish Executive 2007. UK Air Quality Strategy Vols. 1 & 2
- 15.6.5 Scottish Government March 2016. Policy Guidance PG(S) (16)
- 15.6.6 HMSO 2003. No. 428 ENVIRONMENTAL PROTECTION The Air Quality Limit Values

(Scotland) Regulations 2003.

15.6.7 Scottish Statutory Instrument 2000 No. 97. Air Quality (Scotland) Regulations 2000 (as amended).

15.6.8 WHO Europe, 2005. Air Quality Guidelines

15.6.9 Scottish Statutory Instrument 2016 No. 162. Environmental Protection. The Air Quality (Scotland) Amendment Regulations 2016

15.6.10 Stirling Council June 2019. Air Quality Annual Progress Report

15.6.11 Scottish Executive 2004. Air Quality and Land Use Planning.

15.6.12 <http://www.scottishairquality.scot/latest/diffusion-sites>

15.6.13 <http://www.scottishairquality.scot/data/mapping?view=data>

15.6.14 <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017>

15.7 Assessor information

This assessment was conducted by Steve Fraser BSc MPhil CEnv MloA CIWM. Steve has more than three decades of experience in air quality impact assessment in the public and private sectors.

16 Socio-Economic Effects

16.1 Introduction

16.1.1 This chapter of the EIA Report has been produced by Savills to assess the potential socio-economic effects that the Proposed Development (Detailed Application) and the Proposed Development (PPiP Masterplan) could have upon existing population groups during the construction and operational phases.

16.2 Assessment Criteria & Methodology

Previous Assessment

16.2.1 There has been no previous assessment of socio-economic effects in relation to the Proposed Development.

Scoping Opinion

16.2.2 A scoping report was submitted to Stirling Council in December 2019. The scope of this assessment was included in the Scoping Report. The Scoping Opinion was received from Stirling Council on the 23rd of April 2020 and has been taken into account.

16.2.3 There were no responses relating directly to the proposed methodology for assessment of the socio-economic effects. However, the scoping opinion does suggest that the assessment of tourism effects and a separate health impact chapter would aid the application.

16.2.4 The Scoping Opinion highlighted that the tourism impact assessment should consider the direct and indirect effects on recreational interests and resources in the local area. The Proposed Development (PPiP Masterplan) includes tourism accommodation facilities and the Site contains local paths which the layouts of the Proposed Development (Detailed Application) and the Proposed Development (PPiP Masterplan) will need to encompass.

16.2.5 The Scoping Opinion also states that there would be merit in including a separate human health chapter to assess the Proposed Development's (PPiP Masterplan) effects on human health (see Chapter 17). This may draw upon the finding of the other technical assessments but should also include analysis relevant to the location and characteristics of the Proposed Development (PPiP Masterplan).

Legislative Context

16.2.6 There is no legislation specifically relevant to the socio-economic assessment.

Planning Policy and Guidance

16.2.7 There are a range of documents which are relevant to the undertaking of the socio-economic assessment at the Scottish and district-level. In particular:

- Scottish Planning Policy, 2014 (SPP)¹;
- Scotland's National Planning Framework 3, 2014 (NPF3)²;
- Draft Advice on Net Economic Benefit and Planning, 2016 (Draft NEBP)³;

¹ Scottish Government, (2014), 'Scottish Planning Policy', Available [online] at: <http://www.scotland.gov.uk/Resource/0045/00453827.pdf>

² Scottish Government, (2014), 'National Planning Framework 3', Available [online] at: <http://www.scotland.gov.uk/Publications/2014/06/3539>

³ Scottish Government, (2016), 'Draft Advice on Net Economic Benefit and Planning', Available [online] at:

<https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2016/03/draft-advice-on-net-economic-benefit-and-planning/documents/draft-advice-net-economic-benefit-planning-pdf/draft-advice-net-economic-benefit-planning-pdf/govscot%3Adocument/Draft%2BAdvice%2Bon%2BNet%2BEconomic%2BBenefit%2BAnd%2BPlanning.pdf>

- Tourism Development Framework for Scotland 2016-2020, 2016⁴;
- Stirling Local Development Plan, 2018 (LDP)⁵;
- Draft Supplementary Guidance – Developer Contributions, 2019 (Draft SGDC)⁶;
- Stirling’s Economic Strategy, 2014 (ECS)⁷;
- Stirling’s Education Improvement Plan 2019-2020, 2019⁸;
- NHS Forth Valley Healthcare Strategy 2016 – 2021, 2016⁹;
- Stirling’s Open Space Strategy, 2012¹⁰;
- The Tourism Strategy for Stirling, 2014¹¹; and,
- Stirling’s Housing Strategy, 2012¹².

Scottish Planning Policy

Scottish Planning Policy (SPP, 2014)

16.2.8 SPP sets out the national planning policies which reflect the Scottish Government’s priorities for the operation of the planning system, development, and land-use. The SPP sets out the core values of the Scottish planning system, which are to:

- focus on outcomes, maximising benefits and balancing competing interests;
- play a key role in facilitating sustainable economic growth, particularly the creation of new jobs and the strengthening of economic capacity and resilience within communities;
- be plan-led, with plans being up-to-date and relevant;
- make decisions in a timely, transparent and fair way to provide a supportive business environment and engender public confidence in the system;
- be inclusive, engaging all interests as early and effectively as possible;
- be proportionate, only imposing conditions and obligations where necessary; and
- uphold the law and enforce the terms of decisions made.

16.2.9 SPP lists a number of principles that the Scottish planning system should follow including:

- giving due weight to net economic benefit;
- responding to economic issues, challenges and opportunities, as outlined in local economic strategies;
- supporting good design and the six qualities of successful places;
- making efficient use of existing capacities of land, buildings and infrastructure including supporting town centre and regeneration priorities;
- supporting delivery of accessible housing, business, retailing and leisure development;
- improving health and well-being by offering opportunities for social interaction and

4 Visit Scotland, 2016, Tourism Development Framework for Scotland, Available [online] at: <https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/policies/tourism-development-framework-dec16.pdf>

5 Stirling Council, 2018, Local Development Plan 2018.

6 Stirling Council, 2019, Draft Supplementary Guidance – Developer Contributions.

7 Stirling Council, 2014, Stirling’s Economic Strategy, Available [online] at: <https://www.stirling.gov.uk/media/4461/stirlingseconomicstrategy.pdf>

8 Stirling Council, 2019, Schools, Learning and Education Improvement Plan 2019/2020, Available [online] at: <https://www.stirling.gov.uk/media/10943/educationimprovementplan20192020.pdf>

9 NHS Forth Valley, 2016, Healthcare Strategy 2016-2021, Available [online] at: <https://nhsforthvalley.com/wp-content/uploads/2014/06/NHS-Forth-Valley-Healthcare-Strategy-2016-21.pdf>

10 Stirling Council, 2012, Open Space Strategy.

11 Stirling Council, 2014, Tourism Strategy for Stirling.

12 Stirling Council, 2012, Stirling’s Housing Strategy.

physical activity, including sport and recreation.

16.2.10 SPP contains a number of key policy subjects which are relevant to the socio-economic impact of the proposals at Craigforth including:

- Supporting Business and Employment (p24);
- Enabling Delivery of New Homes (p27);
- Valuing the Natural Environment (p45);
- Maximising the Benefits of Green Infrastructure (p50);
- Promoting Sustainable Transport and Active Travel (p61).

16.2.11 SPP underlines its ambitions for sustainable economic growth with its overarching policy relating to sustainability. This is in favour of development that contributes to sustainable development, stating that: *“The planning system should support economically, environmentally and socially sustainable places by enabling development that balances the costs and benefits of a proposal over the longer term. The aim is to achieve the right development in the right place”* (p9).

Scotland’s National Planning Framework 3 (NPF3, 2014)

16.2.12 NPF3 provides a framework for planning and development in Scotland by setting out the Scottish Government’s development priorities for the next 20-30 years. NPF3 also identifies key areas for sustainable development growth and regeneration. The framework aims to achieve sustainable development growth through the following broad ambitions. These include making Scotland:

- a successful, sustainable place;
- a low carbon place;
- a natural, resilient place;
- a connected place.

16.2.13 Cities are highlighted as a focal point for investment in the framework’s spatial priorities for change. Stirling is mentioned specifically in this section. The vision focuses on making Stirling a location of choice with a vibrant and growing economy with job opportunities for all. NPF3s spatial priorities also intend for Stirling to be a place that provides a high quality of life for its residents.

Draft Advice on Net Economic Benefit and Planning (2016)

16.2.14 The Draft NEBP was published by the Scottish Government in March 2016. Whilst it has never been formally approved, the advice remains in place in draft form and has not been withdrawn. The Draft NEBP encourages developers and planning authorities to recognise the potential economic effects of development. The Draft NEBP states that the key criterion in assessing the economic impact of development is the assessment of the net economic benefit. The net economic benefit of a development is the difference between the economic effects of a development in a scenario where it proceeds compared to the “do nothing scenario” in which it does not.

16.2.15 The Draft NEBP states that where socio-economic baseline information suggests that economic benefit is particularly needed in the community/communities affected by a development, the economic impact on them should be given significant weight in the decision making process.

Tourism Development Framework for Scotland 2016-2020 (2016)

16.2.16 The development framework aims to support sustainable growth within the tourism economy in Scotland. It provides guidance for local authorities to help develop their own strategies. The development framework operates in combination with the Tourism Scotland 2020 strategy which “*highlights the need to secure growth through turning Scotland’s tourism assets into authentic experiences which cannot be easily replicated by Scotland’s competitors*” (p.8)¹³.

Stirling Council Planning Policy

Stirling Local Development Plan (2018)

16.2.17 The Stirling Local Development Plan (LDP) was adopted in October 2018 and sets out the Council’s view on how the Study Area should be developed from the LDPs adoption to 2027 and beyond to 2037. Stirling Council support sustainable economic growth.

16.2.18 The overarching policy of the LDP is to ensure development is of good quality, is in the right place and that it meets the social and economic needs of the community around it. All development is required to demonstrate the following:

- Compatibility with the Spatial Strategy and conformity with the relevant Sustainable Development Criteria.
- A design-led approach, including high standards of design, reinforcement of a sense of place, integration with neighbouring areas and the wider community.
- Appropriate measures for mitigation of and adaption to climate change.
- Appropriate measures for the safeguarding, conservation, and enhancement of the historic and natural environment.
- Safeguarding and appropriate management and utilisation of natural resources.
- Adherence to the principles of the National Planning Framework proposal for a Central Scotland Green Network, with relevant contributions to local and national Green Network objectives.

16.2.19 The LDP highlights how Stirling Council aims to increase its contribution to the Scottish economy by creating high quality jobs and encouraging a wider range of employment opportunities.

16.2.20 Policy 2.5: Employment Development, states that the Stirling Council supports development for business space if it is located within an allocated employment site. This is to help provide a good choice and mix of employment space which can support vibrant and prosperous communities.

16.2.21 Policy 2.6: Supporting Town Centres describes how city and local centres will be the preferred locations for uses that create significant footfall like community and public buildings including educational and healthcare facilities.

¹³ Visit Scotland, 2016. Tourism Development Framework for Scotland 2016-2020 Accessed 16/06/20. From: <https://www.visitscotland.org/about-us/what-we-do/our-plans/tourism-development-framework>

- 16.2.22 Policy 3.3: Developer Contributions, asserts that where a development creates need for new public infrastructure developer contributions will be sought. This will be determined through consideration of existing capacity and also cumulative development pressures arising from other proposals in the LDP. If a contribution is necessary it will be a fair and reasonable contribution (financial or 'in kind'), which will be proportionate to the scale and nature of the development.
- 16.2.23 Policy 3.3 (d)(ii) states that developers will, if necessary, be required to make a contribution to ensure that there is adequate provision of primary and secondary places in the local education facilities. The amount of provision should be sufficient to accommodate the effects of the Proposed Development and cumulative developments.
- 16.2.24 Stirling Council is taking a more strategic, long term approach to the planning of education facilities. This is to avoid education effects being assessed on an application by application or 'first come first served' basis. This approach allows for the consideration of cumulative effects arising from all planned development within the respective school catchment areas.
- 16.2.25 Policy 3.3 (d)(v) refers to healthcare provision contributions and states that developers will be required to make a fair and reasonable contribution specific to the requirements of the new development if necessary. This could be equivalent to the cost of expanded or new healthcare facilities if it is required.
- 16.2.26 According to the LDP Policy 3.3 (d)(iv) contributions to offsite provision will only be sought where onsite provision is not appropriate.
- 16.2.27 The LDP also states that all open spaces should be considered and designed in a manner to create safe, accessible, inclusive places, which are easily navigable, particularly by active or public transport. Policy 1.3: Green Infrastructure and Open Space states that development proposals are assessed on their impact on and potential to contribute to Green Networks and open space. This includes the safeguarding of existing provision and creation of new space. New development should, where necessary, incorporate an appropriate amount of accessible multifunctional open space of the required quality to meet the needs arising from the nature of the development itself.
- 16.2.28 Primary Policy 15: Tourism and Recreational Development, highlights how tourism activities provide a significant contribution to the economy of Stirling. Policies 15.1(a)(i-iv): Tourism Development including facilities and accommodation, states that tourism developments including facilities and accommodation will be supported if they:
- Are commensurate in scale with their location and setting within the built and natural environment;
 - Complement existing tourist facilities and help facilitate the sustainable movement of tourists at or between major tourist destinations;
 - Promote a wider spread of visitors and therefore economic benefits; and
 - Promote responsible access to, interpretation of, and effective management and enhancement of the natural and historic environment, and cultural heritage.
- 16.2.29 Additionally, Policy 15.1(b)(i), states that proposals for chalet developments will be supported where the landscape can accommodate such development without it being visually prominent.

Stirling Council Draft Supplementary Guidance – Developer Contributions (2019)

- 16.2.30 The Draft Supplementary Guidance (SG) states that modelling of the planned growth in the Core Education Area, which based on the 2018 Housing Land Audit, shows that additional school capacity will be required to accommodate the expected number of pupils. This will include new high school capacity, 1 new double stream primary school and 2 new single stream primary schools alongside some smaller scale extensions and improvements to existing facilities.
- 16.2.31 All developments (apart from those listed as exempt) applying for planning permission will be expected to pay a contribution for the provision of education capacity within their respective catchments where it is shown that, cumulatively, new development will result in a school or schools being over their working capacity. A contribution will be required where the school roll, as a direct result of cumulative impact of development within each catchment, is forecast to exceed 87% of the school capacity.
- 16.2.32 Primary pupil yields based on age of homes are estimated by the Council in the SG. For new developments where houses are under 10 years old the primary school pupil yield is expected to be 0.28 pupils per home. This shrinks to 0.13 pupils per home for houses aged 10-20 years and is 0.17 for houses over 20 years.
- 16.2.33 Secondary pupil yields are also suggested by the SG. For new developments where houses are less than 10 years old the pupil yield per home is 0.12. For homes aged 10-20 years it is 0.23 and for houses over 20 years old the pupil yield is estimated to be 0.16 per house. This takes into account that whilst most developments are built out within 10 years, some will take longer and evidence shows that the pupil yield value varies with time.
- 16.2.34 According to the SG, the NHS is aware that it cannot accommodate the demand from the future development identified within the LDP. The NHS will likely mean to plan strategically within Stirling. This could result in the creation of one new larger facility at one location and the extension of smaller existing health centres. This is similar to the experiences of other areas. The Proposed Development (Detailed Application) and the Proposed Development (PPIp Masterplan) at Craigforth are not in the catchment where an automatic contribution per new house is required.
- 16.2.35 The NHS recommends that the maximum patients per Working Time Equivalent (WTE) GP should be 1,700. This figure can be used as a benchmark to estimate the capacity of the healthcare estate.

Stirling's Economic Strategy, (2014)

- 16.2.36 Stirling's Economic Strategy was published in 2014 and outlines the current economic situation in Stirling and the council's ambition to attract higher investment to support more and higher quality jobs in the years ahead. The economic strategy incorporates five main themes that are:
- investment in infrastructure;
 - skills development; business support;
 - rural development; and
 - the promotion of Stirling's advantage as a world class location in which to work, live, learn and visit.

16.2.37 Stirling's Economic Strategy recognises that the creation of new business space has an important role to play in Stirling's future. Stirling states that that availability of appropriate, modern, and affordable business space is crucial for sustaining and growing the local economy. The strategy includes aspirational activities to support successful businesses.

Stirling's Education Improvement Plan 2019-2020, (2019)

16.2.38 Stirling's Education Improvement Plan 2019-2020 sets out how improvement in schools will be taken forward. The Education Improvement Plan intends to satisfy the priorities set by the National Improvement Framework and Improvement Plan (NIF) which are to improve: school attainment, inequality, young people's health and employability skills¹⁴. Stirling Council states it is ambitious for the future and is working to improve outcomes for children and young people in Stirling in the context of increasing demand, reducing budgets and a predicted increase in child poverty. The Education Improvement Plan notes that despite being an overall affluent area, significant education inequalities do exist within Stirling. This is alongside the existence of key contrasts between the urban and rural settings. Stirling Council state that tax and benefit reforms have started to have an adverse effect on low income households with children, with the cost of living and basic essentials rising much faster than benefit rates. The Education Improvement Plan 2019-2020 is in part informed by the Standards and Quality Report 2018/19¹⁵.

NHS Forth Valley Healthcare Strategy 2016 – 2021, (2016)

16.2.39 There are two Health and Social Care Partnerships in the Forth Valley area - one covering Falkirk and the other covering Clackmannanshire and Stirling. These Partnerships provide an opportunity to strengthen relationships between local health and social work staff and ensure services are better co-ordinated and more joined-up in the future. The Healthcare strategy intends to establish a number of local community 'hubs' which will provide a range of health and social care services. The Healthcare Strategy also aims to ensure that the required workforce with the correct skills to deliver the very best services are attracted to retained within the Forth Valley to meet the future needs of patients and their families¹⁶.

Stirling's Open Space Strategy, (2012)

16.2.40 Scottish Planning Policy (SPP) 2010 requires Planning Authorities to take a strategic and long-term approach to managing open space within their area and recommends that an Open Space Strategy should be prepared based on an audit of existing open space provision examining Quantity, Quality and Accessibility of open space. Stirling's Open Space Strategy was agreed to be adopted in 2012 and supplemented by the Green Network Supplementary Guidance SG02 in 2014. The Green Network guidance aims to promote and achieve the delivery of quality, sustainable, new development by prioritising good urban design and by supporting the creation of functional, quality and well used green networks and open space¹⁷.

14 Scottish Government, 2015. National Improvement Framework and Improvement Plan. Accessed: 15/06/2020 from: <https://education.gov.scot/parentzone/learning-in-scotland/national-improvement-framework/>

15 Stirling Council, 2019. Schools Learning and Education – Standards and Quality Report 2018/19. Accessed: 15/06/2020 from: <https://www.stirling.gov.uk/media/21055/standardsandqualityreport20182019.pdf>

16 NHS Forth Valley, 2016. Shaping the Future – NHS Forth Valley Healthcare Strategy 2016-2021. Accessed: 15/06/2020 from: <https://nhsforthvalley.com/wp-content/uploads/2014/06/NHS-Forth-Valley-Healthcare-Strategy-2016-21.pdf>

17 Stirling Council. 2014, Supplementary Guidance SG02 – Green network. Accessed: 15/06/20 From: <https://www.stirling.gov.uk/media/21085/sg02-stirlings-green-network-and-appendix.pdf>

The Tourism Strategy for Stirling, (2014)

16.2.41 Visitors are attracted to Stirling by its renowned heritage, historic built environment, and natural landscapes. The Tourism Strategy for Stirling identifies that tourism is a key business sector for the area. In 2014 tourism contributed over £400 million to the local economy which is approximately 15% of the Study Area's GDP. Tourism in Stirling also supported a wide range of jobs through the wider supply chain. In this way the Tourism Strategy for Stirling links with Stirling's Economic Strategy and seeks to help grow Stirling's economy by building on areas of competitive advantage and by creating investment opportunities. The vision for Stirling is to make the area a destination of choice for high quality, value for money, authentic experiences. The Tourism Strategy for Stirling highlights that to achieve its vision and strategic objectives for Stirling's tourism industry, a collaborative approach between the public and private sectors is required. The Tourism Strategy for Stirling is also accompanied by an area action plan that was led by Destination Stirling.

Stirling's Local Housing Strategy, (2012)

16.2.42 Stirling's Local Housing Strategy was updated in April 2012. Stirling's housing stock, in 2012, was just over 39,000 houses of which 67% were owner occupied, 19% were rented either from Stirling Council or a registered social landlord and 14% were in the private rented sector. In 2012 there was an acute crisis regarding affordable housing quality in Stirling. The housing strategy reports that there were 6,600 households in need due to issues like: homelessness, overcrowding, poor condition, support requirements and harassment.

16.2.43 The Local Housing Strategy identifies that there was a need for around 310 market homes per year. The strategy set the target to build 328 new market houses per annum in the Stirling LDP area. The strategy set the housing supply target for affordable housing at 88 units per annum.

Emerging Planning Policy

16.2.44 The Council is currently developing the next Local Housing Strategy. Consultations were held in 2019.

Best Practice Guidance

Assessment of Potential Economic Effects

16.2.45 There are a number of different methods for assessing the potential economic effects of proposed development interventions. Differences in approach include variation in terminology, the factors considered in calculating additionality, the treatment of deadweight and methods for estimating gross value added (GVA). The method used in this assessment is broadly consistent with best practice guidance including the UK's 'DCLG Appraisal Guide', 2016, Scottish Enterprise evaluation and appraisal guidance¹⁸, and the UK Homes & Communities Agency (HCA) Additionality Guide¹⁹.

Assessment Methodology

16.2.46 This section presents the approach to the assessment of the socio-economic effects of the Proposed Development, in line with the Scoping Opinion and the requirements of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

¹⁸ Scottish Enterprise – Additionality & Economic Impact Assessment Guidance Note: A Summary Guide to Assessing the Additional Benefit, or Additionality, of an Economic Development Project or Programme, 2008

¹⁹ UK Homes & Communities Agency – Additionality Guide, Fourth Edition, 2014.

Significance Criteria

16.2.47 The assessment intends to be objective and to quantify effects, where possible. Where quantification is not possible, qualitative assessments will be made based on professional judgement and will be justified. The relative significance of an effect is largely a product of the sensitivity of the identified receptor and the magnitude and duration of the impact.

16.2.48 **Table 16.1** identifies the receptors and details their assessed sensitivity. The assessment of receptor sensitivity is based on the Baseline Assessment in the following section. A receptor's sensitivity can be described as either; High, Medium, Low or Negligible,

Table 16.1 Receptor Sensitivity

Receptor	Receptor Sensitivity	Commentary
Residents in Stirling that could benefit from the direct, indirect and induced employment generated by demolition and construction activity.	Low	<p>General unemployment is marginally higher in Stirling compared to the Scottish average but lower than that of Great Britain.</p> <p>Stirling's construction industry is in terms of employees a proportionately similar size to the rest of Scotland but is proportionally larger than the construction industry in Great Britain.</p> <p>The construction industry can be expected to grow in the future as the demand is forecast to increase.</p>
Residents in Stirling that could benefit from the direct, indirect and induced employment generated by the new businesses locating onsite during operation.	Low	<p>General unemployment is marginally higher in Stirling compared to the Scottish average but lower than that of the United Kingdom.</p> <p>The industry sectors most closely associated with the office development in the North Site are proportionately larger, in terms of employees, the same sectors in Scotland and Great Britain. Similarly, the Arts, Entertainment and Recreation sector in Stirling is proportionally larger than in Scotland and Great Britain.</p>
Residents in Stirling that could benefit from the effects on Gross Value Added as a result of additional economic activity in various employment sectors	Low	<p>Receptor deemed to have low sensitivity because Stirling's economy is performing well and is one of the fastest growing in Scotland. Measured by GVA per head it is more productive than the Scottish average.</p>
Residents in Stirling that could benefit from the wider economic effects including effects on businesses and spending arising from employees and households;	Medium	<p>Despite being an overall affluent area levels of inequality, deprivation and unemployment do exist within Stirling. General unemployment is marginally higher in Stirling compared to the Scottish average. The Proposed Developments are situated close to Raploch which is one of the most deprived areas in Scotland.</p>
Residents in the Survey Area using or planning to use GP Services.	Low	<p>Stirling's population forecast to age meaning increased pressure on local GP practices. However, there is currently significant spare capacity within the GP practices in the Survey Area.</p>
Residents in the Survey Area using or planning to use primary schools.	Low	<p>There is significant spare capacity in the primary schools located within the Survey Area.</p>
Residents in the Survey Area using or planning to use secondary schools.	Low	<p>There is significant spare capacity in the secondary schools located within the Survey Area.</p>

Residents in the Survey Area using or planning to use open spaces or child play spaces.	Medium	Many open and play spaces exist in the Survey Area and the Site is immediately next to Ben Craigforth and other non-designated open spaces. However, there are no existing designated green or play spaces close to the Site.
Tourist facilities which may be effected by the economic activity created by the development or its visual impact.	Low	The tourism industry is an important contributor to Stirling's economy. The Tourism industry is well established and is, in terms of employees, proportionately larger in Stirling than in the rest of Scotland and Great Britain. There are a large number of tourist attractions and accommodation facilities within the Survey Area.

16.2.49 Assessment of the magnitude of an effect is based on its scale and duration. In this assessment, effects are either beneficial or adverse in nature and their magnitude is described as either; High, Medium, Low or Negligible. Regarding the duration of an effect, if an effect is associated with the Site preparation and construction phase of the Proposed Development then the duration is described as short to medium-term. If an effect is associated with the completed Proposed Development and its operation, then the effect duration is considered long-term. **Table 16.2** below describes the magnitude of effects.

Table 16.2 Magnitude of Effect

Magnitude	Description
High	These effects are likely to be important considerations at a regional or district scale but, if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision making process.
Medium	These effects, while important at a local scale, are not likely to be key decision making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.
Low	These effects may be raised as local issues but are unlikely to be of importance in the decision making process. Nevertheless, they are of relevance in the detailed design of the project.
Negligible	Effects which are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

16.2.50 Assessment of the significance of effects is based upon the assessment of the magnitude of the effect and sensitivity of the receptor. Effects are defined as either:

- Beneficial – An advantageous effect on the impact area;
- Negligible – An imperceptible effect on the impact area; and
- Adverse – Detrimental effect on the impact area.

16.2.51 Beneficial and adverse effects are based on a standard set of significance criteria defined as follows:

- Major;
- Moderate;
- Minor; or
- Negligible.

16.2.52 The combination of receptor sensitivity and magnitude of an effect can be considered using the matrix in **Table 16.3** below to determine the significance of an effect.

16.2.53 The assessed significance of an effect is relative to the receptor affected, the scale of the effect and contextual factors. For example, employment generation of 100 new jobs could be considered to have a major beneficial effect in a settlement of 1,000 residents, but it would be relatively smaller effect in a larger settlement of 100,000 residents.

Table 16.3 Significance of Effect

Receptor Sensitivity	Magnitude of Effect			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

16.2.54 Major effects are considered to be significant in terms of this EIA, with other types of effects considered insignificant.

Geographical Scope

Impact Areas

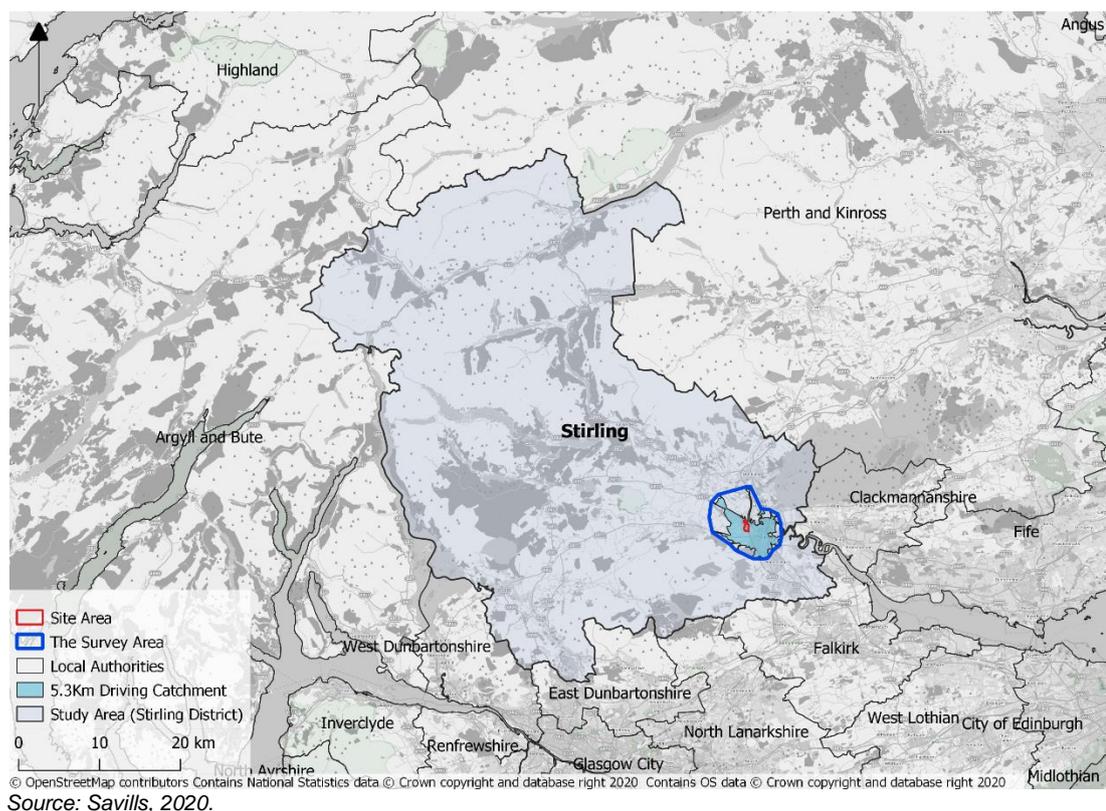
16.2.55 The concept of a primary area of influence and study area is standard in socio-economic assessment practice, however there is no standard approach in defining it. For socio-economic impact assessments this is further complicated by the mobility and network of potential receptors.

16.2.56 The geographical scope of this assessment varies for particular aspects of socio-economic impact analysis. This study involves two impact areas at two different geographical scales to which the socio-economic effects of the Proposed Development (Detailed Application) and the Proposed Development (PPiP Masterplan) are assessed. The two different areas are referred to as:

- The Study Area.
- The Survey Area.

16.2.57 The Study Area represents the Stirling Council area as shown in **Figure 16.1** and is the level to which the economic effects are assessed as this is the area to which employment and GVA effects are accrued.

Figure 16.1 The Study Area



16.2.58 The Survey Area is the primary impact area and denotes the lowest level to which effects are assessed. The Survey Area is used to assess the social effects of the Proposed Development including the effects on the social infrastructure receptors like: education, health and open space provision.

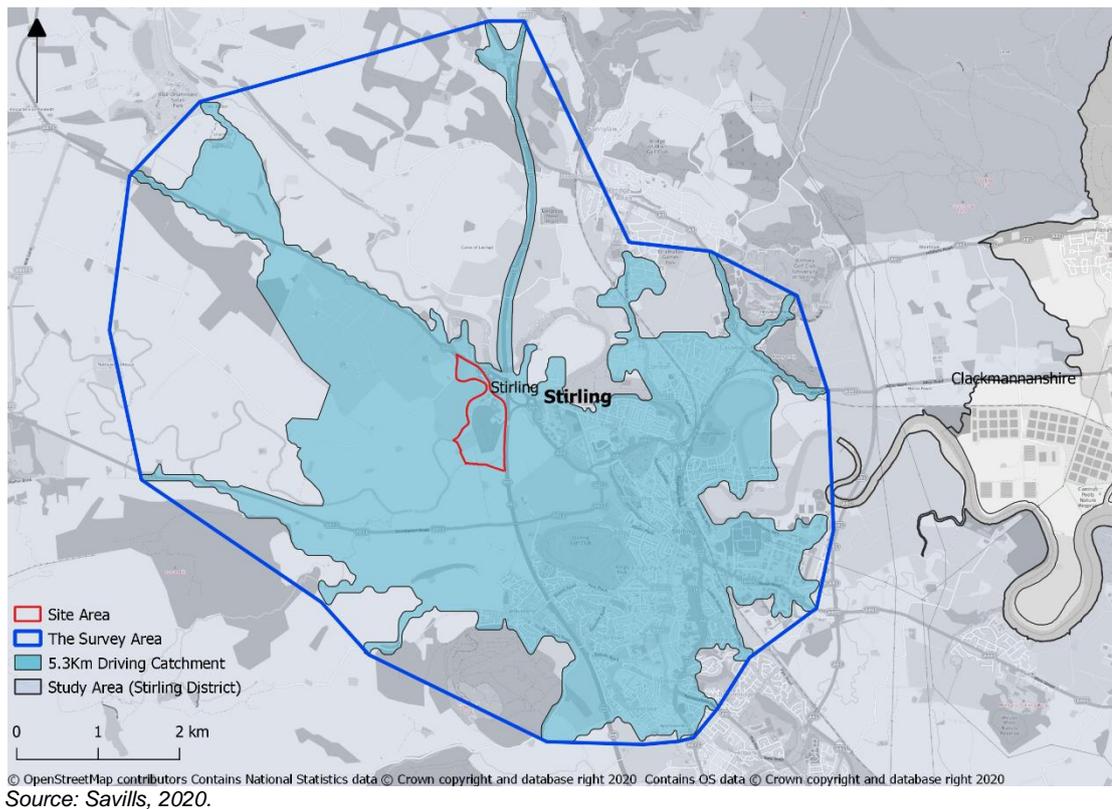
16.2.59 The Survey Area is a smaller geographical area than the Study Area and is founded on a 5.3km driving distance from the access point of the Site. The 5.3km distance is based on the average commute for primary and secondary education and shopping in Scotland²⁰. This distance is equivalent to a 8-12 minute drive or approximately a 60 minute walk. **Figure 16.2** demonstrates the Survey Area.

16.2.60 The Survey Area incorporates parts of Stirling including the city centre. The Survey Area takes into account the natural and man-made barriers that act as constraints and would limit access for future residents. Specifically, these barriers include the River Forth to the west and north, the A84 to the north and the M9 to the east.

16.2.61 The Survey Area will also be used as the area of assessment to assess the effects on the local tourism industry receptors.

²⁰ Scottish Government, 2008. National Travel Survey – Scottish Results

Figure 16.2 The Survey Area



16.2.62 In this assessment the regional and national levels are also referenced to provide socio-economic context. In this assessment Scotland represents the regional level and Great Britain the national level.

Baseline Data Collection

16.2.63 The baseline conditions of the Study Area are established and compared to the wider sub-regional and national conditions for context when applicable. This considers recent and future trends for socio-economic indicators including the demographic profile, employment structure, housing delivery and economic performance. The baseline conditions of the Survey Area are also established including the utilisation of social infrastructure and characteristics of the local tourism industry.

16.2.64 Baseline data on the socio-economic conditions has been collated from the planning policy and guidance documents stated in the above section, and a variety of publicly available sources including:

- Scotland's Census (2001) and (2011);
- Scottish Government Statistics;
- NOMIS Labour market statistics;
- Scottish Annual Business Statistics;
- The Scottish Index of Multiple Deprivation;
- National Planning Framework;
- National Record for Scotland;
- National Travel Survey, Scotland;
- Stirling Council;
- NHS Digital (2020);
- CoStar (2020);
- Visit Britain (2020);

Assumptions & Limitations

16.2.65 By the nature of the methodology, estimates of change in the socio-economic elements such as economic and employment effects are subject to uncertainty. The estimates in this chapter are based on good practice, but there is a degree of uncertainty around estimates.

16.2.66 Actual effects are likely to be in a range of +/- 20% of figures given to account for this uncertainty, as is standard practice with such matters. The assessment of spare capacity in social infrastructure is relatively high level, which is a reflection of the data available.

16.2.67 The analysis presented in this report was prepared during the Coronavirus crisis. The analysis and conclusions should be considered as potentially relevant to the situation once the UK economy has recovered from the most significant effects of Coronavirus. However, it is too early to estimate how the crisis will impact on trends and, for example, how strong the rebound will be and to what degree there is a change in the composition of demand and activities in the post Coronavirus crisis world. Our findings should be kept under review as the situation evolves.

Consultation

16.2.68 A Scoping Report was submitted to Stirling Council in December 2019. Queries and comments received have been taken into account. The Scoping Opinion stated that the EIA should address the consequences of the Proposed Development for users of the countryside and its direct and indirect effects on tourism and recreational interests and resources in the vicinity.

16.2.69 No community consultation has been undertaken to inform the socio-economic impact assessment. As agreed in the scoping exercise, the assessment of the socio-economic effects is a desktop operation.

Scoped Out Effects

16.2.70 The potential for on Site business operations to be adversely affected by construction traffic will be considered as part of the assessment of transport effects. In general, it is considered that disruption during construction will be controlled and managed through implementation of the Construction and Environment Management Plan.

16.3 Baseline Assessment

16.3.1 The baseline assessment sets out the characteristics of the local economy and workforce in the Study Area including; economic activity, unemployment rates, skills and qualifications and occupation profile. The baseline assessment also assesses the characteristics of the existing population e.g. age, household composition, and levels of deprivation.

16.3.2 The baseline includes information about the economic and population receptors identified in the previous section, as well as existing relevant infrastructure serving them. The baseline conditions have been established by undertaking a policy review to provide an outline of the relevant local and regional, social and economic policies for the area, and, through a desk-top review of the current social and economic conditions prevalent in the local area.

16.3.3 In addition to the economic and population metrics, the baseline also considers the current provision of community facilities required by the population in the Survey Area, such as capacity of primary and secondary schools, GPs and the provision of open space.

16.3.4 In summary, the baseline is structured around the following subjects. These provide the context for the impact assessment:

- Population demographics;
- Economic profile;
- Deprivation;
- Housing need; and
- Social infrastructure (pre-schools, primary and secondary schools, GPs, dentists, open space and community centres).

Local Population

16.3.5 **Figure 16.3** below shows that in 2019, the population of Stirling was 94,210. This is a decrease of 0.1% from 94,330 in 2018. Over the same period, the population of Scotland increased by 0.5%. Between 1998 and 2019, the population of Stirling has overall increased by 11.3%. This is the 10th highest percentage change out of the 32 council areas in Scotland. Over the same period, Scotland's population rose by 7.6%²¹.

²¹ National Record of Scotland, (2020) Stirling Council Profile. Accessed 28/05/20 from: <https://www.nrscotland.gov.uk/files/statistics/council-area-data-sheets/stirling-council-profile.html>

Figure 16.3 Population Growth in Stirling 1998-2019



Source: NRSScotland, 2020.

16.3.6 Between 2018 and 2028, the population of Stirling is projected to increase from 94,330 to 98,836. This is an increase of 4.8%, which compares to a projected increase of 1.8% for Scotland as a whole. This means Stirling is projected to have the 6th highest population growth rate out of the 32 council areas in Scotland between 2019 and 2028.

Local Population Demographics

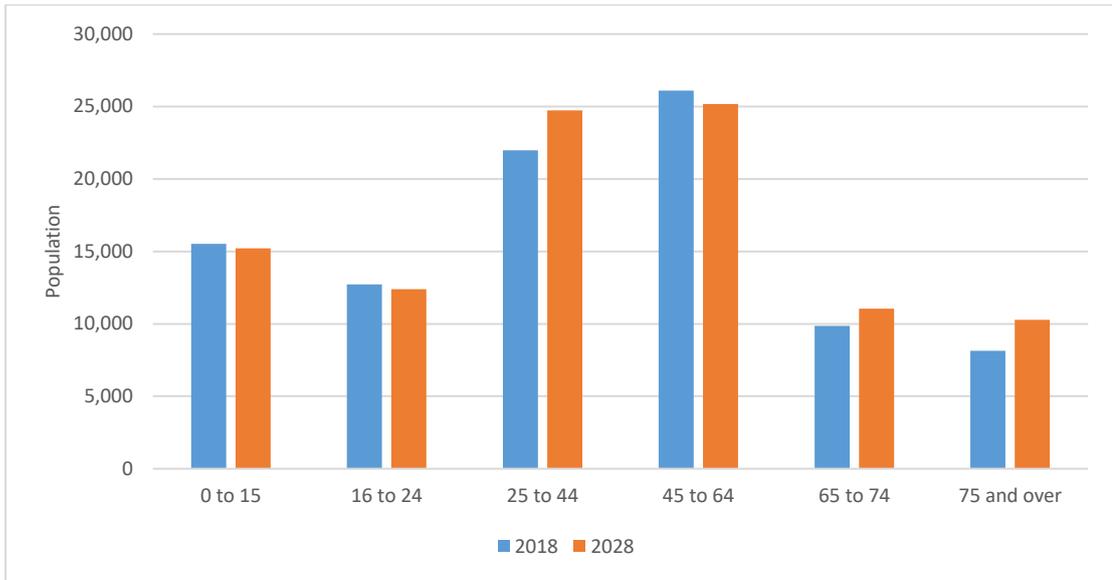
16.3.7 The working age population (persons aged 16-64) of Stirling was 60,814 in 2018, which represents 64% of the total population²². Between 2018 and 2028 the working age population is forecast to increase by around 1,500 people which means that the working age population in 2028 will represent a similar proportion of the total population as it did in 2018.

16.3.8 In 2018, 19.1% of Stirling’s population was aged over 75 years which is marginally older than the Scottish (18.9%) and British (18.4%) proportions. Between 2018 and 2028 the proportion of Stirling’s population aged over 75 years is forecast to increase to 21.6%.

16.3.9 As can be seen in **Figure 16.4** below the number of young people aged under 24 years is forecast to decrease. Between 2018 and 2028, the number of people in Stirling aged 16-24 is expected to decrease by 2.6%. In comparison, in Scotland the 16-24 aged group is expected to decrease by 0.9% in the same period. This indicates that compared of the rest of Scotland, Stirling has an ageing population.

²² ONS, 2018. Office for National Statistics – Nomis Local Area Profile.

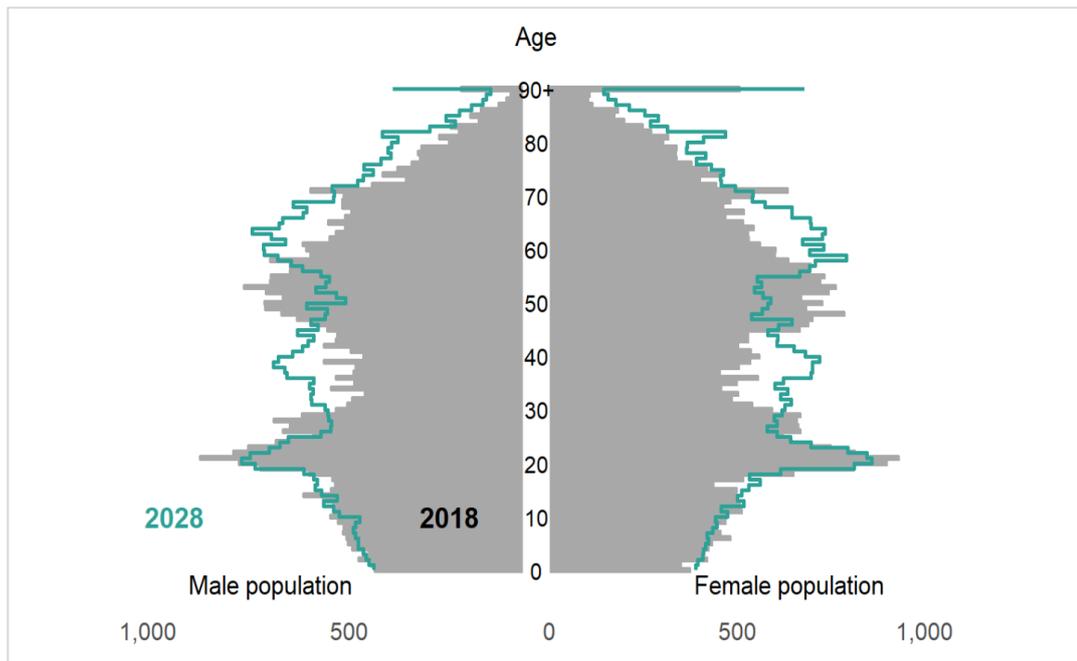
Figure 16.4 Stirling Population by Age Group



Source: NRSScotland, 2020.

16.3.10 In 2019, there were more females (51.8%) than males (48.2%) living in Stirling. There were also more females (51.3%) than males (48.7%) living in Scotland overall. This can be seen in **Figure 16.5** below. **Figure 16.5** also shows how the average age of the population of Stirling is projected to increase as the baby boomer generation ages and more people are expected to live longer.

Figure 16.5 Stirling Current and Projected Population Profiles



Source: NRSScotland, 2020.

Households

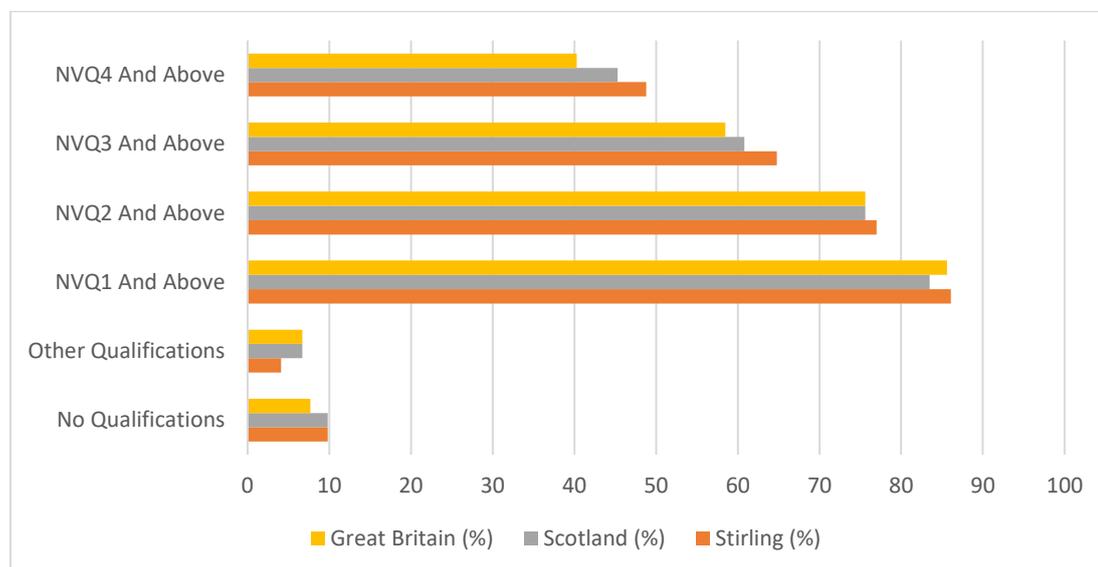
16.3.11 In 2018, the average household size in Stirling was of 2.39 residents. This is higher than the Scottish average, which was 2.17 at the time, but similar to the British average.

Qualifications

16.3.12 The population of Stirling is comparatively more qualified than the rest of Scotland and Great Britain. A higher proportion of the residents in Stirling have a National Vocation Qualification (NVQ) of at least level one or above compared to Scotland and Great Britain. The University of Stirling has around 8,239 undergraduate and 3,272 postgraduate students the employment rate of which, within 6 months of graduation, is consistently well over the national average. Additionally, the main campus of Forth Valley College is located in the city. The college has around 20,000 students. Both the University of Stirling and Fourth Valley College provide a host of highly skilled labour. The large student population also provides an important source of part time labour for the tourism and hospitality industry in the Stirling, as well as a good supply of graduate employees.

16.3.13 The population of Stirling does, however, have a higher proportion of people with no qualifications compared to Great Britain and a similar proportion compared to the rest of Scotland. This is shown below in **Figure 16.6**.

Figure 16.6 Qualification Level



Source: NOMIS, 2020.

Economic Profile

Employment

16.3.14 In 2019, Stirling had a lower proportion of economically active residents (76.3%) than the rest of Scotland (77.5%) and Great Britain (78.9%)²³.

16.3.15 The unemployment rate within the working age population (16-64) for Stirling in 2019 3.8%, which is a marginally higher rate than the rest of Scotland (3.5%) but lower than the rate in Great Britain (3.9%).

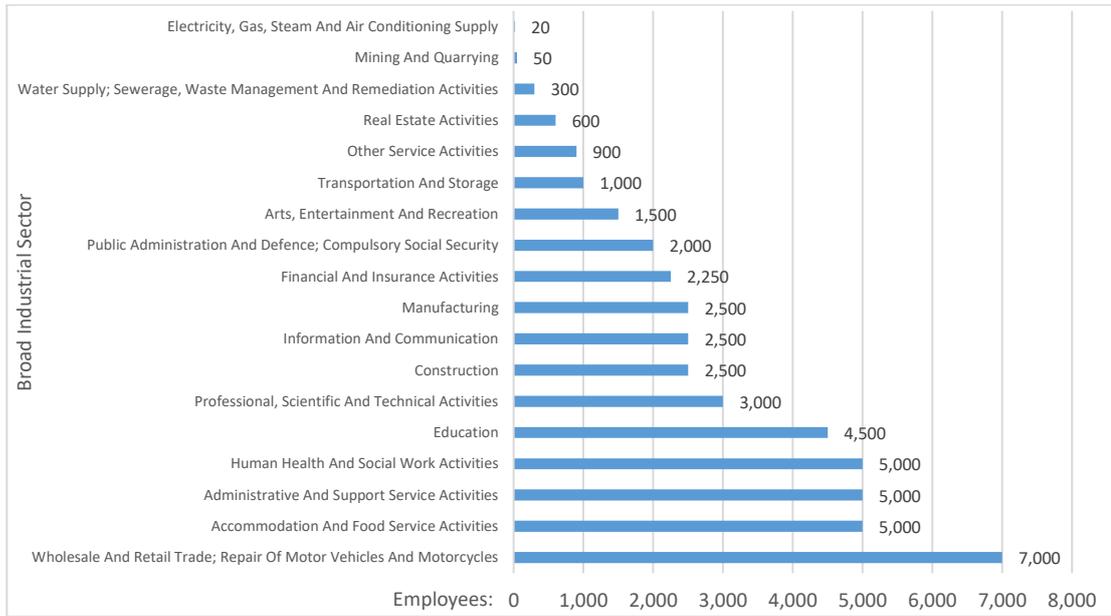
16.3.16 In 2018, the proportion of full time employees earning less than living wage in Stirling was 12.4% which was higher than the Scottish average of 11.5%.

²³ ONS, 2020. Nomis – Official Labour Market Statistics. Labour Market Profile: Stirling. Accessed 28/05/20 from: <https://www.nomisweb.co.uk/reports/lmp/la/1946157434/report.aspx#tabrespop>

- 16.3.17 Employment in the Stirling Council area is dominated by a concentration of industrial sectors with the top ten incorporating 80% of employees²⁴. **Figure 16.7** below shows employment by broad industrial sector in Stirling. As demonstrated, the Wholesale And Retail Trade; Repair Of Motor Vehicles And Motorcycles sector is the largest employer, employing 15% (7,000 people) of total employees in Stirling. The Accommodation and Food Service Activities, Administrative and Support Service Activities, and Human Health and Social Work Activities sectors are the next largest employers each employing around 11% of total employees.
- 16.3.18 The construction industry in Stirling makes a major contribution to the economy and employment with a number of trade bodies represented in the area including Ogilvie Construction which is one of Scotland's largest privately owned construction companies. The construction industry in Stirling incorporated around 2,500 jobs in 2018 representing approximately 5.4% of total employees in Stirling. In Scotland and Great Britain this figure was 5.5% and 4.7% respectively. This indicates that Stirling's construction industry contributes to the Stirling economy at a proportionately similar level compared to the construction industry in Scotland and more so than in Great Britain.
- 16.3.19 Two broad industrial sectors align most closely with occupations associated with the office space created as part of the Proposed Development (Detailed Application). These are the Financial and Insurance Activities sector, and, the Administrative and Support Services sector. In Stirling, in 2018, there were around 2,250 employees working in the Financial And Insurance Activities sector and around 5,000 people employed in the Administrative and Support Services sector. This represents approximately 4.9% and 10.9% of total employees in Stirling respectively. These proportions are larger than what is represented at the Scottish and Great British levels. This indicates that the Stirling Financial and Insurance Activities sector and Administrative and Support Services sectors are proportionately larger and more important in Stirling compared to at the regional and national levels.
- 16.3.20 The Arts, Entertainment and Recreation, and, Accommodation and Food Service sectors are the broad industrial sectors that the tourism industry is most closely associated with. In 2018, there were around 1,500 employees in the Arts, Entertainment and Recreation sector and around 5,000 in the Accommodation and Food Service sector. This constitutes roughly 3% and 11% respectively of the total employees in Stirling. Both the Arts, Entertainment and Recreation, and, Accommodation and Food Service sectors in Stirling employ proportionately more people than in Scotland and Great Britain. This implies that tourism industry in Stirling is proportionately larger than the regional and national equivalents.

²⁴ Cordant People, 2016. - Regional Profile Stirling. Accessed 28/05/20 from:
<https://www.cordantrecruitment.com/branches/labourmarketprofiledownload/47>

Figure 16.7 Stirling Employment by Industry Sector

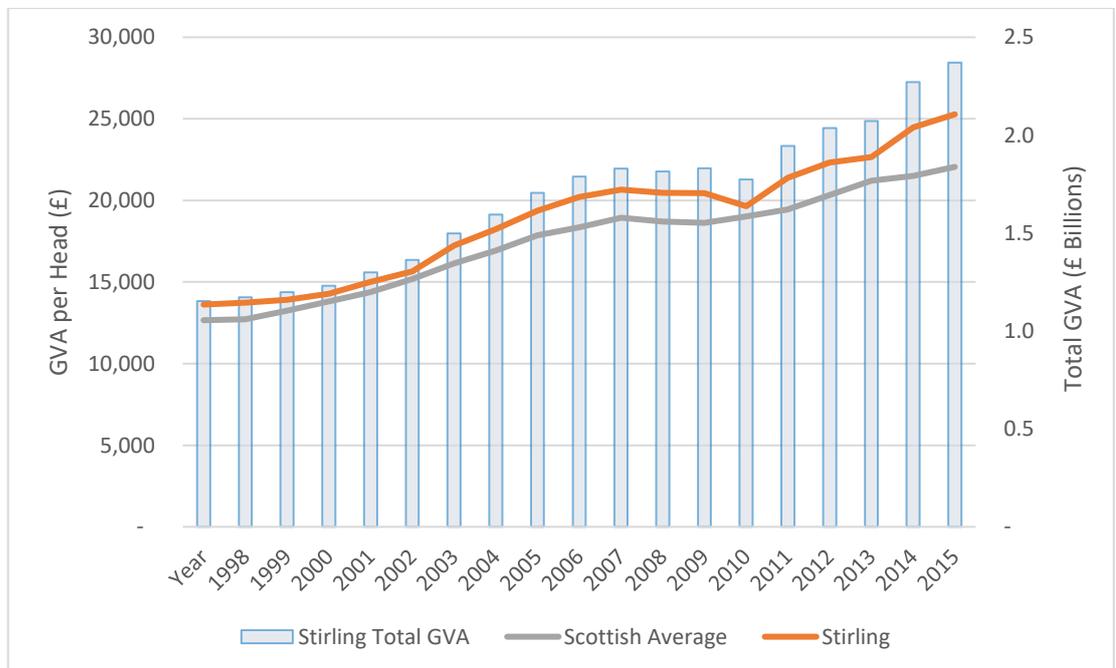


Source: NOMIS, 2020. Source: ONS Business Register and Employment Survey, 2018

Economic Growth

16.3.21 In the last two decades, Stirling has historically had a higher productivity rate measured by GVA per head than the Scottish average, as shown in **Figure 16.8** below. Over the period 2011-2015, GVA per head of population increased by 16% in the Stirling Council area and alongside Inverness, Stirling demonstrated the highest relative growth of all Scottish cities.

Figure 16.8 Stirling GVA per Head & Total GVA



Source: ONS, 2020. Regional Gross Value Added (Balanced) by Local Authority in the UK.

16.3.22 Oxford Economics produces UK local authority economic forecasts. This offers detailed data, forecasts and analysis on 19 industries from 2019 to 2029. Oxford Economics predicts that total employment will increase from around 55,100 jobs in 2019 to 57,400 in 2029. This is an increase of 2,300, equivalent to 4.2% of the total existing jobs. The forecast employment growth in Stirling is significantly faster than the average forecast for Scotland which is predicted to experience around a 2.2% growth in total employment²⁵.

16.3.23 In Stirling the industry sector that is forecast to grow the most to 2029 is the Administrative and Support sector which is closely associated with the anticipated operational use of the Proposed Development (Detailed Application). The Administrative and Support sector in Stirling is forecast to experience an increase of around 800 jobs which represents a growth of 16.4%. Manufacturing is forecast to shirk the most with a reduction of 19.4% expected equivalent to 400 job losses. The Financial and Insurance Activities is also forecast to decrease by around 4.0% by 2029 which would constitute around 100 job losses in the sector.

16.3.24 The majority of the other sectors are forecast to experience consistent growth 2019-2029 including the Accommodation and Food Service Activities, and, Professional, Scientific and Technical Activities sectors are forecast to grow 5.6% and 11.8% respectively which entails jobs increases of around 300 and 400 additional jobs per sector. The forecast growth of the Accommodation and Food Service Activities indicates that the overall tourism sector in Stirling is anticipated to grow.

16.3.25 Job growth implies increases to the GVA to the local economy. It is noted that different job types are associated with different generating different magnitudes of GVA per annum. For example, the GVA rates per typical office worker per annum is £54,893 and the GVA rates per education employee per annum is £41,162²⁶. This is taken into account as part of the assessment.

Existing Employment

16.3.26 The Site currently accommodates a number of different employment entities. The approximate employment figures for which were provided by the current property management and are shown in **Table 16.3** below.

Table 16.3 Existing Onsite Employment Estimates

Entity	Approximate Staff Numbers
Prudential and Tata Consultancy Services	800
Diligenta (Part of Tata)	700
Capita/Capita Aviva	180
SS&C (bought DST/IFDS) Lomond View	500
BaxterStorey (Catering Team)	20
CBRE (M&E, Maintenance)	15
Churchill Cleaning	25
Wilson James Security	21
Paragon Printers	5
Little Stars	20
Total	2,286

Source: Ambassador LB Holdings, 2020.

²⁵ Oxford Economics, 2020. Key economic and demographic indicators for Scotland and Stirling.

²⁶ BRES, 2019. Scottish Enterprise calculations based on ONS Nominal and real regional gross value added (balanced) by industry and BRES employment statistics

16.3.27 The rest of the Site is currently woodland or agricultural land and is therefore considered to have negligible employment associated with it.

Deprivation

16.3.28 Overall, there are relatively low levels of deprivation in Stirling, however, Stirling does contain some communities which rank among the most deprived in Scotland. According to the Scottish Index of Multiple Deprivation, 15 out of Stirling's 121 datazones are within the bottom quintile most deprived communities in Scotland. Within Stirling, the district of Raploch is the most deprived area by rank. In 2012 three out of four data zones were in the most deprived 1% in Scotland and the remaining datazone was in the worst 6%. Between 2012-16 Raploch experienced marginal improvement with two datazones now being in the bottom 7% and 12% nationally.

16.3.29 Stirling also faces an acute homelessness crisis. In March 2011, 277 homeless households were in temporary accommodation and the Council had an outstanding duty to provide settled accommodation for 305 homeless households. As part of the Housing Strategy the Council intends for the two thirds of all council house relets to be allocated to homeless households. In June 2017 there were 210 homeless applicants for council housing.

Housing Need

16.3.30 Stirling's Local Housing Strategy set the target of delivering 416 (328 market and 88 affordable) dwellings per annum in the Stirling LDP area²⁷. Overall, this target has not been achieved as between 2014 and 2019 the increase in the number of dwellings averaged 332 per annum²⁸.

16.3.31 Stirling's Housing Need & Demand Assessment (HoNDA) was written in November 2019 and covers the period 2019-2039. The HoDNA provides long term estimates of housing need, and provides an evidence base for both the Local Housing Strategy and LDP. The HoDNA forecasts that the number of households in Stirling is going to increase at a faster rate than the population. Between 2019-2023 there is a need for around 2,141 additional housing units this is demonstrated by the increased housing targets detailed in **Figure 16.9** below.

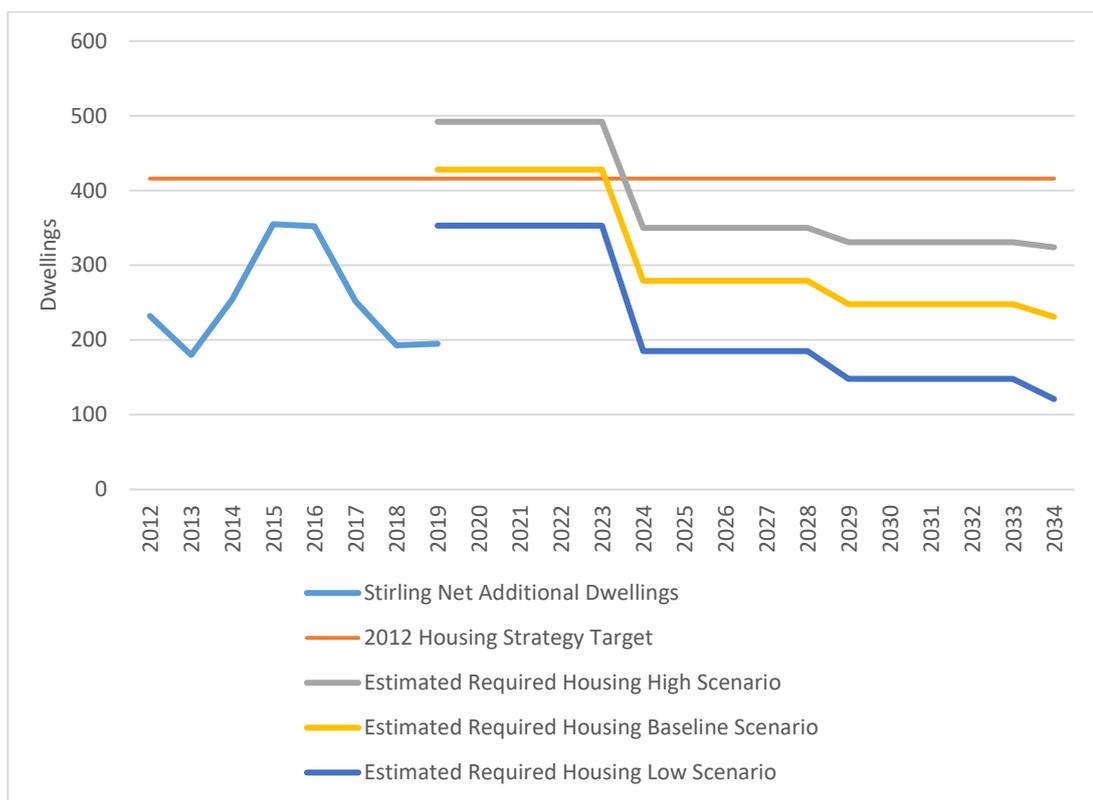
²⁷ Stirling Council, 2012. Stirling's Local Housing Strategy. Accessed: 08/06/20 from:

<https://www.whatdotheyknow.com/request/193643/response/496949/attach/2/stirlings%20l%20s%202012%20jan13.pdf>

²⁸ Stirling Council, 2019. Stirling's Housing Need & Demand Assessment 2019-2038. Accessed: 08/06/20 from:

<https://www.stirling.gov.uk/media/11257/stirling-hnda-2019-final.pdf>

Figure 16.9 Stirling Housing Supply & Forecast Requirement



Source: NRS Scotland. Stirling Council Housing Strategy 2012 & HDNA 2019.

16.3.32 By 2041, it is anticipated that there will be 7,010 more households which represents a 18% increase from 2018. Key drivers for this are the forecast growth of single adult households and an ageing population²⁹. The forecast increased demand is due to historic under provision and the anticipated demographic changes as outlined by the baseline.

16.3.33 Average property prices in Stirling are higher than the national average. In the Q3 of 2017 the average property in Stirling was 9% higher at £192,946 compared to £176,063. This is anticipated to be in part caused by recent under-provision in Stirling but and also differences in quality and type of stock.

16.3.34 The Scottish Government and Stirling Council have outlined the long-term planning for supporting the increased delivery of housing by resource planning for affordable housing provision. It is understood that £9.011m of funds will be provided for 2019/20 and £9.614m for 2020/21. The Scottish Government has also asked Stirling Council to over-programme to ensure delivery should slippage occur³⁰.

29 Stirling Council, 2019. Stirling's Housing Need & Demand Assessment 2019-2038. Accessed: 08/06/20 from: <https://www.stirling.gov.uk/media/11257/stirling-hnda-2019-final.pdf>

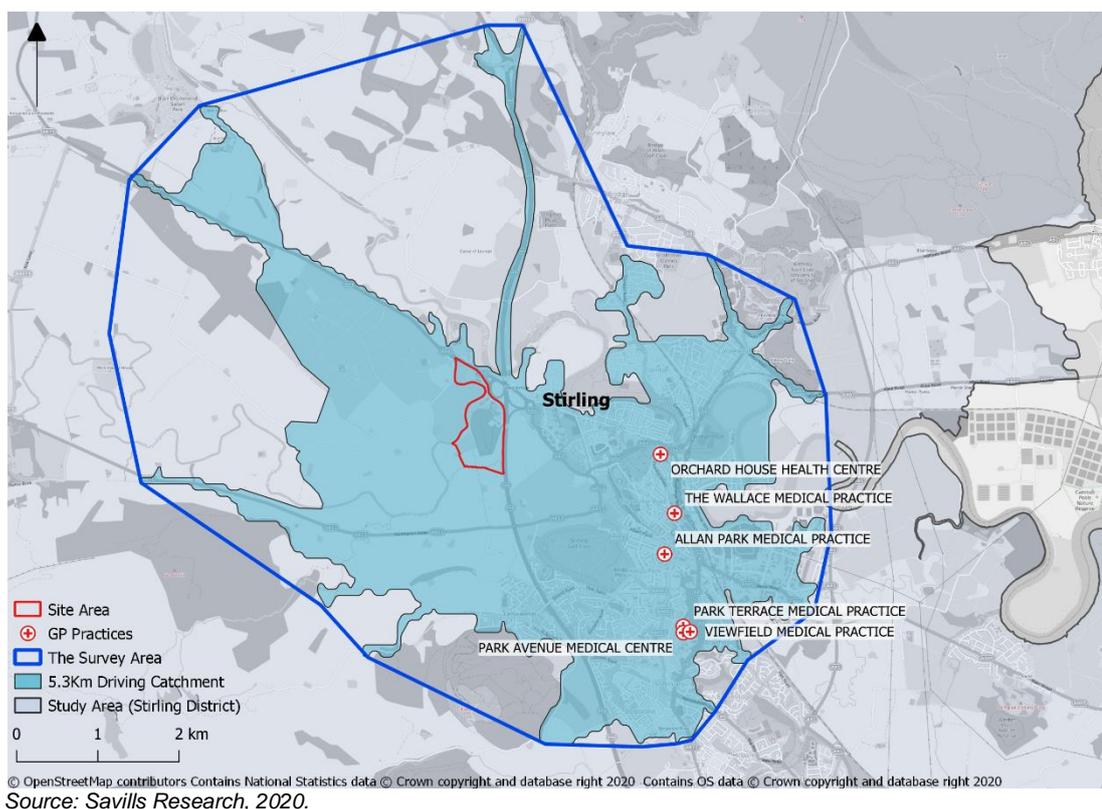
30 Stirling Council, 2017. Strategic Housing Investment Plan 2018/19 to 2022/23.

Social Infrastructure

Primary Health – GP Practices

16.3.35 The NHS board relating to the Proposed Development (PPIp Masterplan) is the Forth Valley NHS board within which Clackmannanshire and Stirling is the relevant Health and Social Care Partnership. As **Figure 16.10** below demonstrates, a total of six GP practices were identified within the Survey Area.

Figure 16.10 GP Practices



16.3.36 The identified GP practices incorporate 28 practicing GPs and have a combined patient list size of 33,742 as **Table 16.4** demonstrates. On average there are 5,624 patients registered at each practice and 1,426 registered patients per GP WTE. Compared to the Scottish average the practices within the Survey Area has a significantly lower number of patients per practice. In 2018, the mean practice size in Scotland was around 6,000 patients³¹.

16.3.37 The capacity of the practices was calculated using the NHS recommended benchmark to indicate whether or not a health centre is operating at capacity. This figure is 1,700 patients per WTE practitioner³². This also allowed for the spare capacity to be calculated which represents the number of additional patients that could be supported up to the 1,700 patients per WTE practitioner benchmark. As **Table 16.4** below demonstrates, there is significant spare capacity in the GP practices within the Survey Area.

³¹ NHS Scotland, 2018. General Practice - GP Workforce and practice list sizes 2008–2018. Accessed: 08/06/20 from: <https://www.isdscotland.org/Health-Topics/General-Practice/Publications/2018-12-11/2018-12-11-GPWorkforce2018-Report.pdf>

³² Stirling Council, 2019. Draft Supplementary Guidance – Developer Contributions. Accessed: 08/06/20 from: https://www.stirling.gov.uk/media/5868/dsg-developer-contributions-18_02_2019-rfs.pdf

Table 16.4 Registered Patients, GPs and Practices in the Survey Area

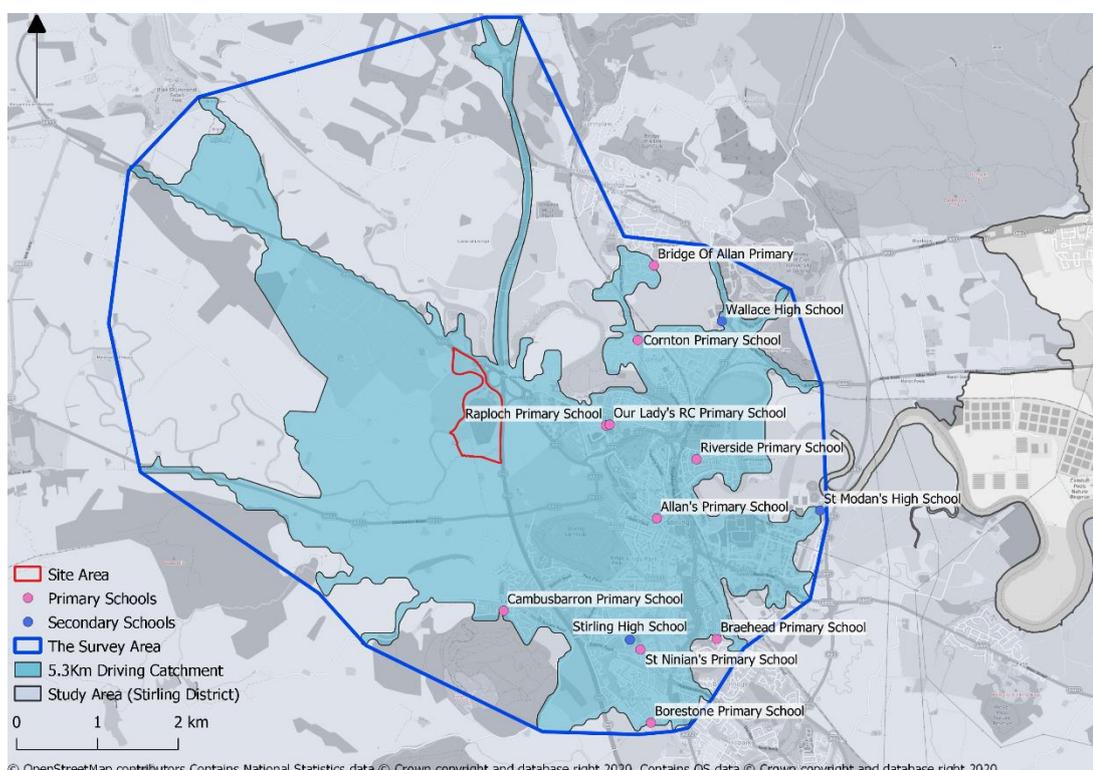
GP Practice	Number of GPs (WTE)	Registered Patients	Recorded Capacity	Patient/ GP (WTE)	Spare Capacity
Allan Park Medical Practice	5.4	3,941	9,180	730	5,239
Orchard House Health Centre	3.6	4,292	6,120	1,192	1,828
Park Avenue Medical Centre	5.4	7,958	9,180	1,474	1,222
Park Terrace Medical Practice	5.4	7,126	9,180	1,320	2,054
The Wallace Medical Practice	0.9	1,717	1,530	1,908	-
Viewfield Medical Practice	4.5	8,708	7,650	1,935	-
Total	25.2	33,742	42,840	*1,426	10,343

Source: Public Health Scotland, 2020. GP Workforce & Practice Populations. April 2020. (* Average)

Education - Schools

16.3.38 There are 10 primary schools of varying size within the Survey Area and also three secondary schools as demonstrated by **Figure 16.11**.

Figure 16.11 Primary and Secondary Schools



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Source: Savills Research, 2020.

Education - Primary Schools

16.3.39 These schools have a total recorded capacity of 3,794 pupil places. Combined there are around 2,700 pupils recorded as attending these schools. This indicates that there is significant spare capacity of 1,094 places in the existing primary school estate within the Survey Area. To be more conservative in the assessment of spare capacity a buffer of 7.5% was applied to the recorded capacity of the primary schools as recommended by the National Audit Office³³. The 7.5% buffer provides flexibility which can account for swings in parent preference, and any unexpected changes in pupil numbers. After applying the buffer, it is clear that there is significant spare capacity in the exiting primary school estate within the Survey Area. This is detailed in **Table 16.5** below which shows that across the primary school's estate there is spare capacity of circa 800 pupil places.

Table 16.5 Primary Schools within Study Area

Primary School	Pupils On Roll	School Capacity	Spare Capacity (with 7.5% buffer)
Allan's Primary School	152	215	47
Borestone Primary School	270	459	155
Braehead Primary School	333	430	65
Bridge Of Allan Primary	364	455	57
Cambusbarron Primary School	224	315	67
Cornton Primary School	199	240	23
Our Lady's RC Primary School	108	215	91
Raploch Primary School	187	430	211
Riverside Primary School	480	580	57
St Ninian's Primary School	385	455	36
Total	2,702	3,794	807

Source: Scottish Government, 2019. School Estate Statistics 2019

Education - Secondary Schools

16.3.40 As **Table 16.6** below demonstrates there are three secondary schools in the Survey Area with a recorded combined capacity of 3,750 pupil places. Within these schools there are a recorded 2,936 pupils in attendance. After a 7.5% buffer has been taken into account the assessed spare capacity in the secondary schools in the Survey Area is 553 pupil places.

Table 16.6 Secondary Schools within the Study Area

Primary School	Pupils on Roll	School Capacity	Spare Capacity (with 7.5% buffer)
St Modan's High School	978	1,250	178
Stirling High School	944	1,250	212
Wallace High School	1,014	1,250	142
Total	2,936	3,750	533

Source: Scottish Government, 2019. School Estate Statistics 2019.

³³ National Audit Office, 2013. Capital Funding for New School Places. Department for Education. Accessed: 09/07/20 from: <https://www.nao.org.uk/report/capital-funding-for-new-school-places/>

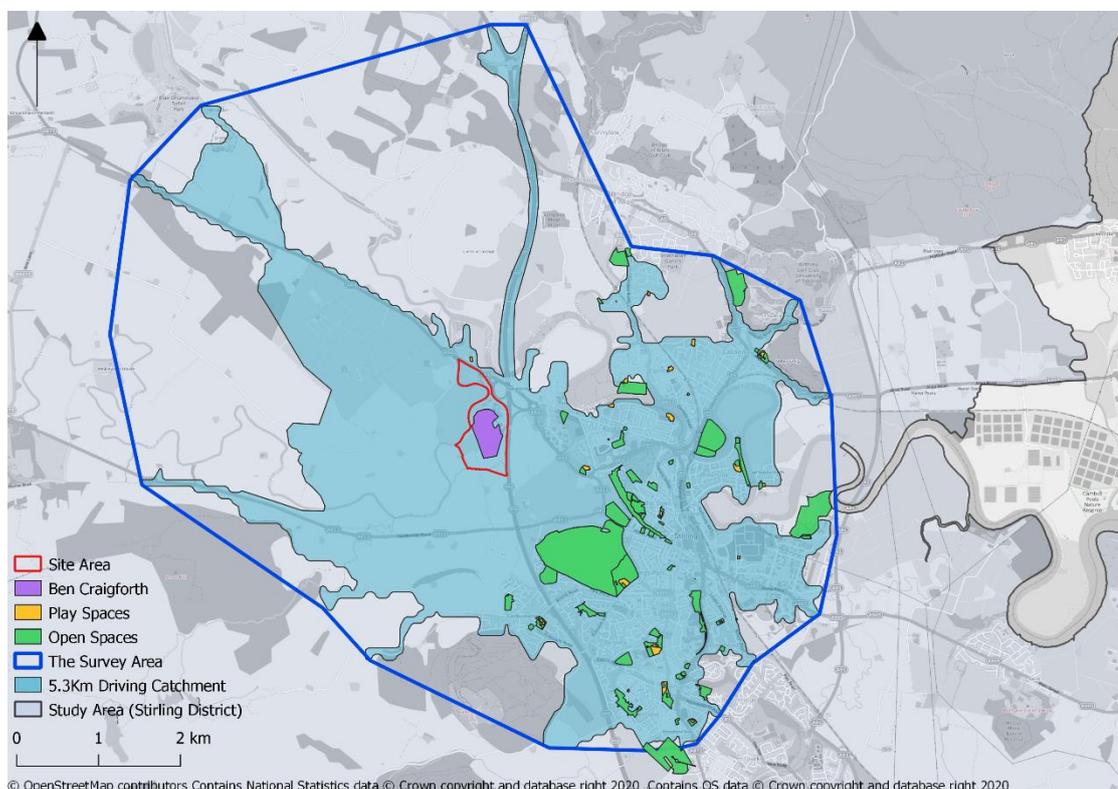
Open Space – Green Space

16.3.41 Stirling has an array of open and green spaces. There are around 68 open green spaces as defined by the Ordnance Survey in the Survey Area in Stirling. Green spaces include, parks, playing fields, religious grounds, bowling greens and other outdoor sports facilities. As demonstrated by **Figure 16.12** below, the majority of these green spaces are around the city centre. The Proposed Development (PPiP Masterplan) also surrounds Ben Craigforth which is a small hill popular with hikers and is situated within a Scottish National Heritage Landscape type 153 - Carselands.

Open Space – Child Play Space

16.3.42 Stirling has a number of designated play spaces defined by the Ordnance Survey. Within the Survey Area there are around 30 play spaces however similar to the city's open spaces the play spaces are concentrated towards the city centre. The play spaces identified in the Survey Area are also presented in **Figure 16.12** below.

Figure 16.12 Stirling Open Space & Child Play Space



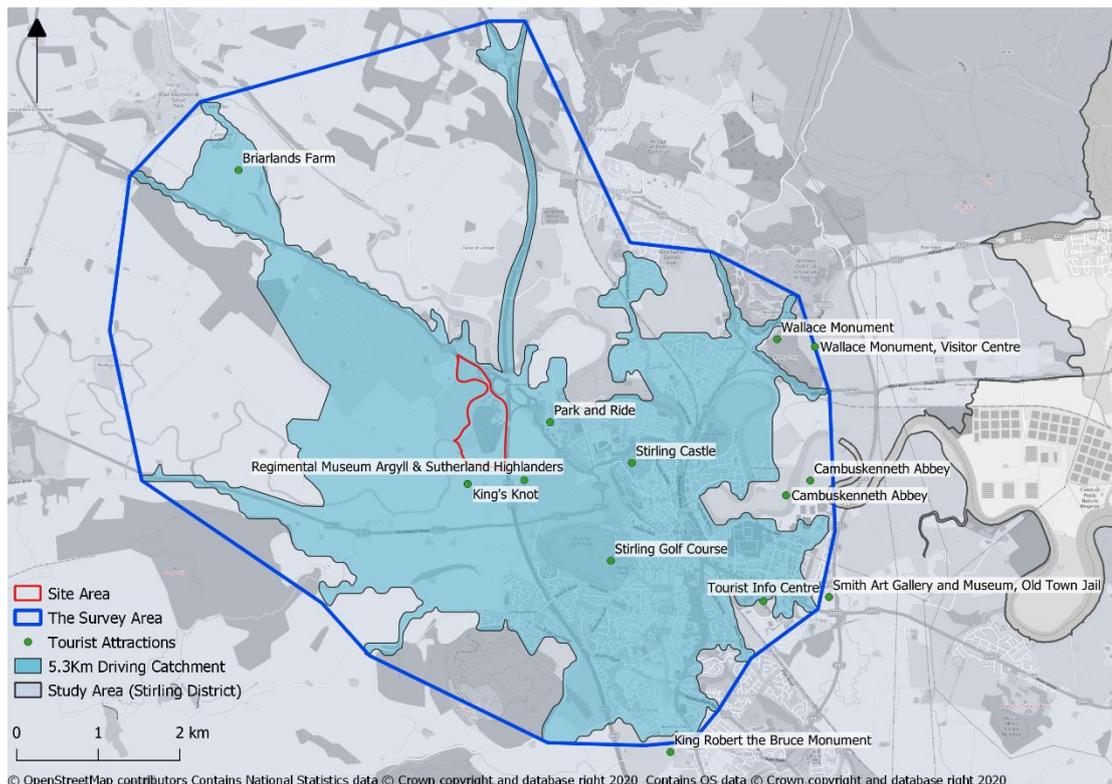
Tourism – Attractions

16.3.43 Tourism is an integral part of Stirling’s economy. Stirling is a tourist destination which attracts both domestic and international visitors, with over half (54%) of all visitors to the area from overseas. This is driven by the presence of some of the most significant Scottish heritage sites in the city, including Stirling Castle. The city’s global profile is enhanced by its proximity to both Glasgow and Edinburgh international airports which are both accessible in 30 mins by road. Stirling’s position close to the major road network provides access to more than half of the Scottish population within an hour’s drive, and over 80% within 2 hours giving a huge catchment of day trip visitors³⁴. In addition to this excellent road access, Stirling is a key interchange on Scotland’s rail network and allows quick and efficient rail travel across Scotland and beyond, including a direct rail link to London.

16.3.44 In 2018, the average daily expenditure in Scotland for an international visitor was £91 per person whereas for a domestic visitor it was £68 per person.

16.3.45 Stirling offers an array of tourism attractions including, world class historic attractions the most notable of which include Stirling Castle, The National Wallace Monument and the Battle of Bannockburn Centre. As detailed below in **Figure 16.13**, 12 tourist attractions were identified within the Survey Area that could potentially be affected by the Proposed Development (PPiP Masterplan).

Figure 16.13 Local Tourist Attractions



Source: Savills Research, 2020.

34 Invest in Stirling, 2020. Stirling - at the heart of Scotland's tourism sector. Accessed 17/06/20. From: <http://www.investinstirling.com/key-sectors/tourism/>

16.3.46 **Table 16.7** below provides a list of the key tourism attractions identified. This list is not exhaustive but can be used to gauge the provision of tourism attractions within the Survey Area.

Table 16.7 Local Tourist Attractions

Tourist Attraction	Distance from the Site as the crow flies
Briarlands Farm	4.0 km
Cambuskenneth Abbey	3.9 km
Castleview Park and Ride	0.9 km
King Robert the Bruce Monument	5.1 km
King's Knot	1.3 km
Regimental Museum Argyll & Sutherland Highlanders	1.3 km
Smith Art Gallery, Museum & Old Town Jail	5.0 km
Stirling Castle	2.1 km
Stirling Golf Club	2.7 km
Tourist Info Centre	4.4 km
Wallace Monument	1.7 km
Wallace Monument, Visitor Centre	3.6 km

Source: Ordnance Survey, 2020.

Tourism – Accommodation

16.3.47 Around 54% of visitors who visit Stirling stay for at least one night³⁵. In 2015, Stirling and the Forth Valley received 2 million overnight visits³⁶. The average occupancy rate of Stirling's hotels is 76% and the average overnight stay is approximately 2.8 nights in Scotland. Stirling has a variety of different accommodation types on offer. **Figure 16.14** details the distribution of the tourist accommodation facilities identified within the Survey Area.

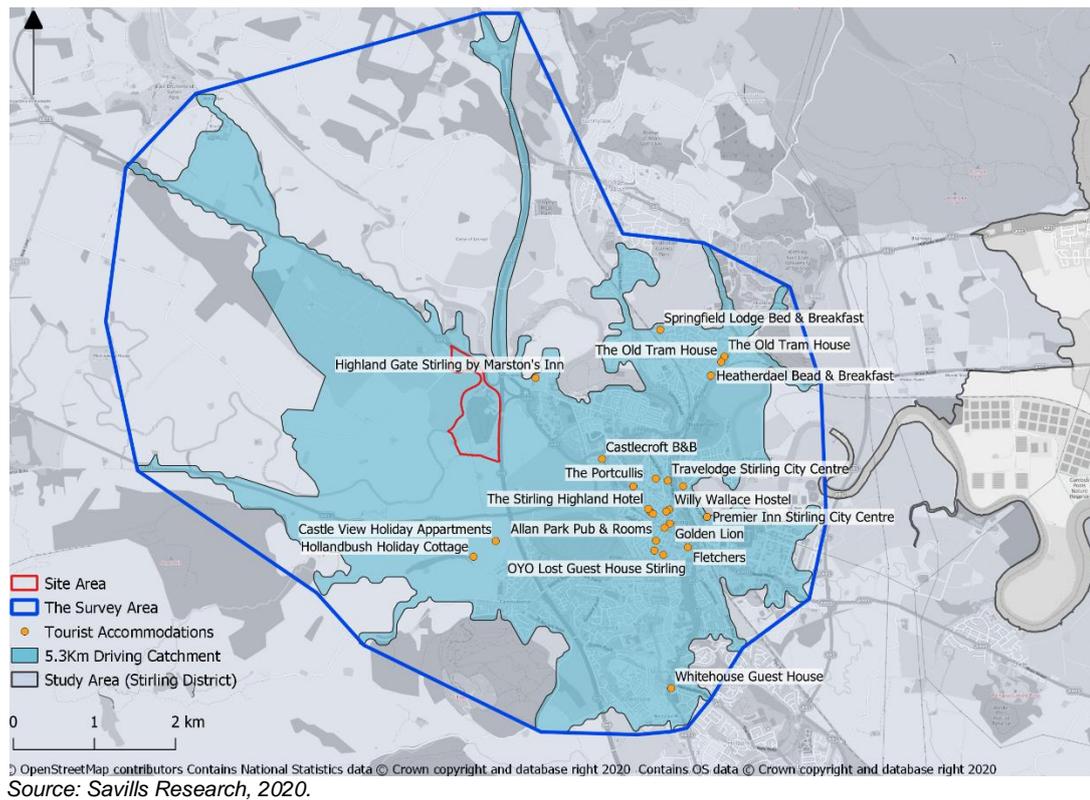
16.3.48 According to Invest in Stirling, Hotels in Stirling experience an average occupancy rate of 76%³⁷. Considering tourist accommodation facilities experience seasonality effect, the average occupancy rate indicates that overall demand for accommodation in Stirling is high.

³⁵ Invest in Stirling, 2020. Stirling - at the heart of Scotland's tourism sector. Accessed: 17/06/20. From: <http://www.investinstirling.com/key-sectors/tourism/>

³⁶ Visit Scotland, 2016. Visitors Survey- Regional Results Stirling, Falkirk & Forth Valley. Accessed: 17/06/20. From: <https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers/scotland-visitor-survey-stirling-falkirk-forth-valley-2016.pdf>

³⁷ Invest in Stirling, 2020. Stirling - at the heart of Scotland's tourism sector. Accessed: 17/06/20. From: <http://www.investinstirling.com/key-sectors/tourism/>

Figure 16.14 Local Tourist Accommodation Facilities.



16.3.49 **Table 16.8** below includes a list of tourism accommodation facilities within the Survey Area. As demonstrated 26 accommodation facilities including hotels, B&B's, holiday cottages and hostels were identified within the Survey Area. Again, this is not an exhaustive list but can be used to gauge the provision of tourism accommodation within the Survey Area.

Table 16.8 Local Tourist Accommodation Facilities

Tourist Accommodation	Distance from the Site as the crow flies
Allan Park Pub & Rooms	3.0 km
Castle View Holiday Apartments	2.1 km
Castle Walk Bed & Breakfast	3.0 km
Castlecroft B&B	1.9 km
Dunblane Hotel	5.7 km
Fletchers Rooms	3.4 km
Forth Guest House	2.9 km
Friars Wind Hotel	2.9 km
Glebe Crescent Bed & Breakfast	3.1 km
Golden Lion Pub and Rooms	3.0 km
Heatherdael Bed & Breakfast	2.8 km
Highland Gate Stirling by Marston's Inn	0.7 km
Hollandbush Holiday Cottage	2.3 km
Hotel Colessio	2.8 km
OYO Lost Guest House Stirling	3.2 km
Premier Inn Stirling City Centre	3.3 km
Queens Guest House	2.6 km
Springfield Lodge Bed & Breakfast	2.3 km
Stirling Highland Hotel	2.7 km
The Old Tram House	3.0 km
The Portcullis Hotel	2.4 km
The Stirling Highland Hotel	2.7 km
Travelodge Stirling City Centre	2.7 km
Travelodge Stirling M80 Hotel	7.4 km
Whitehouse Guest House	4.6 km
Willy Wallace Hostel	2.9 km

Source: CoStar, 2020. Savills Research, 2020.

16.4 North Site (The Proposed Development (Detailed Application)) Assessment

Potential effects

16.4.1 This section identifies and assesses the likely effects resulting from the Proposed Development (Detailed Application). This assessment considers the effects generated from the construction and operational phases. The nature, magnitude and timeframe of each effect resulting from the Proposed Development (Detailed Application) are also discussed.

Construction Effects

16.4.2 The most significant construction effects are likely to be associated with employment generation. It is considered that during construction workers are unlikely to relocate to the local area.

16.4.3 It is anticipated that disruption during construction would be controlled and managed through implementation of the Construction Environmental Management Plan.

Employment

16.4.4 The construction of the Proposed Development (Detailed Application) would provide business for construction firms operating in the Study Area and support jobs in the industry. The Proposed Development's (Detailed Application) construction would lead to the creation of new direct and indirect jobs, through supply chain benefits and new expenditure introduced to the local economy.

Direct Employment

16.4.5 To estimate the number of jobs required for the construction of the Proposed Development (Detailed Application), the average output per construction worker for Scotland³⁸ is used in combination with the estimated construction cost of the Proposed Development (Detailed Application)³⁹. **Table 16.9** below details the steps involved in estimating the construction employment.

16.4.6 'Step E' below, represents the 'gross direct' employment and can be considered as the number of workers onsite, on average, throughout the construction period. The precise numbers will depend on the phase of work and specific construction activities onsite. During the peak of construction activities, the onsite workforce is expected to be larger.

Table 16.9 North Site - Construction Jobs

Steps	Step Description	Key Figures
A	Estimated Construction Cost (£)	£25m
B	Average revenue per construction employee in Scotland (2019)	£124,509
C	Estimate of number of worker years required for the construction of the Proposed Development (Detailed Application) (jobs) (A/B)	200
D	Duration of Construction Phase (years)	2 years*
E	Average Onsite Construction Jobs per annum (C/D)	100

Source: Savills 2020. (*Estimated based on BCIS Duration Calculator)

16.4.7 The construction process would include the range of occupational levels, including unskilled or labouring jobs to more senior positions, as well as across a range of professional disciplines. The Proposed Development (Detailed Application) could facilitate the growth of the local construction industry, thus enabling firms to expand potentially take on employees. This also supports existing jobs.

16.4.8 Occupational and skill demand in the construction sector revolves around specialist skills, i.e. electricians, plumbers, bricklayers, carpenters, and plant operation trades. These skills tend to be contract labour offered by construction/building firms locally. In addition, low skilled manual labour would be expected to be in demand. In this case, employment tends to be contracted via Job Centres and Employment Agencies on a needs basis.

Indirect and Induced Employment

16.4.9 Additionally, businesses in the local, and regional economies, would benefit from the trade linkages established to construct the Proposed Development (Detailed Application), meaning that further indirect jobs would be supported locally in suppliers of construction materials and equipment. Local businesses would generally also benefit to some extent from temporary increases in expenditure as a result of the direct and indirect employment effects of the construction phase, for example, as construction workers spend their wages in local shops, accommodation and other facilities.

38 Business Population Estimates for the UK and Regions (2019) Department for Business, Energy and Industrial Strategy

39 Building Cost Information Service (BCIS) (2020), and including externals, fees and contingency.

16.4.10 The construction of the Proposed Development (Detailed Application) would set off a chain reaction of increases in expenditure, such as through the sale of building materials, design services, legal services, and insurance. This in turn can result in jobs close to the Site, generating an increase in demand for goods and services and generate growth in the local economy. The above form the multiplier effects.

Additional Employment

16.4.11 There are further steps involved in estimating the ‘additionality’ of the Proposed Development (Detailed Application). The first is leakage, which is the proportion of the employment effects that benefit those outside of the Study Area. This is calculated by taking into account the Proposed Development (Detailed Application)’s location within the Study Area and the characteristics of the commuting patterns of workers in Stirling. It is estimated that around 31% of the workers onsite would be commuters from outside the Stirling Authority area. This is a moderate level of leakage and is based on the distance travelled to work reported by Stirling Council⁴⁰.

16.4.12 The second step is estimating displacement. Displacement is accounts for the possibility that the construction activity could displace other construction activities in the target area; thereby reducing its additionality. In this case, the amount of employment onsite per annum is a very small proportion of the existing construction workforce in Stirling (approximately 5%), therefore it is likely to have a low effect. To be conservative, a low displacement level of 25% has been applied as per the Additionality Guide⁴¹.

16.4.13 The third step is estimating the indirect benefits of the construction activity, the benefits to companies in the supply chain, and to the local economy by the new expenditure introduced to the area from the construction workers. The construction multiplier applied is as estimated by the Scottish Government for Construction Type 1 multipliers and is 1.4⁴².

16.4.14 **Table 16.10** sets out the steps involved in estimating the additionality of the construction employment for the Proposed Development (Detailed Application).

Table 16.10 North Site Construction Jobs – Additionality

Steps	Step Description	Jobs per Annum*
A	Construction workers onsite (gross, direct, per annum)	100
B	Leakage to workers from outside study area (31%) (A*(0-31%))	-30
C	Onsite jobs (direct, for residents from the Study Area) (A+B)	70
D	Displacement of other activities (25%) (C*(0-25%))	-20
E	Multiplier effects (1.4) (C-D*0.4)	20
F	Employment offsite induced by construction employment in Study Area (net, indirect) (D+E)	3
G	Net additional employment from construction of the Proposed Development (Detailed Application) (C+F)	70

Source: Savills 2020. (*Figures are rounded so may not sum)

40 Stirling Council (2018) Active Travel Action Plan Walking and Cycling to a Healthier Stirling. Accessed: 10/06/20 from: <https://www.stirling.gov.uk/media/3622/stirling-council-active-travel-action-plan.pdf>

41 Homes and Communities Agency (2014) Additionality Guide.

42 Scottish Government Statistics (2020) Construction Type 1 Multipliers.

16.4.15 **Table 16.10** shows that the Proposed Development (Detailed Application) will generate a total of approximately 100 onsite gross direct construction jobs. Once the additionality effects of leakage, displacement, and multiplier effects have been considered, this equates to 70 net additional constructions jobs for residents of Stirling, for the duration of the construction period. The Proposed Development (Detailed Application) is estimated to have a medium beneficial effect.

16.4.16 Residents in Stirling that could benefit from the direct, indirect, and induced employment generated by demolition and construction activity were designated as a low sensitivity receptor in Stirling. This means that the Proposed Development (Detailed Application) could have a **minor beneficial** effect on the local construction industry and construction workers in Stirling over the short term.

Operational Effects

16.4.17 This section identifies the potential likely significant socio-economic effects from the completion and occupation of the Proposed Development (Detailed Application).

Employment

16.4.18 Operational phase jobs would be generated once the construction has been completed and the Proposed Development (Detailed Application) is occupied. These arise from the creation of new employment space. The assessment also the considers indirect multiplier effects as a result of new jobs on the Site.

Direct Employment

16.4.19 Once operational the Proposed Development (Detailed Application) would generate a number of jobs. To estimate the forecast number of operational jobs the proposed floor space was divided by the employment density figure targeted by the Applicant which is 8sqm NIA per employee. This is a target that the Applicant hopes to achieve by providing flexible working conditions. This may also reflect the potential effects of Covid-19 causing a higher rate of homeworking.

16.4.20 It is estimated that once operational the Proposed Development (Detailed Application) will generate approximately 1,180 gross, direct onsite jobs.

Indirect and Induced Employment

16.4.21 Additionality effects of the onsite operational employment were calculated including leakage, displacement, and multiplier effects. The displacement effect of the new office space was fixed at zero because the new office space incorporated in the Proposed Development (Detailed Application) will essentially replace the existing office space just outside the North Site Boundary.

16.4.22 **Table 16.11** below shows that the Proposed Development (Detailed Application) would generate approximately 1,180 gross direct jobs once operational and, after additionality effects are taken into account, an estimated 1,340 net additional jobs for residents in Stirling. The magnitude of the employment effect caused by the Proposed Development (Detailed Application) is considered to be highly beneficial.

Table 16.11 North Site Operational Jobs – Additionality

Steps	Step Description	Jobs per Annum
A	Operational workers onsite (gross, direct)	1,180
B	Leakage to workers from outside study area	-470
C	Onsite jobs (direct, for residents from the Study Area) (A+B)	710
D	Displacement of other activities	-0
E	Multiplier effects	630
F	Employment offsite induced by operational employment (net, indirect) (D+E)	630
G	Total employment generated from operation of the Proposed Development (Detailed Application) (C+F)	1,340

Source: Savills 2020.

16.4.23 Residents in Stirling that could benefit from the direct, indirect, and induced employment generated by the new businesses locating onsite during operation were identified as a low sensitivity receptor. Therefore, overall the effect that the Proposed Development (Detailed Application) is estimated to have on employment in Stirling is assessed to be a **moderate beneficial** effect in the long term.

Gross Value Added

16.4.24 Additional operational jobs are associated with an increase in the productivity of the regional economy (GVA). The GVA that the Proposed Development (Detailed Application) is expected to generate is around £65 million per annum. The magnitude of this effect is categorised as being highly beneficial. Considering the residents in Stirling that could benefit from the effects on Gross Value Added were deemed to be a low sensitivity receptor, the overall effect is deemed to be **moderate beneficial** over the long term.

Public Sector Revenues

16.4.25 Additionally, the Proposed Development (Detailed Application) will generate local authority revenues from commercial rates which can be re-invested in the community and local services. Commercial rates have been estimated using existing rateable values of comparable facilities from the Valuation Office. It is estimated that Stirling Council can anticipate to receive around £140,000 annually from the Proposed Development (Detailed Application).

Additional mitigation

16.4.26 The significance of the effects is characterised in the absence of mitigation measures, beyond those identified and described as inherent design mitigation. The significance of residual effects, post-mitigation, is also identified.

Residual effects

16.4.27 The residual effects of the Proposed Development (Detailed Application) during the construction and the operational phase are assessed to be overall insignificant as **Table 16.12** below details.

Table 16.12 North Site Assessment Residual Effects

Receptor	Residual Effect
Construction Employment	Not Significant
Operational Employment	Not Significant
GVA Uplift	Not Significant

Source: Savills 2020.

16.4.28 As demonstrated this socio-economic assessment found none of the above effects to be significant. The above assessment is based on the combination of the assessment of the magnitude of the predicted effects, the sensitivity of each receptor and the significance criteria as set out in the assessment methodology section.

Cumulative effects

16.4.29 The cumulative effects of the Proposed Development (Detailed Application) are discussed in Chapter 19.

16.5 Masterplan Assessment (The Proposed Development (PPiP Masterplan))

Potential effects

16.5.1 This section identifies and assesses the likely effects resulting from the Proposed Development (PPiP Masterplan). It does this by considering the effects generated from the construction and operational phases. The nature, magnitude and timeframe of each effect resulting from the Proposed Development (PPiP Masterplan) are also discussed.

Construction Effects

16.5.2 In terms of construction effects, the most significant effects are likely to be on employment, as the population is not expected to increase significantly during construction as workers are unlikely to relocate to the local area.

16.5.3 It is considered that disruption during construction would be controlled and managed through implementation of the Construction Environmental Management Plan.

Employment

16.5.4 The construction of the Proposed Development (PPiP Masterplan) would help support construction firms operating in the Study Area and provide jobs in the industry. The Proposed Development (PPiP Masterplan) would lead to the creation of new direct and indirect jobs, through supply chain benefits and new expenditure introduced to the local economy.

Direct Employment

16.5.5 To estimate the number of jobs required for the construction of the Proposed Development (PPiP Masterplan), the average output per construction worker for Scotland⁴³ is used in combination with the estimated construction cost of the Proposed Development (PPiP Masterplan)⁴⁴. **Table 16.13** sets out the steps involved in estimating the construction employment.

43 Business Population Estimates for the UK and Regions (2019) Department for Business, Energy and Industrial Strategy

44 Building Cost Information Service (BCIS) (2020), and including externals, fees and contingency.

16.5.6 'Step E' below, represents the 'gross direct' employment and can be considered as the number of workers onsite, on average, throughout the construction period. The precise numbers will depend on the phase of work and specific construction activities onsite. During the peak of construction activities, the onsite workforce is expected to be larger.

Table 16.13 PPIp Masterplan - Construction Jobs

Steps	Step Description	Key Figures
A	Estimated Construction Cost (£)	£123m
B	Average revenue per construction employee in Scotland (2019)	£124,509
C	Estimate of number of worker years required for the construction of the Proposed Development (PPIp Masterplan) (jobs) (A/B)	990
D	Duration of Construction Phase (years)	2.5 years*
E	Average Onsite Construction Jobs per annum (C/D)	400

Source: Savills 2020. (*Estimated based on BCIS)

16.5.7 The construction process would include the range of occupational levels, including unskilled or labouring jobs to more senior positions, as well as across a range of professional disciplines. The construction of the Proposed Development (PPIp Masterplan) could facilitate the growth of the local construction industry, enabling firms to secure existing employment levels and potentially expand.

16.5.8 Occupational and skill demand in the construction sector revolves around specialist skills, i.e. electricians, plumbers, bricklayers, carpenters, and plant operation trades. These skills tend to be contract labour offered by construction/building firms locally. In addition, low skilled manual labour would be expected to be in demand. In this case, employment tends to be contracted via Job Centres and Employment Agencies on a needs basis.

Indirect and Induced Employment

16.5.9 In addition, business in the local, and regional economy, would benefit from the trade linkages that would be established to construct the development, meaning that further indirect jobs would be supported locally in suppliers of construction materials and equipment. Local businesses would generally also benefit to some extent from temporary increases in expenditure as a result of the direct and indirect employment effects of the construction phase, for example, as construction workers spend their wages in local shops, accommodation, and other facilities.

16.5.10 The Proposed Development (PPIp Masterplan) would set off a chain reaction of increases in expenditure, such as through the sale of building materials, design services, legal services, and insurance. This in turn can result in jobs close to the Site, generating an increase in demand for goods and services and generate growth in the local economy. The above form the multiplier effects.

Additional Employment

- 16.5.11 There are further steps involved in estimating the ‘additionality’ of the Proposed Development (PPiP Masterplan). The first is leakage, which refers to the proportion of the employment effects that benefit those outside of the Study Area. This is calculated by taking into account the Proposed Development (PPiP Masterplan)’s location within the Study Area and the characteristics of the commuting patterns of workers in Stirling. It is estimated that around 31% of the workers onsite would be commuters from outside the Stirling Authority area. This is based on the distance travelled to work reported by Stirling Council⁴⁵ and represents a moderate level of leakage.
- 16.5.12 The second step is estimating displacement. Displacement is where the proposed activity could displace another activity in the target area; thereby reducing its additionality. In this case, the amount of employment onsite per annum is a small proportion of the existing construction workforce in Stirling (approximately 16%), therefore it is likely to have a low effect. To be conservative a low displacement level of 25% has been applied as per the Additionality Guide⁴⁶.
- 16.5.13 The third step is estimating the indirect benefits of the construction activity, the benefits to companies in the supply chain, and to the local economy by the new expenditure introduced to the area from the construction workers. The construction multiplier applied is as estimated by the Scottish Government for Construction Type 1 multipliers and is 1.4⁴⁷.
- 16.5.14 **Table 16.14** sets out the steps involved in estimating the additionality of the construction employment. **Table 16.14** shows that the Proposed Development (PPiP Masterplan) will generate a total of approximately 400 gross direct onsite construction jobs. Once the effects of leakage, displacement, and multiplier effects have been considered, this equates to 290 net additional constructions jobs for residents of Stirling, for the duration of the construction period. The Proposed Development (PPiP Masterplan) is estimated to have a medium beneficial effect.

Table 16.14 PPiP Masterplan Construction Jobs – Additionality

Steps	Step Description	Jobs per Annum*
A	Construction workers onsite (gross, direct, per annum)	400
B	Leakage to workers from outside study area (31%) (A*(0-31%))	-120
C	Onsite jobs (direct, for residents from the Study Area) (A+B)	270
D	Displacement of other activities (25%) (C*(0-25%))	-70
E	Multiplier effects (1.4) (C-D*0.4)	80
F	Employment offsite induced by construction employment (net, indirect) (D+E)	10
G	Net additional employment from construction of Proposed Development (C+F)	290

Source: Savills 2020. (*Figures are rounded so may not sum)

45 Stirling Council (2018) Active Travel Action Plan Walking and Cycling to a Healthier Stirling. Accessed: 10/06/20 from: <https://www.stirling.gov.uk/media/3622/stirling-council-active-travel-action-plan.pdf>

46 Homes and Communities Agency (2014) Additionality Guide.

47 Scottish Government Statistics (2020) Construction Type 1 Multipliers.

16.5.15 Residents in Stirling that could benefit from the direct, indirect, and induced employment generated by demolition and construction activity were designated as a low sensitivity receptor in Stirling. This means that the Proposed Development (PPiP Masterplan) could have a **minor beneficial** effect on the local construction industry and construction workers in Stirling over the short term.

Operational Effects

16.5.16 This section identifies the potential likely significant socio-economic effects from the completion and occupation of the Proposed Development (PPiP Masterplan).

Employment

16.5.17 Operational phase jobs would be generated once the construction has been completed and the Proposed Development (PPiP Masterplan) is occupied. These arise from the creation of new employment spaces and opportunities for home working. The increased local population will also generate an associated increase in expenditure in local shops, businesses and services. The assessment also considers indirect multiplier effects as a result of new jobs on the Site.

Direct Employment

16.5.18 Once operational the Proposed Development (PPiP Masterplan) would generate a number of jobs in each of the different proposed employment use types. For each use type with the exception of the office space, hotel and holiday villas, the forecast number of jobs generated was estimated by dividing the proposed floor space with the standard employment density as reported by the employment density guidelines⁴⁸ and shown below in **Table 16.15**. The office employment density used was provided by the Applicant.

Table 16.15 Assumed Employment Densities

Use Type	Employment Density (SQM per worker)
Office	8 (NIA)
Early Years Nursery	15 (GIA)
Retail	17 (NIA)
Restaurant/ pub	17 (NIA)
Gym/ Leisure	80 (GIA)

Source: Ambassador LB Holdings LLP, 2020. HCA Employment Density Guide, 2015.

16.5.19 Employment estimates for the number of jobs generated by the hotel and holiday villas was based on the number of beds proposed in the facilities and the type of accommodation⁴⁹.

16.5.20 Once operational, the Proposed Development (PPiP Masterplan) could generate a number of homeworkers. These were estimated by calculating the projected residential population of the Proposed Development (PPiP Masterplan) and the rate of homeworking in the region which is 14%⁵⁰.

16.5.21 In total it is estimated that around 1,890 gross, direct onsite jobs will be created by the Proposed Development (PPiP Masterplan) once operational, including approximately 60 homeworkers.

48 HCA, 2015. Employment Density Guideline.

49 HCA, 2015. Employment Density Guideline.

50 Scottish Government, 2011. Scotland Census. Accessed: 10/06/20 from: <https://www.scotlandscensus.gov.uk/ods-web/area.html>

Indirect and Induced Employment

16.5.22 Additionality effects of the onsite operational employment were calculated including leakage, displacement and multiplier effects. The additionality effect on each use-type was estimated separately before being combined to provide figures for the whole of the Proposed Development (PPiP Masterplan), which is summarised in **Table 16.16** below. The displacement effect of the new office space was fixed at zero due to the Proposed Development (PPiP Masterplan) comprising an overall net loss of office space compared to the existing conditions. Additionally, the induced employment generated from new tourist expenditure was also calculated⁵¹.

16.5.23 **Table 16.16** below shows that the Proposed Development (PPiP Masterplan) would generate approximately 2,190 jobs for residents in the Study Area once operational. Considering the reported 2,286 existing jobs onsite, the Proposed Development (PPiP Masterplan) is expected to generate a net decrease in employment of around 96 jobs. The magnitude of the employment effect caused by the Proposed Development (PPiP Masterplan) is considered to be medium adverse.

Table 16.16 Masterplan Operational Jobs – Additionality

Steps	Step Description	Jobs per Annum*
A	Operational workers onsite (gross, direct)	1,890
B	Leakage to workers from outside study area	-670
C	Onsite jobs (direct, for residents from the Study Area) (A+B)	1,230
D	Displacement of other activities	-50
E	Multiplier effects	1,010
F	Employment offsite induced by operational employment (net, indirect) (D+E)	960
G	Total employment generated from operation of the Proposed Development (PPiP Masterplan) (C+F)	2,190

Source: Savills 2020. (*Figures are rounded so may not sum)

16.5.24 Residents in Stirling that could benefit from the direct, indirect and induced employment generated by the new businesses locating onsite during operation were identified as a low sensitivity receptor. Therefore, overall, the effect that the Proposed Development (PPiP Masterplan) is estimated to have on employment in Stirling is assessed to be a **minor adverse** effect in the long term.

16.5.25 It is recognised that the additional non-office-based employment uses included in the Proposed Development (PPiP Masterplan), which are expected to generate around 300 jobs onsite, would significantly lessen the effects of the reduction in employment numbers on office-based roles. Overall, the reduction of office-based jobs is around 580 jobs. The additional employment generated by the non-office employment uses would mitigate the effects of the loss of this employment.

Gross Value Added

16.5.26 Additional operational jobs are associated with an increase in the productivity of the regional economy (GVA).

51 VisitBritain, 2013. Tourism: jobs and growth – The economic contribution of the tourism economy in the UK.

16.5.27 The GVA that the Proposed Development (PPiP Masterplan) is expected to generate is around £103 million per annum. The estimated GVA of the existing site operation is £122 million per annum meaning the Proposed Development (PPiP Masterplan) will reduce the GVA of the Site by approximately £19 million per annum. The magnitude of this effect is categorised as being highly adverse. Considering, the residents in Stirling that could benefit from the effects on Gross Value Added were deemed to be a low sensitivity receptor, the overall effect is deemed to be **moderate adverse** over the long term.

16.5.28 Similar to the operational employment effects, it is important to stress that the overall reduction of GVA per annum is reduced by the non-office-based employment uses, which will generate approximately £9 million in GVA per annum. The proposed employment spaces additional to the Proposed Development (Detailed Application) therefore significantly mitigate the overall economic effect on GVA, which would otherwise be more adverse.

Public Sector Revenues

16.5.29 The Proposed Development (PPiP Masterplan) will generate local authority revenues from commercial rates and council tax which can be re-invested in the community and local services. Commercial rates have been estimated using existing rateable values of comparable facilities from the Valuation Office. It is estimated that Stirling Council can anticipate to receive around £210,000 annually in business rates from the Proposed Development (PPiP Masterplan). This is a slight increase from the estimated business rates revenues generated from the existing conditions.

16.5.30 Additionally, the Proposed Development (PPiP Masterplan) could generate around £470,000 annually in council tax receipts from the residential elements.

New Residential Expenditure

16.5.31 The population uplift created by the Proposed Development (PPiP Masterplan) will generate an estimated £1.8m of retail and food and beverage expenditure per annum within the Study Area. The magnitude of this wider economic effect is deemed to be a medium beneficial effect. The new residential expenditure is estimated to generate around eight new retail jobs and four food and beverage jobs in Stirling.

16.5.32 Residents in Stirling that could benefit from the wider economic effects including effects on businesses and spending arising from the Proposed Development (PPiP Masterplan) was identified as a medium sensitivity receptor. The effect on this receptor was, therefore, assessed to be a **moderate beneficial** effect.

GP Services

16.5.33 There are six GP practices within the Survey Area. Utilising the average household size for Stirling of 2.39 persons, the incoming resident population from the Proposed Development (PPiP Masterplan) is estimated to be around 1,000 people. By considering that there is an estimated spare capacity of over 10,000 patient places in the local GP estate the need of the incoming population would be met by the existing GP practices⁵². The Proposed Development (PPiP Masterplan) is therefore estimated to have a negligible impact on the low sensitivity users of GPs in the Survey Area resulting in a **negligible** effect over the long-term.

52 Stirling Council, 2019. Draft Supplementary Guidance – Developer Contributions. Accessed: 08/06/20 from: https://www.stirling.gov.uk/media/5868/dsg-developer-contributions-18_02_2019-rfs.pdf

Primary Education

16.5.34 The baseline assessment indicates that there are 10 primary schools within the Survey Area with a significant spare capacity of around 810 primary school places. This meant that as a receptor the residents in the Survey Area using or planning to use primary schools were deemed to have a low sensitivity.

16.5.35 The Draft Supplementary Guidance – Developer Contributions, states that for new developments the primary school pupil yield is expected to be 0.28 pupils per home. Based on this, the need from the Proposed Development (PPiP Masterplan) is around 120 primary school places. This is a conservative approach because the Proposed Development (PPiP Masterplan) is expected to provide intergenerational housing with around 90 units earmarked for retirement and care-home type accommodations. These will likely cause the Proposed Development (PPiP Masterplan) to generate a lower pupil yield.

16.5.36 Consequently, the Proposed Development (PPiP Masterplan) is estimated to have a **negligible** effect over the long term because, as demonstrated there is significant spare capacity in the existing primary schools to accommodate this increase in demand but some of the spare capacity will be used up.

Secondary Education

16.5.37 The need from the Proposed Development (PPiP Masterplan) is estimated to be around 50 places, calculated by using the pupil yields published in the 2019 Draft Supplementary Guidance – Developer Contributions which states that for new developments the pupil yield per home is 0.12⁵³. Similar, this estimate is considered to be conservative as the Proposed Development (PPiP Masterplan) is expected to provide intergenerational housing including retirement and care-home type accommodations. These will likely cause the Proposed Development (PPiP Masterplan) to generate a lower secondary school pupil yield.

16.5.38 The baseline assessment reports there are three secondary schools within the Survey Area, which have a combined spare capacity of 533 places. This meant that the receptor involving residents in the Survey Area using or planning to use secondary schools was categorised as a low sensitivity receptor.

16.5.39 The Proposed Development (PPiP Masterplan) is estimated to have a negligible adverse effect on the low sensitivity users of secondary schools in the Survey Area, resulting in the effect to be assessed as a **negligible** effect overall in the long-term.

Open Spaces

16.5.40 The baseline assessment found that there are around 68 open green spaces and 30 play spaces in the Survey Area as defined by the Ordnance Survey. The baseline assessment also identified that the distribution of the city's open and play spaces are concentrated towards the city centre. As such, the receptor associated with residents in the Survey Area using or planning to use open spaces or child play spaces is defined as a medium sensitivity receptor.

53 Stirling Council, 2019. Draft Supplementary Guidance – Developer Contributions. Accessed: 08/06/20 from: https://www.stirling.gov.uk/media/5868/dsg-developer-contributions-18_02_2019-rfs.pdf

16.5.41 The Proposed Development (PPiP Masterplan) is expected to generate a population uplift of around 1,000 people including approximately 120 primary school primary school aged children. The Proposed Development (PPiP Masterplan) will provide sufficient open and play spaces. The Proposed Development (PPiP Masterplan) will create a community and biodiversity resource through the provision of a linear green network and amenity open space. There is also opportunity to create a mosaic of beneficial wildlife habitats. The Proposed Development (PPiP Masterplan) intends to enhance the existing open space provision by having natural open spaces and by providing well-connected trails and short loop walks in addition to a green link that brings all development together. There are also programmed spaces for sport and play including natural and equipped play areas. The play spaces are intended to be at the heart of the development and cater for all ages. Consequently, the Proposed Development (PPiP Masterplan)'s impact on open and play space provision is assessed to be a medium beneficial effect. Considering the low sensitivity of the receptor the overall effect is deemed to be a **moderate beneficial** effect.

New Tourism Expenditure

16.5.42 The hotels and holiday villas incorporated in the Proposed Development (PPiP Masterplan) will likely contribute to the local tourism industry by increasing the number of visitors to Stirling thereby generating additional expenditure. By assessing the characteristics of tourist visiting Stirling and their typical spending behaviour the forecast additional expenditure that the tourist elements of the Proposed Development (PPiP Masterplan) will generate was estimated. It is expected that the increased tourism expenditure in Stirling will be around £5.5m per annum. This effect is categorised as a medium beneficial effect.

16.5.43 The tourism attractions that may be affected by the increased economic activity generated by the Proposed Development (PPiP Masterplan) was classified as a low sensitivity receptor. Overall, the effect on tourism attractions is deemed to be a **minor beneficial** effect.

Additional mitigation

16.5.44 The significance of the effects are characterised in the absence of mitigation measures, beyond those identified and described as inherent design mitigation. The significance of residual effects, post-mitigation, are also identified.

Residual effects

16.5.45 The residual effects of the Proposed Development (PPiP Masterplan) during the construction and the operational phase are assessed to be overall insignificant.

Table 16.17 Masterplan Assessment Residual Effects

Receptor	Residual Effect
Construction Employment	Not Significant
Operational Employment	Not Significant
GVA Uplift	Not Significant
Wider Economic Effects	Not Significant
Primary Education	Not Significant
Secondary Education	Not Significant
GP Provision	Not Significant
Open & Child Play Space Provision	Not Significant
Tourist Attractions	Not Significant

Source: Savills 2020.

16.5.46 As demonstrated, this socio-economic assessment found none of the above effects to be significant. The above assessment is based on the combination of the assessment of the magnitude of the predicted effects, the sensitivity of each receptor and the significance criteria as set out in the assessment methodology section.

Cumulative effects

16.5.47 The cumulative effects of the Proposed Development (PPiP Masterplan) are discussed in Chapter 19.

16.6 Summary

Baseline Summary

- 16.6.1 The baseline research found that the population in the Stirling local authority area is forecast to grow by 4.8% over the period of 2018-2028, which is a higher rate than the population growth of Scotland (1.8%) for the same period.
- 16.6.2 The projected demographic profile of Stirling shows an aging population. Between 2018 and 2028 the proportion of Stirling's population aged over 75 years is forecast to increase to 21.6%.
- 16.6.3 The unemployment rate within the working age population (16-64) for Stirling in 2019 3.8%, which is a marginally higher rate than the rest of Scotland (3.5%) but lower than the rate in Great Britain (3.9%).
- 16.6.4 In 2018 the average household size in Stirling was 2.39. The forecast population uplift generated by the Proposed Development (PPiP Masterplan) was estimated by applying this figure to the unit number. The population of the Proposed Development (PPiP Masterplan) once operational was estimated to be around 1,000 persons.
- 16.6.5 The baseline identified that there are six GP surgeries, 10 primary schools and three secondary schools within the Survey Area all with significant spare capacity. The baseline assessment also found that there are around 68 open green spaces and 30 play spaces in the Survey Area.

North Site – Assessment Summary

- 16.6.6 The construction of the Proposed Development (Detailed Application) is expected to generate 70 net additional construction jobs per annum for residents of Stirling during the construction period. The Proposed Development (Detailed Application) is estimated to have a medium beneficial impact on the low sensitivity construction workers in Stirling resulting in a **minor beneficial** effect over the short term.
- 16.6.7 Once operational, the Proposed Development (Detailed Application) could generate a total of 1,340 net additional onsite direct, offsite indirect and induced jobs for residents of Stirling. The magnitude of employment in the Proposed Development (Detailed Application) is considered to be highly beneficial. The sensitivity of the employees in the Stirling is low. Therefore, the generation of operational jobs by the Proposed Development (Detailed Application) is assessed to be a **moderate beneficial** effect over the long term.
- 16.6.8 The Proposed Development (Detailed Application) is anticipated to generate an increase in GVA to the local economy. This assessment found that the Proposed Development (Detailed Application) will generate approximately £65 million per annum. This effect is deemed to be a **moderate beneficial** effect over the long term.

Masterplan – Assessment Summary

- 16.6.9 The construction of the Proposed Development (PPiP Masterplan) is expected to generate 290 net additional construction jobs on and offsite per annum over the duration of the construction period. The Proposed Development (PPiP Masterplan) is estimated to have a medium beneficial effect on the low sensitivity construction workers in Stirling resulting in a **minor beneficial** effect over the short term.
- 16.6.10 Once operational, the Proposed Development (PPiP Masterplan) could generate a total of 2,190 onsite direct and offsite indirect and induced jobs. Despite this, the Proposed Development (PPiP Masterplan) is expected to generate a net decrease in employment of around 96 jobs. The magnitude of the effect on employment is considered to be medium adverse. The sensitivity of the employees in the Stirling is low. Therefore, the effect on operational jobs caused by the Proposed Development (PPiP Masterplan) is predicted to be a **minor adverse** effect over the long term. Importantly, given the overall reduction of office-based jobs from around 2,180 to 1,600 across the site, the additional employment uses included in the Proposed Development (PPiP Masterplan) would significantly lessen the reduction in employment numbers and therefore would mitigate the adverse nature of the operational employment effect.
- 16.6.11 As there will be slightly fewer operational jobs onsite as a result of the Proposed Development (PPiP Masterplan) compared to the Site's existing operation there is an associated decrease in the GVA to the local economy. This assessment found that the Proposed Development (PPiP Masterplan) will reduce the GVA of the Site by approximately £19 million per annum. This effect is deemed to be a **moderate adverse** effect over the long term. It is important to stress that the overall reduction of GVA would be greater if the Proposed Development (PPiP Masterplan) did not come into fruition. This is because the proposed employment spaces contained within the Proposed Development (PPiP Masterplan) additional to the proposed office spaces mitigate the overall economic effect on the Site's GVA which would otherwise be more adverse.
- 16.6.12 The population uplift created by the Proposed Development (PPiP Masterplan) will generate an estimated £1.8m of retail and food and beverage expenditure per annum within the Study Area. Residents in Stirling that could benefit from the wider economic effects including effects on businesses and spending arising from the Proposed Development (PPiP Masterplan) was identified as a medium sensitivity receptor. The effect on this receptor was, therefore, assessed to be a **moderate beneficial** effect.
- 16.6.13 The additional need for GP facilities arising from the incoming population generated by the Proposed Development (PPiP Masterplan) is covered by the existing GPs. The Proposed Development (PPiP Masterplan) is estimated to have a negligible effect on the low sensitivity users of the GPs in the Survey Area, resulting in a **negligible** effect over the long-term.
- 16.6.14 The baseline assessment indicates that there are 10 primary schools within the Survey Area. Overall significant spare capacity was identified within the primary school estate within the Survey Area. The need from the Proposed Development (PPiP Masterplan) is 120 primary school places, calculated by using the pupil yields published in the Draft Supplementary Guidance – Developer Contributions. The Proposed Development (PPiP Masterplan) is estimated to have a negligible effect on the low sensitivity receptor resulting in a **negligible** effect over the long term.

- 16.6.15 The baseline assessment reports three secondary schools within the Survey Area. Overall significant spare capacity of around 533 secondary school places was identified within the secondary school estate. The need from the scheme is expected to be around 50 places, calculated by using the Draft Supplementary Guidance – Developer Contributions. The Proposed Development (PPiP Masterplan) is estimated to have a negligible effect on the low sensitivity secondary school pupils in the Survey Area resulting in an overall **negligible** effect in the long term.
- 16.6.16 The baseline assessment reports there are around 68 open green spaces and 30 play spaces in the Survey Area. The Proposed Development (PPiP Masterplan) also intends to enhance the existing open space provision by having a natural open spaces and by providing well-connected trails in addition to programmed spaces for sport and play including natural and equipped play areas. Considering this and the low sensitivity of the relevant receptor, the overall effect is deemed to be a **moderate beneficial** effect.
- 16.6.17 The Proposed Development (PPiP Masterplan) is expected to contribute significantly to the tourism industry in Stirling by providing tourism accommodation facilities, increasing the number of visitors to Stirling, and thereby generating additional expenditure. The increased tourism expenditure in Stirling will be around £5.5m per annum. This effect is on a low sensitivity receptor meant that overall, the effect on tourism attractions is deemed to be a **minor beneficial** effect.

16.7 Assessor information

- 16.7.1 This EIA Report has been prepared under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations'). EIA Regulation 5. (b) requires that an outline of relevant expertise or qualifications of contributors accompanies an assessment. The relevant information for the team is provided below for each of the EIA Report chapters.
- 16.7.2 The Socio-Economic chapter of the EIA Report has been reviewed and edited by Mr Danny Collins, of Savills. Danny has 15 years' experience of preparing socio-economic impact assessments for a wide range of EIA projects.
- 16.7.3 The Socio-Economic chapter was prepared by Mr Patrick Borer MSc BSc who works in the Savills Economics Team. Patrick has two years' experience of preparing socio-economic impact assessments and has contributed to numerous Environmental Statements.

17 Human Health

17.1 Introduction

- 17.1.1 This chapter of the Environmental Impact Assessment (EIA) Report assesses the likely significant effects of the Proposed Development on the environment in relation to human health. The purpose of the chapter is to consider the specific effects of the Proposed Development in respect of health and wellbeing on the local community.
- 17.1.2 The assessment has been undertaken by Savills and draws upon the findings of other technical assessments undertaken for the purposes of this EIA Report.

17.2 Planning Policy and Guidelines

Policy Context

- 17.2.1 Scottish Planning Policy (SPP)¹ states *'planning can provide opportunities for people to make sustainable choices and improve their quality of life. Well-planned places promote wellbeing, a sense of identity and pride, and greater opportunities for social interaction. Planning, therefore, has an important role in promoting strong, resilient and inclusive communities. Delivering high-quality buildings, infrastructure and spaces in the right locations helps provide choice over where to live and style of home, choice as to how to access amenities and services and choice to live more active, engaged, independent and healthy lifestyles'* (Paragraph 15).
- 17.2.2 The Stirling Local Development Plan 2018² Vision states that, *"By 2037 the Plan will have contributed to the delivery of high quality new development in places which support local businesses; help sustain and build local communities; contributes to the health and wellbeing of local residents; and are attractive to visitors"* (P. 12).

Guidance

- 17.2.3 This Chapter has been prepared with reference to *'Health in Environmental Impact Assessment'*³ published by the Institute of Environmental Management and Assessment (IEMA).

¹ Scottish Government, (2014), 'Scottish Planning Policy', Available [online] at: <http://www.scotland.gov.uk/Resource/0045/00453827.pdf>

² Stirling Council, 2018, Local Development Plan 2018.

³ Institute of Environmental Management & Assessment, 2017, 'Health in Environmental Impact Assessment', Available [online] at: <https://www.iema.net/assets/newbuild/documents/IEMAPrimeronHealthinUKEIADocV11.pdf>

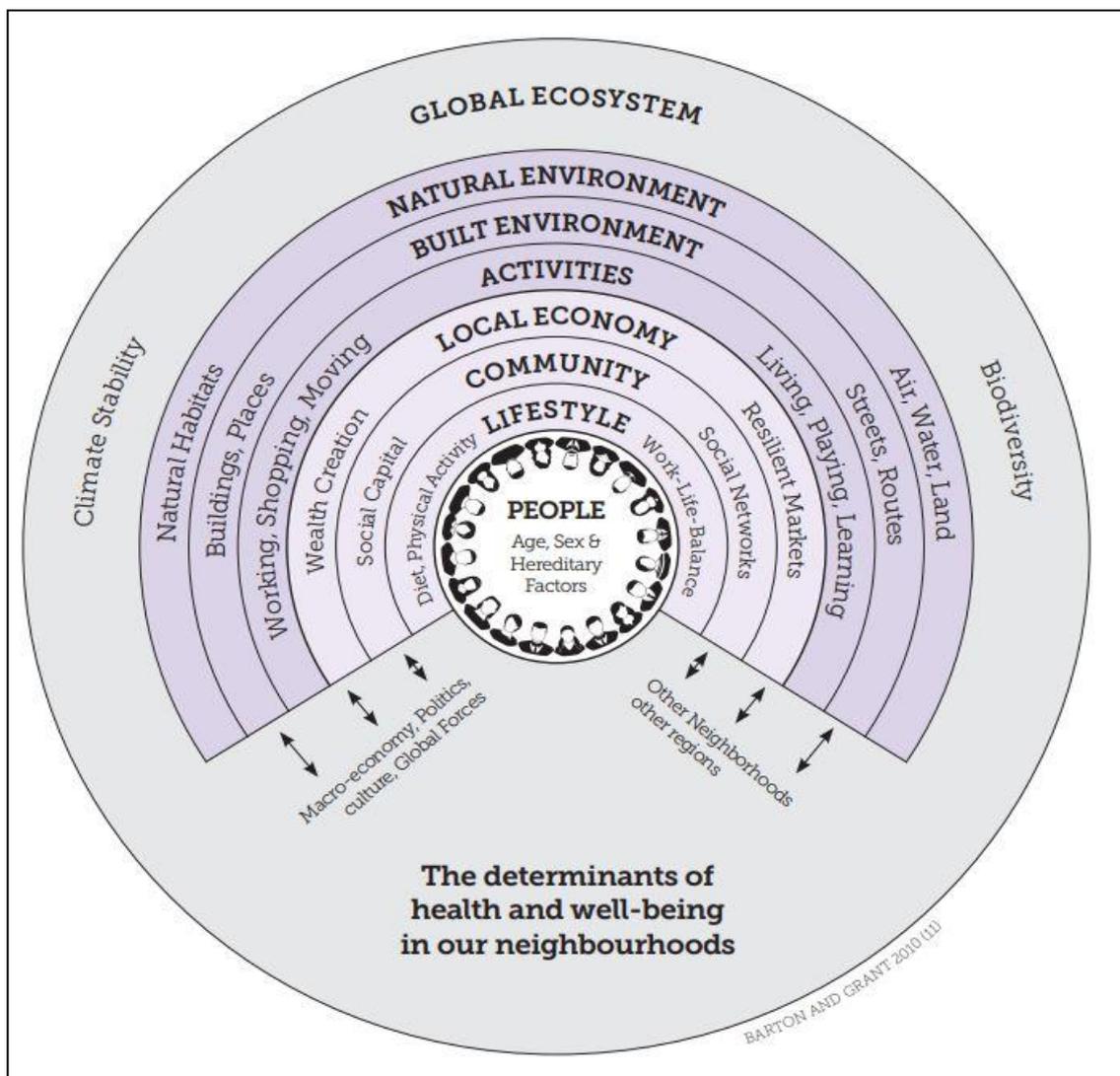


Figure 17.1 Determinants of health and wellbeing in our neighbourhoods⁴

Consultation

17.2.4 A request for a Scoping Opinion for the Proposed Development was submitted to Stirling Council (SC) in February 2020. The Scoping Opinion, received on 23rd April 2020, contained the following advice of specific regard to the subject area of human health.

Table 17.1 Consultation Summary

Consultee	Issue Raised	Action
SC	It is noted that the Report considers that a separate chapter on Health Impacts should be scoped out – stating that the inclusion of air quality, noise impact, and transport assessments will assess likely effects, including those on human health. Given the new Planning Act requires consideration be given, before permission is granted for either national or major developments, to the likely	Chapter 17 Human Health has been prepared.

⁴ Institute of Environmental Management & Assessment, 2017, 'Health in Environmental Impact Assessment', Available [online] at: <https://www.iema.net/assets/newbuild/documents/IEMAPrimeronHealthinUKEIADocV11.pdf>

	<p>health effects of the proposed development, consider there is merit for any Environmental Report to have a separate chapter addressing the issue. This may draw upon the findings of technical assessments informing separate chapters such as transport, but should also seek to include assessment of impact relative to location, quality of place, buildings, and open spaces relative to health and wellbeing.</p>	
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17.2.5 At the time of writing, no further correspondence relating to human health had been received from any of the consultees and the foregoing response was used as the basis for the finalised scope of the study.

17.3 Proposed Development Assessment

Potential effects

Air Quality

17.3.1 The natural environment is a key determinant identified within Figure 17.1 with air quality forming a key component of this.

17.3.2 Air pollution from road traffic can affect human health through the inhalation of toxic gases and particles. The main pollutants of concern in the study area are likely to be long-term exposure to NO₂ and airborne particles e.g. PM₁₀ and PM_{2.5}.

17.3.3 Notwithstanding, as outlined within chapter 15, the predicted effects from exposure to NO₂ as a consequence of the Proposed Development are of negligible significance at all sensitive receptors considered within the study area. NO₂ in the study area is predicted to continue to remain below the UK's statutory annual mean limit value. The predicted effects from exposure to particles as PM₁₀ and PM_{2.5} are of negligible significance at all receptors considered within the study area.

Noise & Vibration

17.3.4 Noise sources, as detailed in chapter 14, such as road traffic from the M9 and the A84 have the potential to adversely affect the health and amenity of future occupiers and residents within the Proposed Development.

17.3.5 Notwithstanding, as detailed in chapter 14, zones have been identified where mitigation measures are required to protect residential amenity. Mitigation measures will include: use of buffer areas to separate noise sensitive development from noisy activities, use of layout and design to reduce noise in private gardens, and use of acoustic glazing and acoustic trickle vents to ensure that noise inside dwellings will comply with appropriate criteria.

Traffic & Transport

17.3.6 Parking provision for the Proposed Development (Detailed Application) will represent a reduction in parking provision from what is currently provided on site for office uses. This in combination with the extensive active travel provision being incorporated within both the Proposed Development (Detailed Application) and Proposed Development (PPiP Masterplan) which will encourage more sustainable travel patterns by users of the Site. An increase in sustainable travel patterns can contribute positively towards users' health and wellbeing with

Figure 17.1 setting out the importance of ensuring the built environment contributes towards the objective of increasing health and wellbeing.

- 17.3.7 The introduction of a new access point into the North Site and the Proposed Development (Detailed Application) combined with the vehicular access strategy set out for the Proposed Development (PPiP Masterplan) has been designed to reduce conflicts at these access points, and will seek to reduce the risk of any queuing back onto the trunk road network. In doing so, the resultant effect of the Proposed Development on accidents and road safety is considered to be insignificant.

Sustainability

- 17.3.8 Craigforth Campus is accessible on foot, by bike and via public transport. Active travel has been promoted through the provision of extensive pedestrian and cycle networks allowing the public and campus users to utilise these proposed amenities and promote healthy lifestyles.
- 17.3.9 The Proposed Development (PPiP Masterplan) includes the extensive provision of pedestrian and cycle ways throughout the Site which help to improve its permeability while encouraging users to make more positive active travel choices.
- 17.3.10 The implementation of the Energy Strategy (see Technical Appendix 18.2) will assist in reducing carbon dioxide emissions.
- 17.3.11 Although district heating is not considered viable for the Proposed Development (Detailed Application), due to the absence of existing networks (see analysis in Technical Appendix 18.2), the accompanying Energy Statement (Technical Appendix 18.2) for the Proposed Development (PPiP Masterplan) details that there is potential for the creation of a new heat network to serve the Proposed Development (PPiP Masterplan), particularly the residential uses and potentially the mix of uses located in the Central Sub-Area. This is due to these plots accommodating buildings that are likely to have sufficient heat demands that could support it.

Landscaping

- 17.3.12 The provision of the landscaping and public realm strategy (see Design & Access Statement), enables key valuable assets within the Site, including the Crag, Ancient Woodland and Riverside to be utilised for health and wellbeing activities by the public and campus users. These assets are currently underutilised with access to the public limited and difficult to obtain due to the predominantly business nature of the Site.
- 17.3.13 The Site's natural assets are to be considerably enhanced and made more accessible with the provision of a diverse range of active and passive landscapes that are inter-related and offer opportunities for interaction. It is proposed that approximately 30ha of the Site will be retained and enhanced to provide valuable provision of accessible open space.
- 17.3.14 These landscaped areas will provide the public and campus users access to multi-sensorial, quiet environments while spaces will also be available for social interaction and fitness activities. As set out in Figure 17.1, the inclusion of these facilities will enable certain lifestyle choices allowing physical activities to be undertaken within the Site.
- 17.3.15 Opportunities and the provision of the necessary landscaping for the public and campus users to dwell, socialise and take exercise in an attractive setting is considered to have a major beneficial effect.
- 17.3.16 The introduction of extensive tree planting, in addition to the existing mature tree coverage within the Site, enhances the biodiversity value of the Site (a key determinant of health and

wellbeing as per Figure 17.1) and can contribute towards carbon off-setting.

17.3.17 The provision of a green buffer will allow the incorporation of extensive acoustic mitigation from the M9 addressing potential adverse effects on new residents' and occupiers' health and amenity.

Design

17.3.18 The built environment is a key determinant identified within Figure 17.1 with buildings and places forming a key component of this and integral contributors towards users' health and wellbeing.

17.3.19 The Proposed Development (Detailed Application) incorporates a design to exploit natural light which will provide a pleasant working environment. Due to the siting of the building and its orientation, views out across the distinctive natural and designed elements of the landscape and local environment can be enjoyed by users.

17.3.20 Furthermore, the Proposed Development (Detailed Application), has been designed to include spaces that promote health and wellbeing helping to enhance the wellness and productivity of occupants, staff, and visitors. The inclusion of cycle parking and showers within the Proposed Development (Detailed Application) encourages employees to make positive active travel decisions to get to and from work due to the increased accessibility of the Site. This in turn helps to promote health and wellbeing for future occupants.

17.3.21 Within the Proposed Development (PPiP Masterplan), provision for intergenerational living has been incorporated into the Illustrative Masterplan (see Figure 3.3) with the inclusion of a care home, retirement flats and sheltered housing along with traditional market housing. The provision of a mix of tenures have been designed to meet the changing needs of residents and will allow access to a variety of quality housing for a wider range of people depending on the level of care required (if any). The mix of tenures will help to facilitate a diverse range of potential residents who can access quality accommodation within Stirling.

17.3.22 The provision of affordable homes within the Proposed Development (PPiP Masterplan) will provide an increased opportunity for those on lower incomes to gain access to much need housing. This will in turn contribute towards a reduction in the number of people living in poor quality housing or temporary accommodation within Stirling.

17.4 Summary

17.4.1 An assessment has been made of the likely significant effects of the Proposed Development on the environment with respect to human health and wellbeing determinants as identified within Figure 17.1.

18. Climate Change & Sustainability

18.1 Introduction

18.1.1 The Adopted Stirling Local Development Plan 2018¹ (LDP) is clear that the primary link between National Policy aims and the Stirling Council's (the 'Council') own objectives and policies is the Overarching Policy and the Sustainable Development Criteria set out in the LDP.

Climate Change

18.1.2 In addition, and complementary to the above policies and supplementary guidance², the Council has identified and provided policy and guidance in relation to Climate Change. Specifically, the Council is concerned in relation to the rate and scale of change and the underlying cause of these changes – the growing emissions of greenhouse gases associated with human activity increasing carbon dioxide (CO₂) and other greenhouse gas emissions.

18.1.3 For these reasons, the world-leading Climate Change (Scotland) Act 2009 (as amended) was passed unanimously by the Scottish Parliament. Scottish Government emission reduction targets are to reduce national greenhouse gas emissions from a 1990 baseline by 56% by 2020, 75% by 2030 and 90% by 2040.

18.1.4 The Council agrees that adapting to the consequences of a changing climate requires appropriate action, based on assessments of risk and vulnerability. Scotland's statutory Climate Change Adaptation Programme³ addresses the risks identified for Scotland in the UK Climate Change Risk Assessment⁴ (CCRA). The Council have also committed to this approach by signing the Covenant of Mayors' Initiative on Adaptation to Climate Change in October 2014.

18.1.5 This chapter demonstrates how the Proposed Development at Craigforth Campus meets the requirements of the Council's pledges, policy, and guidance in relation to the Climate Adaption Strategy for Stirling 2016⁵. Specifically, it demonstrates how the Proposed Development contributes to mitigating the effects of climate change through actions that reduce our contribution to the causes of climate change, by reducing greenhouse gases and enhancing carbon storage.

Sustainability

18.1.6 The Climate Change agenda drives the Council's policies and, in this regard, within the LDP there is a presumption in favour of development that contributes to sustainable development which meets the Council's Sustainable Development Criteria.

18.1.7 This Chapter demonstrates how the Proposed Development meets each of these criteria and how the Applicant has considered the sustainable aspirations of the Council for development and, along with the more detailed (Primary Policy 4, Policy 4.1 of the LDP) and supplementary policies (such as Supplementary Guidance SG17 Low and Zero Carbon Buildings 2014⁶ and Supplementary Guidance Historic Environment and Micro Renewables 2019⁷) how they will assess the proposal and reach a consented planning decision.

1 Stirling Council, 2018, Local Development Plan 2018.

2 <https://www.stirling.gov.uk/planning-building-the-environment/planning/development-planning/supplementary-guidance/>

3 <https://www.gov.scot/publications/climate-ready-scotland-second-scottish-climate-change-adaptation-programme-2019-2024/pages/6/>

4 <https://www.theccc.org.uk/publications/third-uk-climate-change-risk-assessment/>

5 <https://www.stirling.gov.uk/media/7586/climate-adaptation-strategy.pdf>

6 https://www.stirling.gov.uk/media/3411/sg17-low-and-zero-carbon-buildings_oct-2014.pdf

7 https://www.stirling.gov.uk/media/20528/sg-energy-efficiency-micro-renewables-27_02_2019.pdf

Consultation

- 18.1.8 Prior to the submission of the applications, the applicant has consulted with planning and technical officers at Stirling Council and with relevant statutory consultees and experts.
- 18.1.9 In relation to Climate Change & Sustainability, the Council's feedback has been in the context of: The Built Environment, Urban Design and BREEAM; Flood Risk Sustainability; Surface Water Drainage and Energy Statements (Technical Appendix 18.1 – Energy & Sustainability Statement; Proposed Development (Detailed Application) and Technical Appendix 18.2 – Energy Statement; Proposed Development (PPiP Masterplan). The Council's Sustainability Officer has specifically commented on Roads & Transport and the need for this stand-alone Climate Change & Sustainability Chapter; Biodiversity and Habitats Regulation Assessment; Carbon Reduction and Climate Adaptation.

18.2 Assessment method

- 18.2.1 As there is no single methodology guidance for measuring impacts on climate change and sustainability, with each strand of the sustainability agenda (for example energy, biodiversity, the built and natural environment etc.) having their own methodologies and standards relevant to each assessment, in addition to the individual chapters of this Environmental Impact Assessment Report dealing with each, this chapter focuses on how the Proposed Development meets each of the sustainability criteria with the Overarching Policy and the Sustainable Development Criteria of the LDP. In doing so, each section will adopt the relevant assumptions made in each chapter undertaking the assessments, making reference to consultations undertaken where relevant.

Guidance

- 18.2.2 As mentioned above, in addition to Primary Policies relating to sustainability and carbon reduction and climate change, the LDP and Overarching Policy carry a presumption in favour of development that contributes to sustainable development which meets the Council's Sustainable Development Criteria. As such this Environmental Impact Assessment Report demonstrates the Applicant's assessment of the Proposed Development's:
- (a) Compatibility with the Spatial Strategy and conformity with the relevant Sustainable Development Criteria;
 - (b) Design-led approach, including high standards of design, reinforcement of a sense of place, integration with neighbouring areas and the wider community;
 - (c) Adoption of measures for mitigation of and adaptation to climate change which seek to ensure an area's full potential for electricity and heat from renewable sources;
 - (d) Appropriate measures for the safeguarding, conservation and enhancement of the historic and natural environment;
 - (e) Safeguarding and appropriate management and utilisation of natural resources.
 - (f) Adherence to the principles of the National Planning Framework proposal for a Central Scotland Green Network⁸, with relevant contributions to local and national Green Network and Green Infrastructure objectives.
- 18.2.3 Specifically, this Climate Change & Sustainability Chapter demonstrates how the Proposed Development meets the Council's eleven Sustainable Development Criteria:

⁸ <https://www.gov.scot/publications/national-planning-framework-3/pages/3/>

1. Improvement of the overall quality of the built environment;
2. Contribution to reduction in greenhouse gas emissions, in line with or better than national targets, and encouragement of energy and heat efficiency, and the use of low and zero carbon power generation;
3. Reduction of the need to travel and reliance on the private car by encouraging active travel and other more sustainable travel and transport opportunities;
4. Support of Zero Waste objectives, and minimising life-cycle resource requirements;
5. Avoiding areas at risk of flooding and erosion;
6. Protection and enhancement of historic and cultural environments, and the natural environment (including biodiversity and landscape), and responsible access to such environments;
7. Minimising adverse impacts on water, air and soil quality;
8. Supporting healthy and safer lifestyles, by improving access to amenities, promoting access to open space and other recreation opportunities and by addressing environmental problems;
9. Involving re-use and/or regeneration of previously used land and property, including derelict and contaminated land, and the re-cycling of construction materials;
10. Making efficient use of existing and new infrastructure; and
11. Creating net economic benefit for the area.

Additional Consultation

- 18.2.4 In addition to the EIA scoping exercise, the applicant has consulted with planning and technical officers at Stirling Council other statutory consultees. In relation to Climate Change & Sustainability the main items of feedback were in the context of: Landscape; Biodiversity; Ground Conditions and the Existing Historic environment.

18.3 North Site (The Proposed Development (Detailed Application)) Assessment

1. Improvement of the Overall Quality of the Built Environment

Assumptions and Limitations

- 18.3.1 Place making, from a Statutory Planning perspective, is the key development strategy that determines our built environment. Planning has moved away from a 'generic zoning' approach to a specific urban and townscape led evaluation process. Therefore, a key consideration in the development of The Proposed Development is to ensure the built environment element addresses the main criteria of the Scottish Government's 'Place Making Policy' directive.
- 18.3.2 The assumption of the Applicant therefore is that the Council is in favour of the development of a new office headquarters on the North Site that will allow the existing office campus to continue to operate whilst construction is in progress, maintaining a sustainable place for occupants to work and enjoy. This allows existing financial services employers to be retained in this key location and enables development of a range of complimentary facilities that are not currently available on site and are important for the long-term sustainability of the Site. See the accompanying Design & Access Statement for further information.

Baseline conditions

- 18.3.3 As detailed in the accompanying Design & Access Statement for the Proposed Development (Detailed Application) and this Environmental Impact Assessment Report, the existing built environment at the North Site is not suitable for medium to long term requirements. Buildings are ageing, involve significant maintenance and have poor energy efficiency. They are not suitable to upgrade or adapt to suit modern ways of working and energy standards both in terms of their configuration and the costs that would be involved. The North Site is therefore experiencing a resulting gradual reduction in its ability to retain and attract talent and maintain sustainable levels of employment.
- 18.3.4 The spaces between the buildings and wider landscape provide a very poor environment for pedestrians and amenity, despite the stunning setting, which includes Stirling's third Crag (the others having the Castle and the Wallace Monument on them), a key Listed Building, attractive woodland and the opportunity for an attractive riverside environment connecting into Stirling's broader aspirations for the riverside, landscape and path network throughout the city and beyond. Public access is not encouraged to Craigforth currently and it does not feel very safe or secure if it was.
- 18.3.5 The existing Prudential Campus comprises a number of office and ancillary buildings that have been constructed, extended and adapted over a period of some 70 years and many of these buildings date back to the 60s and 70's, are inefficient, costly to run and maintain and their design and plan arrangements do not lend themselves to modern working practices.
- 18.3.6 Some of these are buildings on the North Site which have been developed over the last 50 years or so and have varied architectural styles which are showing signs of age. These are mainly fairly large office buildings of 3 to 5 storeys in height with some other lower buildings such as Lomond View which is a former large garage converted into an office space. This mix of buildings accommodates around 3,000 staff.
- 18.3.7 Access to the Site is from the north. This leads to car parking areas including 1,396 spaces serving the office buildings. Pedestrian access is poor. Staff also park on the other side of the main road next to the river and on the other side of the motorway at the park & ride and casually in front of the Kildean Business Park. Although there is significant parking, the trees and Crag are the dominant feature.
- 18.3.8 The Site is largely inaccessible to the public.

Changes likely to occur over time in the absence of developing the project

- 18.3.9 In the event that the Proposed Development is not developed, it is anticipated that the ageing of the built environment and buildings will continue and result in the need for more and more significant and inefficient maintenance. The buildings will continue to have poor, worsening energy efficiency. The undeveloped buildings will continue to provide increased difficulty for modern ways of working (including flexible working patterns due to COVID) and energy standards will become more and more difficult to achieve both in terms of their configuration and the costs that would be involved. This is anticipated to result in the campus experiencing an increase in its inability to retain and attract talent and resulting difficulty in attracting employers.
- 18.3.10 As the ageing buildings continue to fall into poor condition, in the absence of the Proposed Development (Detailed Application), it is anticipated that the spaces between the buildings and wider landscape will continue to provide a poorer and poorer environment for pedestrians and amenity as years go by.

Potential effects

- 18.3.11 The riverside location is a valuable natural and sustainable asset for the development the North Site, and it is the intention of the Applicant to use the built environment to maximise the riverside's sustainable amenity and views. Likewise, an arrangement of planted trees sustainably mitigates the existing parking layout along with trees around the perimeter of the site and a natural green landscape mitigating the carpark tarmac surface area. Key aspects during public consultation were the opportunities and effects on sustainable active travel to be provided by the built environment in the Proposed Development (Detailed Application) and it is the Applicant's intention to provide increased sustainable transport opportunities such as segregated and combined cycle routes and footways connecting with existing routes to the West, to the East into Stirling and into the wider sites and beyond. Details can be found in the accompanying Design & Access Statement and relevant chapters of this Environmental Impact Assessment Report.
- 18.3.12 The Design & Access Statement details the Applicant's absolute dedication to providing built environment with sustainability at its core. Health and wellbeing through enhancement of the North Site's existing natural assets such as the Crag, Ancient woodland and the Riverside are demonstrated throughout the Proposed Development (Detailed Application) as key drivers. Likewise, the Applicant's sustainable approach to development is demonstrated through their careful consideration of the natural landscape, maintenance of the unique identity of the ancient woodland, sensitive treatment of Craigforth House and nearby conservation village, careful consideration of globally recognised landmarks such as the Wallace Monument and Stirling Castle and focus on the active travel potential provided by the Proposed Development (Detailed Application)'s connection to Stirling and beyond.
- 18.3.13 The Proposed Development (Detailed Application)'s sustainable built environment strategy also appropriately considers sustainable transport, building design and energy use as highlighted in detail in the accompanying Design & Access Statement and later sections of this Chapter.

2. Contribution to reduction in Greenhouse Gas Emissions, in line with or better than national targets, and Encouragement of Energy and Heat Efficiency, and the use of Low and Zero Carbon Power Generation

Assumption and Limitations

- 18.3.14 As detailed above, Climate Change is a key consideration for the Council, and this is mirrored by the team that the Applicant has put together to deliver the vision for the Proposed Development (Detailed Application) by the sustainable and environmentally conscious experts who have been engaged as part of the Applicant's design team.
- 18.3.15 With regard to climate change, energy and carbon reduction, this section demonstrates compliance with the LDP policies noted above along with Supplementary Guidance SG17. The following examines the Applicant's approach at the Proposed Development (Detailed Application) and is supported by additional reports carried out on the Applicant's behalf by Atelier Ten.

Baseline conditions

- 18.3.16 As mentioned above, the current buildings are ageing and inefficient. The current Energy Performance Certificates rate the main office building well below the recommended ratings of a building of this type (built to building regulations standards current at the date of issue of the certificates). For example, the main office building is rated E as opposed to the recommended rating of D (at the time of certification) and provides for 0 kgCO₂/m² displaced by the use of

renewable sources.

Potential effects

- 18.3.17 Climate Change has been at the forefront of the mind of the Applicant with sustainability and low carbon design principles being a fundamental aspect on the design during the evolution of the Proposed Development (Detailed Application). The Proposed Development (Detailed Application) implements passive design measures to reduce energy demand with highly efficient systems and Low and Zero Carbon Generating Technologies (LZCGT) applied to minimise operational carbon emissions.
- 18.3.18 The Energy and Sustainability Statement (Technical Appendices 18.1 and 18.2) accompanying this Environmental Impact Assessment Report provides a detailed response to Primary Policy 4 (Green House Gas Reduction), Policy 4.1 (Low and Zero Carbon Buildings) and Policy 4.3 (Heat Generation) of the Stirling LDP 2018.
- 18.3.19 In the development of the buildings' energy strategy, an energy hierarchy process of reducing energy demand through passive measures has been adopted, applying highly efficient systems, and the application of LZCGT.
- 18.3.20 The proposed solution for the Craigforth office building involves high levels of fabric thermal performance, Variable Refrigerant Flow/ Air Source Heat Pump (ASHP) technology as the primary heating and cooling system with mechanical ventilation incorporating heat recovery. In addition to the ASHP technology, a photovoltaic array (circa 145m²) generating 25 MWh of renewable electricity is proposed. By implementing these measures, the requirements of the above planning policies are achieved, with energy modelling demonstrating a 20% reduction in carbon emissions as required by Policy 4.1 through the application of LZCGT.
- 18.3.21 Sustainable development design to mitigate the effects of climate change also features high on the agenda in the North Site Proposed Development (Detailed Application). The building designs aim to include the creation of spaces that promote health and wellbeing which will enhance the wellness and productivity of occupants, staff, and visitors. Similarly, high standards in sustainable design and construction will be implemented in accordance with Stirling LDP, including water conservation, drainage impact, waste recycling, material selection and sustainable transport. In addition, the development is considering Building Research Establishment Environmental Assessment Method (BREEAM) Excellent certification against the BREEAM 2018 New Construction scheme.
- 18.3.22 Although district heating is not considered viable for the stand-alone Proposed Development (Detailed Application), due to the absence of existing networks (see analysis in Technical Appendix 18.2), the accompanying Technical Appendix 18.2 for the Proposed Development (PPiP Masterplan) below details that there is potential for the creation of a new heat network to serve the Proposed Development, particularly the southern residential site and potentially the central site. This is since these plots will accommodate buildings that are likely to have sufficient heat demands that could support it.
- 18.3.23 Further environmental analysis is required to determine whether there is sufficient heat density (i.e. the number, size and proximity of buildings to each other) to support a district heating network for these areas, as significant amounts of energy can be lost through underground pipe work which impacts the efficiency of the system. Similarly, an economic analysis is required to determine the financial feasibility for district heating through a counterfactual assessment. This analysis will be provided in detail in The Proposed Development (PPP Masterplan) as part of the future Approval of Matters Specified in Conditions (AMSIC) application and specifically how, where viable, the Proposed Development (Detailed Application) for the North Site can benefit.

18.3.24 Further details can be found in the accompanying Energy and Sustainability Statements and relevant chapters of this Environmental Impact Assessment Report.

3. Reduction of the Need to Travel and Reliance on the Private Car by encouraging Active Travel and other more Sustainable Travel and Transport Opportunities

Baseline conditions

18.3.25 Despite the number of separate buildings and ancillary accommodation, provision of welfare and amenity facilities has historically been very limited at the North Site - there is limited secure cycle storage and associated facilities to support cycling and other sustainable active travel initiatives. The building is located close to existing public transport links on the A84 as well as existing and proposed active travel connections - new cycling and pedestrian routes along the A84 connect with Stirling city centre and beyond.

Potential effects

18.3.26 A functional road hierarchy will be developed through the Site ensuring ease of access to public transport. Pedestrian and cycle features will be incorporated within the Proposed Development (Detailed Application) where the design of the internal walkways will ensure easy, quick, safe and convenient access to all elements of the site for pedestrians and cyclists. The strategy aims to build upon the existing facilities and extend them into and throughout the Site in a sustainable way, thus creating continuous, uninterrupted pedestrian and cycling networks that connect the Proposed Development (Detailed Application) into the wider area.

18.3.27 The site will also be connected via new leisure routes proposed for the wider the Proposed Development (PPP Masterplan) and on to connections out with the Proposed Development. Further details can be found in the accompanying Design & Access Statement (Connections and Active Travel) and relevant chapters of this Environmental Impact Assessment Report. These sections illustrate that although currently not well served by sustainable transport opportunities, there are proposals to improve this substantially with segregated and combined cycle routes and footways connecting with existing routes to the West, to the East into Stirling and into the wider masterplan through the site to the South and beyond.

4. Support of Zero Waste objectives, and Minimising Life-Cycle Resource Requirements

Potential effects

18.3.28 A Zero Waste strategy combines prevention, reuse and recycling with designs that consider entire product life cycles. The Proposed Development (Detailed Application) supports the principles of "Reduce, Reuse and Recycle". Every opportunity will be taken to minimise the amount of cut and fill on the North Site. Where ground conditions are appropriate, material will be extracted for use on the North Site and elsewhere. The material palette chosen will reflect the natural landscape and architecture of the area. Wherever possible, materials will be responsibly sourced from local suppliers which will support the local economy and reduce transport distances and subsequently emissions. Innovative construction methods in the Applicant's suppliers' factories and on-site, allowing greater quality control and minimises waste.

18.3.29 Opportunities also exist within the Proposed Development (Detailed Application) for the construction of roads made from recycled material. The design team are familiar with the use of recycled waste plastic in surfacing new roads, reducing the amount of bitumen in the asphalt.

For every tonne of bitumen replaced, the road surfacing carbon footprint is reduced by a tonne of carbon dioxide. Subject to further agreement with Stirling Council and Transport Scotland and other relevant consultees, it is hoped this innovative solution can be at least investigated further if not utilised at the Proposed Development (Detailed Application).

- 18.3.30 As detailed in the Energy and Sustainability Statement, a Site Waste Management Plan (SWMP) will be developed and implemented according to best practice as part of the Sustainability Strategy. This will enable reduction and effective management of construction site waste. Recycled and/or secondary aggregates (if these can be reasonably procured) will be used in construction, thereby reducing the demand for virgin material. Adequate dedicated storage space for non-recyclable and recyclable waste generated by the building's occupants and visitors will be provided. This will enable appropriate management of waste disposal during building operation. A refuse storage facility is proposed for the new building providing space for refuse containers. The refuse store will be located close to the building entrance within the west car park area providing convenient access from either the north or south building entrances. Refuse collection access will be via the central avenue.

5. Avoiding areas at Risk of Flooding and Erosion

Baseline conditions

- 18.3.31 Although it appears generally level the North Site's topography slopes down towards the river with a resulting 1 in 200-year event floodplain extending inwards from the river edge. Almost half of the north peninsular is currently occupied by surface car parking along with the existing Lomond View building and the remainder is existing natural green landscape, part of which is within the floodplain. Further baseline details can be found in the relevant sections of Chapter 10.

Potential effects

- 18.3.32 A Flood Risk Assessment (FRA) has been undertaken and forms part of this Environmental Impact Assessment Report and the Proposed Development (Detailed Application). The 200-year event flood risk is a site constraint that helps identify the area most suitable for location of a new building. The North Site topography and this 200-year floodplain establishes the most suitable location for a new building is parallel to the A84 on the highest part of the site along the north boundary sitting predominantly within the existing car park.
- 18.3.33 As detailed in Chapter 10, the Proposed Development (Detailed Application) has the potential to alter the hydrological characteristics of the area and impact on flood risk. However, the design has been informed by a site-specific FRA which demonstrates that areas in the north, west and south are likely to flood in a 1 in 200-year flood event. The Proposed Development has therefore been designed to avoid land raising in these areas, in order to avoid any reduction in floodplain storage and associated impacts on receptors elsewhere. A Drainage Design Strategy Report has been produced (see Chapter 11: Drainage & Hydrology) and provides an outline surface water drainage design based on sustainable drainage system (SUDS) principles, which will be incorporated into the Proposed Development to ensure that the greenfield discharge rate is achieved. This will prevent any increase in surface water runoff which could affect downstream receptors.
- 18.3.34 Although there is potential for low magnitude effects during the construction phase of the Proposed Development, these are likely to be temporary and can be mitigated through the application of appropriate additional measures, as outlined in the schedule of mitigation. Residual construction effects have been identified as negligible. With consideration of inherent mitigation, embedded within the design, potential operational effects on flood risk have also

been assessed as negligible. Overall, no significant effects have been identified on flood risk and the Proposed Development (Detailed Application) is considered compliant with the Council's sustainability criteria in this regard.

6. Protection and Enhancement of Historic and Cultural Environments, and the Natural Environment (including biodiversity and landscape), and Responsible Access to such Environments

Baseline conditions

Historical and Cultural Environments

18.3.35 In 1952 Craigforth estate was acquired by Scottish Amicable who initially used Craigforth House as their headquarters. During the 1970s the campus was expanded extensively when many of the current campus buildings were constructed and a modern office conversion was carried out on the main house. In 1973, during this period of campus expansion, Craigforth House was listed Grade B by Historic Scotland.

18.3.36 In 1997, Scottish Amicable were taken over by Prudential who subsequently carried out some redevelopment that was predominantly focused on internal refurbishment of the office buildings and expansion to car parking and roads infrastructure. Overall, there are 17 separate buildings within the campus including 8 office buildings, a conference suite and dining canteen, garages and workshops, an IT suite/Data centre, a security gatehouse and residential units. The North part of the campus is predominantly a large surface car park. Lomond View, a portal framed former garage building was converted to office/call centre as part of Prudential's redevelopment programme.

18.3.37 Chapter 8 of this Environmental Impact Assessment Report provides more detail on the baseline conditions for the Proposed Development (Detailed Application).

Biodiversity

18.3.38 Chapter 9 of this Environmental Impact Assessment Report outlines the baseline in terms of Biodiversity for the North Site. From the River Teith SAC within 0.2 km of the North Site out to and including the Balquhiddelock Wood SSSI/LNR at 4.3 km, all designations in between have been considered as part of the assessments for the Proposed Development (Detailed Application). Chapter 9 also identifies other site habitats, protected mammals, birds and amphibian habitats.

Potential effects – Historic and Cultural Environments

18.3.39 The assessments carried out and detailed in Chapter 8 demonstrate that *inter alia* overall, the Proposed Development (Detailed Application) would have a negligible magnitude effect on the setting of Craigforth House, assessed as being of **negligible** significance: not significant in EIA terms; negligible magnitude effect on the setting of Stirling Castle, assessed as being of **minor** significance: not significant in EIA terms; negligible magnitude effect on the setting of Stirling Castle, Royal Garden and King's Knot, assessed as being of **minor** significance: not significant in EIA terms; low magnitude adverse effect on the setting of Drip Old Bridge, assessed as being of **minor** significance: not significant in EIA terms; low magnitude adverse effect on the setting of Drip Bridge Conservation Area, assessed as being of **minor** significance: not significant in EIA terms; negligible magnitude effect on the setting of Stirling Town and Royal Park Conservation Area, assessed as being of **minor** significance not significant in EIA terms and negligible magnitude effect on the setting of The Wallace Monument, assessed as being of **minor** significance: not significant in EIA terms.

Potential effects – Biodiversity

- 18.3.40 From a sustainability point of view, the Proposed Development (Detailed Application) identifies a number of mitigations which will maintain and enhance the biodiversity of the North Site. For example, good pre-construction planning, site practices, and adherence to relevant pollution prevention guidelines (PPGs) will maintain the sustainable aspects of the Proposed Development (Detailed Application) by ensuring there are negligible adverse effects on the biodiversity of the North Site.
- 18.3.41 Further, an Invasive Species Management Plan is recommended to avoid the illegal spread of species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). In addition, it is recommended that sustainability of biodiversity is maintained through a tree management plan for the North Site which will be devised ensuring that the most ecologically valuable trees are maintained, and any tree to be removed will be subject to detailed bat surveys.
- 18.3.42 In addition, the Environmental Management Plan, accompanying Chapter 9, identifies that the Proposed Development contains extensive greenspace which can be managed in such a way as to aid water management, as well as provide wildlife sites and corridors. Also, establishment of wildflower meadows in the Proposed Development (Detailed Application)'s greenspaces will enrich and support the woodland's wildlife and provide an ecological corridor between the Potential Local Nature Conservation Sites (pLNCS) and the watercourses to the west of the Site. Details of the Proposed Development (Detailed Application) and the proposed Development (PPP Masterplan) proposals for Green and Blue sustainable Infrastructure can be found both in the Environmental Management Plan and the Design & Access Statement. Furthermore, the incorporation of linear green connectivity routes for fossorial water vole, discussed above, will provide additional navigational pathways and foraging resource for bats species.

7. Minimising adverse Impacts on Water, Air and Soil Quality

Baseline conditions

- 18.3.43 For detailed baseline please refer to the Chapters 11 and 15.

Potential effects

- 18.3.44 As intimated above, a Flood Risk Assessment has been carried out alongside a Drainage Assessment, Air Quality Assessment and desktop Site Investigations. The outcomes of these assessments have been built into the sustainable design of the Proposed Development (Detailed Application) and detailed design. The surface water drainage is designed in accordance with the principles of sustainable development. The objective of the SuDS drainage system is to manage the surface water runoff from the Proposed Development by providing flow attenuation, water treatment and controlled discharge or dispersal. The aim is to maintain the predevelopment runoff rate which would be achieved by agreeing a predevelopment runoff rate and designing a system to limit the post development discharge to this value. The preferred method for incorporating SuDS within a development is to provide a series of features forming a management train throughout the site for the storm water.
- 18.3.45 For the construction period, a Construction Environmental Management Plan (CEMP) will be produced identifying the project management structure roles and responsibilities with regard to managing and reporting on the sustainability and environmental impact of the construction phase. During construction, air quality impacts during construction of the proposed development are likely to be in form of dust deposition and emissions from non-road mobile machinery and vehicles accessing the Site.

18.3.46 During construction, vehicles and mobile plant shall be regularly maintained in order to minimise emissions. Air quality impacts during operation of the proposed development arise principally as a result of traffic changes along the local road network. Noise impacts during construction of the Proposed Development may result from plant and machinery associated with the construction phase. Noise impacts during operation of the Proposed Development arise principally as a result of traffic changes along the local road network. Vehicle movements will be kept to the minimum level required and Site roads regularly cleaned to remove debris. Where required, the public will be notified of particularly noisy operations in advance and noise levels will be monitored to ensure that limits are not exceeded. Any plant used on Site would minimise noise emissions and comply with BS5228 Part 1.

8. Supporting Healthy and Safer Lifestyles, by improving access to Amenities, promoting access to Open Space and other Recreation Opportunities and by addressing Environmental Problems;

Potential effects

18.3.47 As part of Proposed Development (Detailed Application) the applicant has looked to encourage active travel throughout the North Site development by linking all parts of the Proposed Development (Detailed Application) by roads and pathways. Further links have been included to link with the existing public transport on the A84 as well as existing and proposed active travel connections - new cycling and pedestrian routes along the A84 connect with Stirling City centre and beyond. The Site will also be connected via new leisure routes proposed for the Proposed Development (PPP Masterplan) and on to connections out with the Craigforth campus and other more informal routes throughout the Site. These linkages help to enhance the proposed Development (Detailed Application) sustainability, encouraging people to make more positive active travel choices due to the accessibility of these proposed routes.

18.3.48 For further information on amenities and routes through the Proposed Development (Detailed Application) are contained within the Design and Access Statement and relevant Chapters of this Environmental Impact Assessment Report.

9. Involving re-use and/or regeneration of previously used land and property, including derelict and contaminated land, and the re-cycling of construction materials.

Baseline conditions

18.3.49 The Proposed Development (Detailed Application) is predominantly on land that has been previously developed.

Potential effects

18.3.50 As intimated above, during construction, waste must be kept to a minimum and opportunities to maximise the use of recycle materials will be considered through Site Waste Management Plans. The Applicant will ensure that wherever practicable waste will be recycled and not disposed to land fill e.g. recycled aggregates such as crushed demolition materials, and suitable excavated material will be incorporated into the works. Waste generated during the construction will be segregated and sorted into material specific skips to be sent for re-processing. Where recycling or re-use is not a realistic option, the Applicant will also ensure that all its waste materials are managed correctly.

10. Making efficient use of Existing and New Infrastructure

Potential effects

- 18.3.51 The Proposed Development (Detailed Application) follows as part of a wider landscape led Masterplan approach which seeks to make best use of existing infrastructure. With it forming part of the mixed-use proposals, new facilities and infrastructure will be required to ensure that the Proposed Development (Detailed Application) is as sustainable as it can be. Connections through a range of transport modes are proposed.
- 18.3.52 New infrastructure is proposed (whilst existing access points) to the Site whilst enhancing the southern approach from Dumbarton Road and providing a new entrance from the A83. Existing Green infrastructure is to be retained where possible and new green networks are to be developed to provide connectivity between habitats and a leafy appearance to the Site. New trees and hedgerow planting will be incorporated to soften new building and infrastructure within setting of Drip Old Bridge. Interwoven green and blue infrastructure will provide onward connectivity between ecological networks and wildlife corridors. Existing green infrastructure will be maintained where possible to retain maturity within the landscape framework, habitat potential and reduce visual impact of new buildings and infrastructure within setting of Drip Old Bridge and Drip Bridge Conservation Area.
- 18.3.53 Details of Blue Green Infrastructure can be found by referring to the accompanying Design and Access Statement.

11. Creating Net Economic Benefit for the Area.

Potential effects

- 18.3.54 As part of the Proposed Development (Detailed Application), Savills, on behalf of the Applicant, undertook a Social - Economic Impact Assessment detailed in Chapter 16 of this Environmental Impact Assessment Report. This concluded that the quantum of new office development will create a range of economic impacts in the local area. Some of the more quantifiable economic impacts of the proposed development include:
- Creating approximately 200 person-years of temporary construction employment, equivalent to 100 temporary jobs for each year of 2 year construction phase at a range of skill levels;
 - Supporting 1,340 direct jobs once the development is operational;
 - Generating £65 million GVA per annum once the development is operational; and
 - Delivering £140,000 of business rates per annum.

18.4 Masterplan Assessment (The Proposed Development (PPiP Masterplan))

- 18.4.1 The Proposed Development (PPiP Masterplan) offers an exciting opportunity to meet and exceed the climate change and sustainability requirements of Stirling Council's planning policies.

1. Improvement of the Overall Quality of the Built Environment

Baseline conditions

- 18.4.2 The most significant Scottish Government Planning Policy and one that has the potential to positively influence the quality of the Proposed Development (PPiP Masterplan), is the

progressive National Place Making Policy⁹.

- 18.4.3 In terms of existing Placemaking, there are currently a number of other buildings on the Site which have been developed over the last 50 years or so and have varied architectural styles which are showing signs of age. These are mainly fairly large office buildings of 3 to 5 storeys in height with some other lower buildings such as Lomond View which is a former large garage converted into an office space. This mix of buildings accommodates around 3000 staff.

Potential effects

- 18.4.4 Alongside the Proposed Development (Detailed Application), the Proposed Development (PPiP Masterplan) seeks to encourage sustainability by opening up public access to the stunning landscape and riverside. This vision is complimentary to wider initiatives centred around key sectors including tourism, heritage, environment, leisure, food & drink and health & well-being.
- 18.4.5 The Proposed Development (PPiP Masterplan) carefully considers the ambitions and priorities of the Council to optimise the benefit of the many excellent attributes of Stirling and the surrounding rural communities by creating the opportunity for a mixed-use campus centred around key objectives of employment, heritage, sustainability, environment and health and wellbeing. Key sectors it recognises are tourism, leisure, rural skills, digital innovation, food and drink, education and intergenerational living, all with sustainability and carbon efficiency at the core.
- 18.4.6 The Applicant's vision for the Proposed Development (PPiP Masterplan) is to deliver a stunning mixed-use campus which will open up sustainable access for all to enjoy the Crag, the ancient woodland and riverside walks with exceptional views to the surrounding landscape.
- 18.4.7 Complementing the North Site Proposed Development (Detailed Application), the Proposed Development (PPiP Masterplan) comprises an additional central site – mixed use and southern site – inter-generational residential areas with sustainable design being the priority driver ethos behind the approach.
- 18.4.8 In terms of the built environment and sustainability, the Proposed Development (PPiP Masterplan) aims to improve the central site as this location is more suitable for a mixed-use development with a similar density and scale to the existing cluster of buildings. Also, improvement is proposed in the southern site by providing low-rise, low density residential development with a focus on intergenerational living, incorporating a varied housing typology that includes a care home and supported living.
- 18.4.9 Sustainable Design details will be finalised in liaison with Stirling Council and its Sustainability Officer and relevant statutory consultees as part of the future Approval of Matters Specified in Conditions (AMSIC) application.

2. Contribution to Reduction in Greenhouse Gas Emissions, in line with or better than National Targets, and Encouragement of Energy and Heat Efficiency, and the use of Low and Zero Carbon Power Generation.

Guidance

- 18.4.10 The Scottish Government has set itself a series of targets towards meeting international and national commitments to control climate change. The Scottish Government introduced the Climate Change (Scotland) Act 2009 (as amended) which is supported by the Electricity Generation Policy Statement (Scottish Government, 2013)¹⁰ and the 'Heat Policy Statement –

⁹ <https://www.gov.scot/publications/scottish-planning-policy/pages/2/>

¹⁰ <https://www.gov.scot/publications/electricity-generation-policy-statement-2013/>

Towards Decarbonising Heat: Maximising the Opportunities for Scotland' (Scottish Government, 2015)¹¹, which outlines the ambition to move towards a fully integrated energy approach in Scotland.

18.4.11 In these policy documents the Scottish Government has published targets for decarbonising the heat and electricity sector including:

- net-zero greenhouse gas emissions by 2045;
- Total final energy consumption in Scotland reduced by 12% by 2020;
- Meeting at least 30% of overall energy demand from renewables by 2020;
- a largely decarbonised heat system by 2050, with significant progress made by 2030;
- Source 11% of heat demand from renewables by 2020;
- Delivering an equivalent of at least 100% of gross electricity consumption from renewables by 2020; and
- An overall target of 1.5 TWh of heat to be delivered by district heating by 2020; and 40,000 homes to be supplied with low cost, low carbon heat through heat networks and communal heating by 2020.

18.4.12 These are an ambitious set of targets that require investment in both energy demand reduction and in energy infrastructure too. The planning and coordination of delivering de-centralised energy development along with district heating networks will assist the achievement of these targets.

18.4.13 The current model for energy supply in the UK was built on economies of scale that relied on the historical abundance of coal and natural gas. At present the majority of electricity generation occurs at large centralised power stations primarily using carbon-intensive fossil fuels and nuclear fuel.

Baseline conditions

18.4.14 The Site relating to the Proposed Development (PPiP Masterplan) currently provides for little or no contribution to reduction in greenhouse gas emissions particularly in terms of the efficiency of the built environment. As demonstrated in tables 18.1 and 18.2 below, all of the existing buildings score well below their recommended energy efficiency ratings (as at the time of issue of certification) and none provide for any displacement of CO2 by the use of renewable sources.

Table 18.1 Energy Performance Ratings

Item	Building	Rating	Score	Recommended Rating
1	Admin Centre	E	77	47 (D+)
2	Bungalow North Craigforth	G	185	32 (C+)
3	Bungalow South Craigforth	G	185	32 (C+)
4	Central 1	E	73	37 (C+)

¹¹ <https://www.gov.scot/publications/heat-policy-statement-towards-decarbonising-heat-maximising-opportunities-scotland/>

5	Central 2	E	71	36 (C+)
6	Central 3	E	79	44 (C)
7	Dining and Conference	F+	87	63 (E+)
8	Garage Craigforth	G	256	80 (E)
9	Gatehouse	C	41	33 (C+)
10	Junior	E+	65	41 (C)
11	Little Stars Nursery	G	113	37 (C+)
12	Lomond View Craigforth	D	60	13 (A)
13	Main Office	G	108	36 (C+)
14	Pru IT Suite	G	108	36 (C+)
15	Riverside	E+	69	37 (C+)

Table 18.2 Displacement of CO2 from Renewable Generation

Item	Building	Rating
1	Admin Centre	0 kgCO2/m2 displaced by the use of renewable sources.
2	Central 1	0 kgCO2/m2 displaced by the use of renewable sources.
3	Central 2	0 kgCO2/m2 displaced by the use of renewable sources.
4	Central 3	0 kgCO2/m2 displaced by the use of renewable sources.
5	Dining and Conference	0 kgCO2/m2 displaced by the use of renewable sources.
6	Gatehouse	0 kgCO2/m2 displaced by the use of renewable sources.
7	Junior	0 kgCO2/m2 displaced by the use of renewable sources.
8	Pru IT Suite	0 kgCO2/m2 displaced by the use of renewable sources.
9	Riverside	0 kgCO2/m2 displaced by the use of renewable sources.

Methodology

18.4.15 The Applicant is fully committed to assessment of the viability of Decentralised Energy in the Proposed Development (PPIP Masterplan) which broadly refers to energy that is generated more locally to the source of demand than the traditional centralised energy system. This means local generation of electricity (or in some circumstances heat only) and where appropriate, the recovery of surplus heat from this generation or other industrial uses for purposes such as building space heating and domestic hot water production.

18.4.16 Decentralised energy generation technology being considered by the Applicant includes the
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potential of sustainable generation such as micro-renewables, wind turbines, energy from waste, combined heat and power, heat only boilers (including biomass), heat pumps, geothermal, anaerobic digestion and solar amongst others. Combining these solutions with smart network infrastructure as well as heat and electricity storage solutions allows the potential for balancing of the heat and power networks.

18.4.17 Initial assessments and preparation for the Proposed Development (PPiP Masterplan) Energy Master planning carried out by the Applicant's Design Team (see Technical Appendix 18.2) are:

- Data Collection:
 - Heat demand, tenure, ownership, location, current heat and electricity supply;
 - Development of an energy demand map and database of the opportunity area; and
 - Development of a supply map, categorising each supply asset.

18.4.18 In addition to the Proposed Development (Detailed Application) additional Energy & Sustainability Report (Technical Appendix 18.1) carried out on the Applicant's behalf by Atelier Ten, further expanded assessments for the Proposed Development (PPiP Masterplan) are being carried out which follow the following methodology.

- Energy Strategy:
 - Deciding the areas to be connected and the heat supply asset(s) to be used, taking into consideration information from stakeholder engagement and strategic objectives to be adopted (e.g. fuel poverty and carbon reduction);
 - Determining the modelling scenarios to be tested; and
 - Determining the network route required (if applicable).
- Technology Options Appraisal;
 - Developing hourly energy model for the system;
 - Assessing the low and zero carbon technology supply options for the project; and
 - Sizing key technical assets such as the energy distribution network and supply assets.
- Economic Assessment;
 - Determine capital and reinvestment costs for key assets;
 - Determine fuel costs and other operational and maintenance costs; and
 - Carry out whole life costing of the project opportunity in terms of payback, IRR and NPV.
- Comparative Assessment;
 - Assessment of each of the modelled scenarios based on the project owners' key drivers; and
 - Ranking of the modelled scenarios and recommendations for feasibility assessment.
- Report key recommendations;
 - Produce high level maps of the proposed opportunity; and
 - Set out key risks that need to be addressed at feasibility stage.

Potential effects

18.4.19 As detailed above there is potential for the creation of a new heat network to serve the Proposed Development, particularly the southern residential site and potentially the central site. This is since these plots will accommodate buildings that are likely to have sufficient heat demands that could support district heating. Further environmental analysis is, however, required to determine whether there is sufficient heat density (i.e. the number, size and proximity of buildings to each other) to support a district heating network for these areas, as significant amounts of energy can be lost through underground pipe work which impacts the efficiency of the system. Similarly, an economic analysis is required to determine the financial feasibility for district heating through a counterfactual assessment.

18.4.20 The Council advises that conditions will be attached to any Planning Permission in Principle (PPP) approvals that will require further details of the measures to be used to achieve the emission targets to be submitted in the form of an updated statement alongside applications for Matters Specified in Conditions (AMSIC). The updated statement will contain the further details of the low carbon technology feasibility including calculations required to demonstrate compliance with Policy 4.1.

3. Reduction of the Need to Travel and Reliance on the Private Car by encouraging Active Travel and other more Sustainable Travel and Transport Opportunities

18.4.21 The Applicant's masterplan strategy for the Proposed Development (PPiP Masterplan) comprises 3 principle development zones. Each has a different character and a different relationship with the Crag and the surrounding landscape – the Applicant has developed a strategy that is site specific and responds to the character and the opportunities of each of the 3 areas whilst working within the site constraints.

Potential effects

18.4.22 A key consideration in developing the masterplan will be connectivity both within the site and beyond and an active travel plan with a focus on walking, cycling, and jogging routes along with public access to the Riverside and the Crag will be a central feature of the masterplan.

18.4.23 Sustainable Design details in terms of active travel plans will be finalised in liaison with the Council and its Sustainability Officer and relevant Statutory Consultees as part of the future Approval of Matters Specified in Conditions (AMSIC) application.

4. Support of Zero Waste objectives, and Minimising Life-Cycle Resource Requirements

18.4.24 In addition to the provisions within the Proposed Development (Detailed Application), the Proposed Development (PPiP Masterplan) proposes additional recycling points as these will be the best positions to serve the local community and offer convenient facilities to recycle a range of materials. These areas would be suitable screened to reduce any impact on amenity and located to ensure access by both users and collection crews.

18.4.25 Commercial activities and employment use within the Proposed Development (PPiP Masterplan) will comply with regulations on waste at the time of operation. At a domestic level,

the Scottish Technical Standards¹² would also be followed with a variety of materials used to screen communal bins within flatted areas to ensure that they are compatible with their surroundings. In accordance with Scottish Technical Standards, areas of hard standing would be provided to store kerbside bins. The buildings will be equipped with adequate space for segregation of waste to encourage occupiers to recycle.

18.4.26 During construction, waste will be kept to a minimum and opportunities to maximise the use of recycle materials will be considered through Site Waste Management Plans. The Applicant will ensure that wherever practicable waste will be recycled and not disposed to land fill e.g. recycled aggregates such as crushed demolition materials, and suitable excavated material will be incorporated into the works. Waste generated during the construction will be segregated and sorted into material specific skips to be sent for re- processing. Where recycling or re-use is not a realistic option, the Applicant will also ensure that all its waste materials are managed correctly.

5. Avoiding areas at Risk of Flooding and Erosion

18.4.27 As detailed in Chapter 10 Flood Risk, although there is potential for low magnitude effects on flood risk during the construction phase of the Proposed Development (PPP Masterplan), these are likely to be temporary in nature and can be avoided or minimised through the application of appropriate additional mitigation measures, as outlined in the schedule of mitigation. Residual (post-mitigation) construction effects have, therefore, been identified as negligible. With consideration of inherent mitigation, embedded within the design, potential operational effects on flood risk have also been assessed as Negligible. Overall, **no significant effects** have been identified on flood risk as demonstrated by table 10.11 Assessment of Effects in Chapter 10.

6. Protection and Enhancement of Historic and Cultural Environments, and the Natural Environment (including biodiversity and landscape), and Responsible Access to such Environments

18.4.28 As detailed in Chapter 8 Cultural Heritage, the introduction of the Proposed Development (PPiP Masterplan) would represent a noticeable change to the current setting and direct effects on two known heritage assets.

18.4.29 That being said, the assessments detailed in Chapter 8 demonstrate that *inter alia* overall, the Proposed Development (PPiP Masterplan) would have a medium magnitude beneficial effect on the setting of Craigforth House, assessed as being of **moderate** significance: significant in EIA terms; would have a negligible magnitude effect on the setting of Stirling Castle, assessed as being of **minor** significance: not significant in EIA terms; would have a negligible magnitude effect on the setting of Stirling Castle, Royal Garden and King's Knot, assessed as being of **minor** significance: not significant in EIA terms; would have a low magnitude adverse effect on the setting of Old Drip Bridge, assessed as being of **minor** significance: not significant in EIA terms; would have a low magnitude adverse effect on the setting of Drip Bridge Conservation Area, assessed as being of **minor** significance: not significant in EIA terms; would have a negligible magnitude effect on the setting of Stirling Town and Royal Park Conservation Area, assessed as being of **minor** significance: not significant in EIA terms and would have a negligible magnitude effect on the setting of The Wallace Monument, assessed as being of

12 <https://www.gov.scot/publications/building-standards-technical-handbook-2019-non-domestic/3-environment/3-25-solid-waste-storage/>

<https://www.gov.scot/publications/building-standards-technical-handbook-2019-domestic/3-environment/3-25-solid-waste-storage/>

minor significance: not significant in EIA terms.

- 18.4.30 Furthermore, Chapter 8 identifies that taking the proposed mitigation into account, any residual effect on cultural heritage arising from construction of the Proposed Development (PPiP Masterplan) would be of no more than **minor** significance, **not significant** in EIA terms and during the operational lifetime of the Proposed Development (PPiP Masterplan), residual effects on the settings of the heritage assets within the Inner and Outer Study Areas would be the same as the predicated effects. One residual beneficial effect of **moderate** significance is predicted: on the setting of Craigforth House. Six residual adverse effects of **minor** significance are predicted that would last the lifetime of the Proposed Development (PPiP Masterplan).
- 18.4.31 Chapter 9 Biodiversity demonstrates the detailed mitigation proposed to minimise impacts of the Proposed Development (PPiP Masterplan). In terms of sustainability, the existing watercourses will be retained with the aim of enhancement to improve the diversity of the habitat. This will be achieved by the introduction of wet meadow areas and additional marginal aquatic vegetation. Water bodies provide an important habitat resource for breeding amphibians as animals will often return to the same aquatic feature each year to breed surrounding terrestrial vegetation, such as rough grassland, hedgerows and woodland can also form an important part of amphibian habitat networks.
- 18.4.32 Existing hedgerows will be retained wherever possible and a large number of new mixed native hedges and other hedge species will be introduced as a strong boundary feature where appropriate thereby providing a valuable habitat to nesting birds, small mammals and insects. The proposals contain new linked green areas which will be managed with a view to maximise opportunities for biodiversity. Amenity grass areas will be limited, and grass areas will be encouraged for grasses and plants to set seed and encourage invertebrate and bird species.

7. Minimising adverse Impacts on Water, Air and Soil Quality

- 18.4.33 As detailed above and in relevant chapters, a Flood Risk Assessment has been carried out alongside a Drainage Assessment, Air Quality Assessment and Site Investigations. The outcomes of these assessments have been built into the Proposed Development (PPiP Masterplan) and detailed design. The surface water drainage is designed in accordance with the principles of sustainable development. The preferred method for incorporating SuDS within a development is detailed in the relevant chapter of this Environmental Impact Assessment Report.
- 18.4.34 For the construction period, a Construction Environmental Management Plan (CEMP) will be produced identifying the project management structure roles and responsibilities with regard to managing and reporting on the environmental impact of the construction phase.
- 18.4.35 During construction, air quality impacts during construction of the proposed development are likely to be in form of dust deposition and emissions from non-road mobile machinery and vehicles accessing the Site.
- 18.4.36 During construction, vehicles and mobile plant shall be regularly maintained in order to minimise emissions. Air quality impacts during operation of the proposed development arise principally as a result of traffic changes along the local road network. Noise impacts during construction of the proposed development may result from plant and machinery associated with the construction phase. Noise impacts during operation of the proposed development arise principally as a result of traffic changes along the local road network. Vehicle movements will be kept to the minimum level required and site roads regularly cleaned to remove debris. Where required, the public will be notified of particularly noisy operations in advance and noise levels

will be monitored to ensure that limits are not exceeded. Any plant used on Site would minimise noise emissions and comply with BS5228 Part 1.

8. Supporting Healthy and Safer Lifestyles, by improving access to Amenities, promoting access to Open Space and other Recreation Opportunities and by addressing Environmental Problems;

18.4.37 As more detailed above and in the relevant parts of this Environmental Impact Assessment Report, part of Proposed Development (PPP Masterplan) looks to encourage active travel through the Site by linking all parts of the Site by roads and pathways. These linkages help to enhance the Proposed Development (PPiP Masterplan)'s permeability, encouraging people to make more positive active travel choices due to the accessibility of these proposed routes.

18.4.38 Further information on travel routes through the Site are contained within the Masterplan/Design and Access Statement.

9. Involving re-use and/or regeneration of previously used land and property, including derelict and contaminated land, and the re-cycling of construction materials;

18.4.39 As detailed in the previous Proposed Development (Detailed Application) section, the Proposed Development (PPiP Masterplan) will likewise during construction ensure that waste will be kept to a minimum and opportunities to maximise the use of recycle materials will be considered through Site Waste Management Plans. The Applicant will ensure that wherever practicable waste will be recycled and not disposed to land fill e.g. recycled aggregates such as crushed demolition materials, and suitable excavated material will be incorporated into the works. Waste generated during the construction will be segregated and sorted into material specific skips to be sent for re-processing. Where recycling or re-use is not a realistic option, the Applicant will also ensure that all its waste materials are managed correctly.

18.4.40 Details in terms of Site Waste Management Plans will be finalised in liaison with Stirling Council and its Sustainability Officer and relevant Statutory Consultees as part of the future Approval of Matters Specified in Conditions (AMSIC) application.

10. Making efficient use of Existing and New Infrastructure

18.4.41 As mentioned above the Proposed Development (Detailed Application) follows as part of a wider landscape led Masterplan approach, the Proposed Development (PPiP Masterplan), which seeks to make best use of existing infrastructure. With it forming mixed-use proposals and residential proposals, new facilities and infrastructure will be required to ensure that the Proposed Development (PPiP Masterplan) is as sustainable as it can be. Connections through a range of transport modes are proposed.

11. Creating Net Economic Benefit for the Area.

18.4.42 As part of the Proposed Development (PPiP Masterplan), Savills on behalf of the Applicant undertook a Social - Economic Impact Assessment detailed in Chapter 16 of this Environmental Impact Assessment Report. This concluded that the quantum of new development will create a range of economic impacts in the local area. Some of the more quantifiable economic impacts of the Proposed Development (PPiP Masterplan) include:

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- Creating approximately 990 person-years of temporary construction employment, equivalent to 400 temporary jobs for each year of 2.5 year construction phase at a range of skill levels;
- Supporting 2,190 direct jobs once the development is operational;
- Generating £103 million GVA per annum once the development is operational;
- Generating £1.8 million of retail and food and beverage expenditure per annum within the Study Area;
- Delivering £470,000 of Tax receipts annual and £210,000 of business rates per annum; and
- Increased tourism expenditure in Stirling will be around £5.5 million per annum.

18.5 Conclusion

- 18.5.1 The unique aspects of the Proposed Development offer an exciting opportunity to meet and exceed the climate change, sustainability and energy requirements of Stirling Council's planning policies. In keeping with Stirling's tradition of building sustainable communities based on high quality living and working space, the Applicant has sought to embed a 21st century approach to sustainable building design. As such, the Proposed Development offers a unique opportunity for the Council to demonstrate developers meeting their climate change, sustainability and energy thresholds.
- 18.5.2 The Proposed Development will be a new mixed use/office/residential development located at a key gateway to the city of Stirling at junction 10 of the M9. The development aims to achieve the highest levels of rated Energy Performance Certificates (EPC) while also complying with the energy requirements of the Scottish Building Standards and Policy 4.1 of the Adopted Stirling Local Development Plan. Furthermore, The Proposed Development main office building will be registered under the Building Research Establishment's Environmental Assessment Method (BREEAM), which will further enhance the energy performance of the building, while also addressing the wider climate change and sustainability issues. However, the final rating is yet to be determined.
- 18.5.3 With the built environment contributing around 40% of the UK's total carbon footprint and almost half of this from energy used in buildings (e.g. plug loads and cooking) and infrastructure (e.g. roads and railways) that has nothing to do with their functional operation, the Proposed Development clearly contributes to the meeting the Council's sustainability criteria in this regard.
- 18.5.4 The conclusion of this Chapter is that the Proposed Development will comply with Policy 4.1 and the Sustainability Criteria within the Adopted Stirling Local Development Plan.

19 Cumulative Impacts

19.1 Introduction

19.1.1 This Chapter presents an assessment of the likely significant cumulative effects of the Proposed Development. Likely cumulative effects have been defined as the likely effects that the Proposed Development may have in combination with other developments which are at application stage, consented, under construction or operational (i.e. the incremental effects resulting from the Proposed Development if all other developments are assumed to be constructed/operated). These effects can be both direct and indirect.

19.2 Identification of Schemes to be Considered

19.2.1 As discussed in Chapter 6 'EIA Methodology and Approach', developments which are at application stage, consented, under construction or operational and for which sufficient information is available have been taken into account in the cumulative effects assessment. These schemes are referred to together as the 'Cumulative Developments' and are shown in relation to the Proposed Development on Figure 19.1. Where the context requires, they are referred to individually.

19.2.2 Consultation was undertaken with Stirling Council to identify and agree any existing, consented, under construction or operational developments that may have possible effects in combination with the Proposed Development. For the purposes of this assessment, the following cumulative developments were identified:

- Stirling Agricultural Centre;
- Dobbies Garden Centre; and
- Kildean Business Park.

19.2.3 An overview of the Cumulative Developments considered in the assessment is provided in Table 19.1 below.

Table 19.1 Schemes Considered in the Cumulative Effects Assessment

Development	Status	Description
Stirling Agricultural Centre	Operational	The site comprises an auction market which includes office, restaurant, and retail floorspace. There are approximately 300 car parking spaces. Two further commercial units are located within the wider site.
Stirling Agriculture Centre	Consented (17/00624/FUL)	New development incorporating Class 1, 4, 5 & 6 uses, comprising a Trailer Centre with an office, storage, service and display area, formation of access, structural landscaping, and ancillary services.
Dobbies Garden Centre	Operational	Large garden centre accessed via entrance from Old Bridge Road (A84). Comprises circa 8,300sqm of retail floorspace and approximately 436 car parking spaces.
Kildean Business Park	Operational / Under Construction	The wider business park consists of Forth Valley College, housing development (construction is ongoing), a family restaurant and a hotel.
Kildean Business Park	In Planning (20/00291/FUL)	New office development with associated landscaping, parking, and site infrastructure.

		8,365sqm gross internal area proposed with 280 car parking spaces.
Kildean Business Park	In Planning (19/00861/FUL)	Erection and operation of a leisure-led commercial development providing swim school facilities for babies and young children. Gross floor area proposed equates to 720sqm with 41 car parking spaces.
Kildean Business Park	Consented (18/00505/FUL)	Provision of roadside services, including erection of a petrol filling station with retail kiosk, and coffee shop with drive through facility, with associated infrastructure, vehicle access, hardstanding and landscaping. Gross floor area consented equates to 504sqm (Petrol Filling Station) and 156sqm (Café Drive Thru) and 43 car parking spaces.

19.3 North Site (Detailed Application) Assessment of Cumulative Effects

19.3.1 The potential cumulative effects of the Proposed Development (Detailed Application) in conjunction with the Cumulative Developments (listed in Table 19.1) are discussed below in relation to each of the technical topics covered within this EIA Report.

Landscape and Visual Amenity

Construction Phase

19.3.2 The construction phase cumulative assessment considers the worst-case scenario of concurrent construction activity of the Proposed Development (Detailed Application) and the Cumulative Developments, with no construction mitigation assumed within the Cumulative Developments. The construction works on the Proposed Development (Detailed Application) would involve site clearance followed by the erection of commercial buildings on currently vacant or brownfield land. Whilst exact programming of construction works is unknown, it is possible that these may occur at the same time and this worst-case scenario must therefore be assessed. In addition to the combined construction traffic, landscape and visual effects arising from the construction sites themselves must also be taken into account.

19.3.3 The Proposed Development (Detailed Application) and the Cumulative Developments all lie within Landscape Character Type (LCT) 0: Peripheral Residential and Commercial. This LCT is described and evaluated in Chapter 7. During the construction phase, a Medium magnitude of change is likely to persist on the landscape character of the Proposed Development (Detailed Application) and the cumulative developments and their immediate settings, which are both of Low-Medium landscape sensitivity to change of the type proposed. Due to the similar construction techniques involved, a similar type of change would occur within both character types which, combined with the screening effect of the intervening mature trees would result in a **Minor** Adverse landscape effect (not significant) when considered in combination. Thus, no significant cumulative effects on the landscape resource of the study area are anticipated during the construction phase of the Proposed Development (Detailed Application).

19.3.4 The Cumulative Developments are situated approximately 400m or further from the North Site and due to intervening mature trees, the Proposed Development (Detailed Application) and the Cumulative Developments have limited intervisibility. As such there would be no combined or successive cumulative construction phase visual effects. However, since the Proposed Development (Detailed Application) and the Cumulative Developments lie adjacent, or near to, the A84, sequential visual effects must also be considered.

19.3.5 In terms of visual amenity, although there would be occasional views of construction vehicles, there would be limited views of construction on the Proposed Development (Detailed Application) and the Cumulative Developments themselves from receptors on the A84 due to substantial mature tree belts and/or hedgerow trees running alongside the road in both cases. Cumulative effects on receptors on the A84 are therefore generally likely to be **Negligible or Minor** Adverse due to Low-Medium sensitivity and a Negligible or Low magnitude of change. The exception would be for receptors passing the A84 Proposed Development (Detailed Application) entrance where adverse construction effects are likely to be **Moderate-Major** as roadside trees are likely to require to be removed.

Operational Phase

19.3.6 As mentioned above, the Proposed Development (Detailed Application) and the Cumulative Developments all lie within LCT 0: Peripheral Residential and Commercial. This LCT is described and evaluated in Chapter 7. At Year One of the operational phase, the Proposed Development (Detailed Application) and the cumulative developments would have changed with the introduction of new built form in lieu of previous vacant or brownfield sites, extending the built character of the adjacent urban and commercial areas into the Proposed Development (Detailed Application) and the Cumulative Developments. The Proposed Development (Detailed Application) would be in keeping with the scale of adjacent existing commercial development in terms of height and massing. This would result in a Medium magnitude of change to the Low-Medium sensitivity local landscape character leading to **Minor-Moderate** adverse effects and this would then decrease with the developing landscape mitigation to direct and indirect **Minor** residual effects (not significant) after 10 years.

19.3.7 As mentioned above, the Cumulative Developments are situated approximately 400m or further from the North Site and due to intervening mature trees, the Proposed Development (Detailed Application) and the Cumulative Developments have limited intervisibility. As such there would be no combined or successive cumulative operational phase visual effects. However, since the Proposed Development (Detailed Application) and the Cumulative Developments lie adjacent, or near to, the A84, sequential visual effects during operation must also be considered.

19.3.8 In terms of visual amenity, there would generally be limited views of the Proposed Development (Detailed Application) and the Cumulative Developments themselves from receptors on the A84 due to substantial mature tree belts and/or hedgerow trees with the exception being at the Proposed Development (Detailed Application) frontage. Therefore, although cumulative effects on receptors on the A84 are likely to be generally **Minor** due to Low or Medium sensitivity and a Low magnitude of change, at the North Site frontage this would increase to a **Moderate** Adverse (significant) effect. At year 10 however, sequential views would feature screen and structure planting having now matured to soften and partially screen the new buildings leading to **generally Minor** but **locally Minor - Moderate** (not significant) residual sequential cumulative visual effects.

Cultural Heritage

19.3.9 The Proposed Development (Detailed Application) could, in combination with Cumulative Developments, result in adverse effects on the setting of cultural heritage assets within the Outer Study Area, and within the wider landscape. Taking into account the locations, nature and scale of the developments identified by Stirling Council as requiring consideration for cumulative effects, it is considered that, for the Proposed Development (Detailed Application), potential cumulative effects are restricted to effects on the following designated heritage assets:

- Stirling Castle (SM 90291): the Proposed Development (Detailed Application) would be

seen, in views from the Castle western ramparts, in combination with the proposed Kildean Business Park developments outlined in Table 19.1. The proposed Stirling Agricultural Centre Trailer Centre would also be visible from the Castle ramparts. In views of the Castle from the wider landscape, the Proposed Development (Detailed Application) would, in most cases, not be seen in combination with the Cumulative Developments. The exception to this would be on the western approach to Stirling, along the A84, where the proposed Stirling Agricultural Centre Trailer Centre would be seen in combination with the Proposed Development (Detailed Application) when approaching Drip Bridge from the west. The two developments would be seen separately and on different sides of the road. Neither development would interrupt the view of Stirling Castle as seen when approaching or passing the existing Agricultural Centre. Taken together, the Proposed Development (Detailed Application) in combination with the other Cumulative Developments, would not give rise to an appreciable additional adverse effect on the setting of Stirling Castle and the additional effect is assessed to be of low magnitude and **minor** significance: not significant in EIA terms.

- Drip Old Bridge over River Forth (LB 6725): the Proposed Development (Detailed Application) would not be seen from Drip Old Bridge in combination with any of the cumulative developments. The proposed Stirling Agricultural Centre Trailer Centre would lie to the west of the Category A Listed Bridge and seen together with the Bridge only on approach from the east: from the north-east end of the bridge but screened by trees that line the north side of the road. None of the Cumulative Developments on the Kildean Business Park site would have any cumulative effect on Drip Old Bridge in combination with the Proposed Development (Detailed Application). Taken together, the Proposed Development (Detailed Application), in combination with the Cumulative Developments, would not give rise to an appreciable additional adverse effect on the setting of Drip Old Bridge and the additional effect is assessed to be of negligible magnitude and **minor** significance: not significant in EIA terms.
- Drip Bridge Conservation Area (including listed buildings within the conservation area): the Proposed Development (Detailed Application) would not be seen from Drip Bridge Conservation Area in combination with any of the Cumulative Developments. The proposed Stirling Agricultural Centre Trailer Centre would lie to the north-west of the Conservation Area and screened by intervening woodland within the northern part of the Conservation Area, along the south side of the A84. None of the cumulative developments on the Kildean Business Park site would have any cumulative effect on Drip Bridge Conservation Area in combination with the Proposed Development (Detailed Application). Taken together, the Proposed Development (Detailed Application), in combination with the Cumulative Developments, would not give rise to an appreciable additional adverse effect on the setting of Drip Bridge Conservation Area and the additional effect is assessed to be of negligible magnitude and **minor** significance: not significant in EIA terms.
- Wallace Monument (LB 41118): the Proposed Development (Detailed Application) would be seen from the Wallace Monument in combination with proposed cumulative developments on the Kildean Business Park site. The proposed Stirling Agricultural Centre Trailer Centre would not be visible in combination with the Proposed Development (Detailed Application). Taken together, the Proposed Development (Detailed Application), in combination with the Cumulative Developments, would give rise to a barely detectable additional adverse effect on the setting of the Wallace Monument and the additional effect is assessed to be of negligible magnitude and **minor** significance: not significant in EIA terms.

19.3.10 There would be no cumulative effect from the Proposed Development (Detailed Application) in combination with the Cumulative Developments on the settings of Craigforth House (LB 15294) and non-designated designed landscape, Stirling Royal Garden including King's Knot (SM 90288) or Stirling Town and Royal Park Conservation Area. There would be no cumulative effect from the Proposed Development (Detailed Application) in combination with the Cumulative Developments on the settings of any other designated heritage assets in the Outer Study Area.

Biodiversity

19.3.11 No cumulative effects are anticipated.

Flood Risk

19.3.12 The Proposed Development (Detailed Application) has been assessed as having a negligible residual effect on flood risk and so no change in the level of effect would be expected when considering existing or proposed developments as downstream receptors. This is because all new developments will be subject to assessment against SPP and will be required to demonstrate that adequate protection against flooding from all sources exists or can be provided and that there is no associated increase in existing flood risk to persons or property upstream and downstream. As a result, it is anticipated that the effect of the Proposed Development (Detailed Application) on drainage and hydrology will remain **Negligible** for both construction and operational phases when considering the cumulative effect of these Cumulative Developments.

Drainage and Hydrology

19.3.13 It is possible that the new Trailer Centre and the Kildean Business Park could have additional short term effects on water quality in the River Forth during their respective construction phases. However, these cumulative developments will be subject to strict environmental controls by regulators and will be required to implement extensive mitigation, comparable to those outlined in **Error! Reference source not found.**, to negate or minimise impacts. As a result, it is anticipated that the effect of the Proposed Development (Detailed Application) on drainage and hydrology will remain **Negligible** for the construction phase when considering the cumulative effect of these cumulative developments.

19.3.14 All developments constructed since the enactment of the Water Environment and Water Services (Scotland) Act in 2003 are required by law to incorporate Sustainable Drainage Systems (SUDS). As such, the Cumulative Developments identified within the vicinity of the Proposed Development (Detailed Application) should, and will, incorporate drainage strategies which mimic natural catchment hydrology, preventing excessive flows (in comparison to baseline) from being discharged to adjacent watercourses and providing appropriate treatment to prevent adverse effects on water quality from any associated increase in pollutant sources. As a result, it is anticipated that the effect of the Proposed Development (Detailed Application) on drainage and hydrology will remain **Negligible** for the operational phase when considering the cumulative effect of these Cumulative Developments.

Ground Conditions

19.3.15 No cumulative effects are anticipated.

Traffic and Transport

19.3.16 The cumulative effects of the traffic and transport impacts from the Proposed Development, alongside those from other developments (including Orchard House, Raploch (various sites)

and Kildean) being progressed in the local area (see Technical Appendix 13.1) have been considered by means of inclusion of committed development traffic within the scope of the assessment. Committed development traffic flows and its distribution on the network of interest have been agreed with Stirling Council and Transport Scotland during the preparation of the supporting Transport Assessment (Technical Appendix 13.1).

19.3.17 Table 19.2 summarises the significance of potential impacts as a result of the Proposed Development (Detailed Application).

Table 19.2 Summary of Impacts

<i>Description of Effect</i>	<i>Significance of Potential Impact</i>	<i>Mitigation Measure</i>	<i>Significance of Residual Impact</i>
Traffic Impacts	Positive	Implementation of a Framework Travel Plan to support sustainable travel. Liaison with public transport operators to provide improved service offering	Positive
Severance	Insignificant	Impact on Link 2. No mitigation proposed.	Insignificant
Driver Delay	Insignificant	No mitigation proposed	Insignificant
Pedestrian Delay	Insignificant	No mitigation proposed.	Insignificant
Pedestrian Amenity, Fear and Intimidation	Insignificant	No mitigation proposed.	Insignificant
Accidents and Road Safety	Insignificant	No mitigation proposed.	Insignificant

Noise & Vibration

19.3.18 The noise assessment undertaken in Chapter 14 considers the contribution from the combined impacts of local traffic growth and the proposed commercial activities. The environmental noise impacts from the Proposed Development with the mitigation in place are of negligible or slight adverse significance.

Air Quality

19.3.19 The air quality assessment undertaken in Chapter 15 considers the contribution from the combined impacts from local traffic growth and Cumulative Developments. The air quality impacts from cumulative impacts are predicted to be of negligible significance.

Socio Economics

Operational Employment, GVA and Wider Economic Benefits

19.3.20 The Cumulative Developments will generate additional employment. Considering general unemployment is marginally higher in Stirling compared to the Scottish average and the assumed scale and use-types of the Cumulative Developments in combination with the Proposed Development (Detailed Application), they are anticipated to have a **neutral effect** over the long term.

Human Health

19.3.21 No cumulative effects are anticipated.

Sustainability & Climate Change

19.3.22 No cumulative effects are anticipated.

19.4 Masterplan (PPiP) Assessment of Cumulative Effects

19.4.1 The potential cumulative effects of the Proposed Development (PPiP Masterplan) in conjunction with the cumulative developments (listed in Table 19.1) are discussed below in relation to each of the technical topics covered within this EIA Report.

Landscape and Visual Amenity

Construction Phase

19.4.2 The construction phase cumulative assessment considers the worst-case scenario of concurrent construction activity of the Proposed Development (PPiP Masterplan) and the Cumulative Developments, with no construction mitigation assumed within the cumulative schemes. The construction works on the Proposed Development (PPiP Masterplan) would involve site clearance and demolition (in the case of the Central Sub-Area) followed by the erection of commercial buildings on currently vacant or brownfield land. Whilst exact programming of construction works is unknown, it is possible that this may occur at the same time and this worst-case scenario must therefore be assessed. In addition to the combined construction traffic, landscape and visual effects arising from the construction sites themselves must also be taken into account.

19.4.3 The Proposed Development and the Cumulative Developments all lie within LCT 0: Peripheral Residential and Commercial. This LCT is described and evaluated in Chapter 7. During the construction phase, a Medium magnitude of change is likely to persist on the landscape character of the Proposed Development (PPiP Masterplan) and the Cumulative Developments and their immediate settings, which are both of Low-Medium landscape sensitivity to change of the type proposed. Due to the similar construction techniques involved, a similar type of change would occur within both character types which combined with the screening effect of the intervening mature trees would result in a **Minor** Adverse landscape effect (not significant) when considered in combination. Thus, no significant cumulative effects on the landscape resource of the study area are anticipated during the construction phase of the Proposed Development.

19.4.4 As mentioned above the Cumulative Developments are situated approximately 400m or further from the Proposed Development (PPiP Masterplan) and due to intervening mature trees, the Proposed Development (PPiP Masterplan) and the Cumulative Developments have limited intervisibility. As such there would be no combined or successive cumulative construction phase visual effects. However, since both sites lie adjacent, or near to, the A84, sequential visual effects must also be considered.

19.4.5 In terms of visual amenity, although there would be occasional views of construction vehicles, there would be limited views of construction on the Proposed Development (Detailed Application) and the Cumulative Developments themselves from receptors on the A84 due to substantial mature tree belts and/or hedgerow trees running alongside the road in both cases. Cumulative effects on receptors on the A84 are therefore generally likely to be **Negligible or Minor** Adverse due to Low-Medium sensitivity and a Negligible or Low magnitude of change. The exception would be for receptors passing the A84 North Site entrance where adverse construction effects are likely to be **Moderate-Major** as roadside trees are likely to require to

be removed.

Operational Phase

- 19.4.6 As mentioned above, the Proposed Development and the Cumulative Developments all lie within LCT 0: Peripheral Residential and Commercial. This LCT is described and evaluated in Chapter 7. At Year One of the operational phase, the Proposed Development (PPiP Masterplan) would have changed with the introduction of new built form in lieu of previous vacant or brownfield sites, extending the built character of the adjacent urban and commercial areas into the Sites. The Proposed Development (PPiP Masterplan) would be in keeping with the scale of adjacent existing commercial development in terms of height and massing. This would result in a Medium magnitude of change to the Low-Medium sensitivity local landscape character leading to **Minor-Moderate** adverse effects and this would then decrease with the developing landscape mitigation to direct and indirect **Minor** residual effects (not significant) after 10 years.
- 19.4.7 As mentioned above, the Cumulative Developments are situated approximately 400m or further from the Proposed Development (PPiP Masterplan) and due to intervening mature trees, the Cumulative Developments have limited intervisibility. As such there would be no combined or successive cumulative operational phase visual effects. However, since both sites lie adjacent, or near to, the A84, sequential visual effects during operation must be considered.
- 19.4.8 In terms of visual amenity, there would generally be limited views of the Proposed Development (PPiP Masterplan) and the Cumulative Developments themselves from receptors on the A84 due to substantial mature tree belts and/or hedgerow trees with the exception being at or near the North Site frontage. Thus, although cumulative effects on receptors on the A84 are likely generally to be Minor due to Low or Medium sensitivity and a Low magnitude of change, at or near the North Site frontage this would increase to a **Moderate** Adverse (significant) effect. At year 10 however, sequential views would feature screen and structure planting having now matured to soften and partially screen the new buildings leading to **generally Minor** but locally **Minor - Moderate** (not significant) residual sequential cumulative visual effects.

Cultural Heritage

- 19.4.9 The Proposed Development (PPiP Masterplan) could, in combination with cumulative developments, result in adverse effects on the setting of cultural heritage assets within the Outer Study Area, and within the wider landscape. Taking into account the locations, nature and scale of the Cumulative Developments identified by Stirling Council as requiring consideration for cumulative effects, it is considered that, for the Proposed Development (PPiP Masterplan), potential cumulative effects are restricted to effects on the following designated heritage assets:
- Stirling Castle (SM 90291): the Proposed Development (PPiP Masterplan) would be seen, in views from the Castle western ramparts, in combination with the proposed Kildean Business Park developments outlined in Table 19.1. The proposed Stirling Agricultural Centre Trailer Centre would also be visible from the Castle ramparts. In views of the Castle from the wider landscape, the Proposed Development (PPiP Masterplan) would, in most cases, not be seen in combination with the Cumulative Developments. The exception to this would be on the western approach to Stirling, along the A84, where the proposed Stirling Agricultural Centre Trailer Centre would be seen in combination with the Proposed Development (PPiP Masterplan) when approaching Drip Bridge from the west. The two developments would be seen separately and on different sides of the road. Neither development would interrupt the view of Stirling Castle as seen when approaching or

passing the existing Agricultural Centre. Taken together, the Proposed Development (PPiP Masterplan) in combination with the other Cumulative Developments, would not give rise to an appreciable additional adverse effect on the setting of Stirling Castle and the additional effect is assessed to be of low magnitude and minor significance: not significant in EIA terms.

- Drip Old Bridge over River Forth (LB 6725): the Proposed Development (PPiP Masterplan) would not be seen from Drip Old Bridge in combination with any of the cumulative developments. The proposed Stirling Agricultural Centre Trailer Centre would lie to the west of the Category A Listed Bridge and seen together with the Bridge only on approach from the east: from the north-east end of the bridge but screened by trees that line the north side of the road. None of the Cumulative Developments on the Kildean Business Park site would have any cumulative effect on Drip Old Bridge in combination with the Proposed Development (PPiP Masterplan). Taken together, the Proposed Development (PPiP Masterplan), in combination with the Cumulative developments, would not give rise to an appreciable additional adverse effect on the setting of Drip Bridge and the additional effect is assessed to be of negligible magnitude and minor significance: not significant in EIA terms.
- Drip Bridge Conservation Area (including listed buildings within the conservation area): the Proposed Development (PPiP Masterplan) would not be seen from Drip Bridge Conservation Area in combination with any of the Cumulative Developments. The proposed Stirling Agricultural Centre Trailer Centre would lie to the north-west of the Conservation Area and screened by intervening woodland within the northern part of the Conservation Area, along the south side of the A84. None of the Cumulative Developments on the Kildean Business Park site would have any cumulative effect on Drip Bridge Conservation Area in combination with the Proposed Development (PPiP Masterplan). Taken together, the Proposed Development (PPiP Masterplan), in combination with the Cumulative Developments, would not give rise to an appreciable additional adverse effect on the setting of Drip Bridge Conservation Area and the additional effect is assessed to be of negligible magnitude and minor significance: not significant in EIA terms.
- Wallace Monument (LB 41118): the Proposed Development (PPiP Masterplan) would be seen from the Wallace Monument in combination with cumulative developments on the Kildean Business Park site. The proposed Stirling Agricultural Centre Trailer Centre would not be visible in combination with the Proposed Development (PPiP Masterplan). Taken together, the Proposed Development (PPiP Masterplan), in combination with the Cumulative Developments, would give rise to a barely detectable additional adverse effect on the setting of the Wallace Monument and the additional effect is assessed to be of negligible magnitude and minor significance: not significant in EIA terms.

19.4.10 There would be no cumulative effect from the Proposed Development (PPiP Masterplan) in combination with the Cumulative Developments on the settings of Craigforth House (LB 15294) and non-designated designed landscape, Stirling Royal Garden including King's Knot (SM 90288) or Stirling Town and Royal Park Conservation Area. There would be no cumulative effect from the Proposed Development (PPiP Masterplan) in combination with the Cumulative Developments on the settings of any other designated heritage assets in the Outer Study Area.

Biodiversity

19.4.11 All impacts arising from the Proposed Development (PPiP Masterplan) are all predicted to be negligible, with the implementation of the potential pollution mitigation measures set out in Chapter 9. The Site is currently used for commercial purposes and footfall and hardstandings

are predicted to be of a similar level following implementation of the Proposed Development (PPiP Masterplan). As such, it is considered extremely unlikely that there will be an additive effect arising from the Proposed Development (PPiP Masterplan) which could meaningfully contribute to a cumulatively significant effect on the ecology resource present.

Flood Risk

19.4.12 The Proposed Development (PPiP Masterplan) has been assessed as having a negligible residual effect on flood risk and so no change in the level of effect would be expected when considering existing or proposed developments as downstream receptors. This is because all new developments will be subject to assessment of SPP and will be required to demonstrate that adequate protection against flooding from all sources exists or can be provided and that there is no associated increase in existing flood risk to persons or property upstream and downstream. As a result, it is anticipated that the effect of the Proposed Development (PPiP Masterplan) on drainage and hydrology will remain **Negligible** for both construction and operational phases when considering the cumulative effect of these Cumulative Developments.

Drainage and Hydrology

19.4.13 It is possible that the new Trailer Centre and the Kildean Business Park could have additional short term effects on water quality in the River Forth during their respective construction phases. However, these cumulative developments will be subject to strict environmental controls by regulators and will be required to implement extensive mitigation, comparable to those outlined in **Error! Reference source not found.**, to negate or minimise impacts. As a result, it is anticipated that the effect of the Proposed Development (PPiP Masterplan) on drainage and hydrology will remain **Negligible** for the construction phase when considering the cumulative effect of these cumulative developments.

19.4.14 All developments constructed since the enactment of the Water Environment and Water Services (Scotland) Act 2003 are required by law to incorporate SUDS. As such, Cumulative Developments identified within the vicinity of the Proposed Development (PPiP Masterplan) should, and will, incorporate drainage strategies which mimic natural catchment hydrology, preventing excessive flows (in comparison to baseline) from being discharged to adjacent watercourses and providing appropriate treatment to prevent adverse effects on water quality from any associated increase in pollutant sources. As a result, it is anticipated that the effect of the Proposed Development (PPiP Masterplan) on drainage and hydrology will remain **Negligible** for the operational phase when considering the cumulative effect of these Cumulative Developments.

Ground Conditions

19.4.15 No cumulative effects are anticipated.

Traffic and Transport

19.4.16 The cumulative effects of the traffic and transport impacts from the Proposed Development, alongside those from other committed developments (including Orchard House, Raploch (various sites) and Kildean) being progressed in the local area, have been considered by means of inclusion of committed development traffic within the scope of the assessment. Committed development traffic flow and its distribution on the network of interest have been agreed with Stirling Council and Transport Scotland during the preparation of the supporting Transport Assessment (Technical Appendix 13.1).

19.4.17 Table 19.3 summarises the significance of potential impacts as a result of the Proposed

Development (PPiP Masterplan). Any required mitigation associated with the Proposed Development (PPiP Masterplan) will be considered at the detailed application stage.

Table 19.3 Summary of Impacts

<i>Description of Effect</i>	<i>Significance of Potential Impact</i>	<i>Mitigation Measure</i>	<i>Significance of Residual Impact</i>
Traffic Impacts	Insignificant	Implementation of a Framework Travel Plan to support sustainable travel. Liaison with public transport operators to provide improved service offering. Linked trips within The Proposed Development.	Insignificant
Severance	Insignificant	Impact on Link 2. No mitigation proposed.	Insignificant
Driver Delay	Insignificant	No mitigation proposed	Insignificant
Pedestrian Delay	Insignificant	No mitigation proposed.	Insignificant
Pedestrian Amenity, Fear and Intimidation	Insignificant	No mitigation proposed.	Insignificant
Accidents and Road Safety	Insignificant	No mitigation proposed.	Insignificant

Noise & Vibration

19.4.18 The noise assessment undertaken in Chapter 14 considers the contribution from the combined impacts from local traffic growth and the proposed retail and commercial activities in the Proposed Development (PPiP Masterplan). The environmental noise impacts from the Proposed Development (PPiP Masterplan) with the mitigation in place are of negligible or slight adverse significance.

Air Quality

19.4.19 The air quality assessment undertaken in Chapter 15 considers the contribution from the combined impacts from local traffic growth and Cumulative Developments. The air quality impacts from cumulative impacts are predicted to be of negligible significance.

Socio Economics

19.4.20 The identified cumulative developments will provide a mix of employment uses. The residential element of the Kildean Business Park is anticipated to generate additional pressures on the local social infrastructure (i.e. education and healthcare), but these are anticipated to be addressed by financial contributions to allow the Local Authority to put in place the necessary mitigation. The residual effects of the Proposed Development (PPiP Masterplan) alongside the expected effects of the Cumulative Developments are combined to assess the overall cumulative effect in relation to the relevant receptors.

Operational Employment, GVA and Wider Economic Benefits

19.4.21 The Cumulative Developments will provide a mix of employment uses which will generate additional employment in the Survey Area. Considering general unemployment is marginally higher in Stirling compared to the Scottish average and the assumed scale and use-types, the Cumulative Developments in combination with the Proposed Development (PPiP Masterplan) are anticipated to have a **neutral effect** over the long term.

GP Services

19.4.22 The residential element of Kildean Business Park incorporates an allocation for 202 residential units. These additional dwellings will generate an estimate population uplift of around 480 people assuming an average household size of 2.39. This population is anticipated to generate additional pressures on local GP services. The assessment found there is significant spare capacity in the existing GP practice estate sufficient to accommodate the population uplift from the Cumulative Developments and the Proposed Development (PPiP Masterplan). Therefore, the Cumulative Developments in combination with the Proposed Development (PPiP Masterplan) are estimated to have a negligible impact on the low sensitivity users of GP surgeries, resulting in a **neutral effect** over the long-term.

Primary Education

19.4.23 There is significant spare capacity in the primary schools located within the survey area of around 810 pupil places. The anticipated primary school pupil yield from the residential element of Kildean Business Park is anticipated to be around 60 pupils assuming a primary school pupil yield of 0.28 per new dwelling. As such the Cumulative Developments in combination with the Proposed Development (PPiP Masterplan) is estimated to have a **neutral** effect over the long-term owing to the significant spare capacity in the existing primary school estate.

Secondary Education

19.4.24 Similarly, within the secondary school estate significant spare capacity (around 530 pupil places) was identified. The residential element of the Cumulative Developments is expected to generate a secondary school age pupil yield of around 24 secondary school aged pupils using a secondary school pupil yield of 0.12 pupils per new dwelling. Consequently, the Cumulative Developments in combination with the Proposed Development (PPiP Masterplan) are estimated to have a **neutral** effect over the long-term.

Open & Play Spaces

19.4.25 With consideration of the details of the Proposed Development (PPiP Masterplan) regarding new open and play space provision, the Cumulative Developments are estimated to have a **neutral** effect over the long-term. This is because the Proposed Development (PPiP Masterplan) will deliver significant amounts of open and play space.

Tourism

19.4.26 The Cumulative Developments in combination with the Proposed Development (PPiP Masterplan) will have a **neutral effect** on the tourism industry in Stirling because the Cumulative Developments are not related to the tourism industry.

19.4.27 The Cumulative Developments are assessed to have an overall **neutral** cumulative socio-economic effect over the long-term.

Human Health

19.4.28 No cumulative effects are anticipated.

Sustainability & Climate Change

19.4.29 No cumulative effects are anticipated.

20 Summary of Mitigation

20.1 Introduction

- 20.1.1 This final chapter of the EIA Report provides a summary of the various mitigation measures identified in the other EIA Report chapters on a subject by subject basis and sequentially in the order in which Chapters appear in the EIA Report. This chapter only summarises those additional mitigation measures that the Applicant is proposing to undertake should permission be granted, either prior to or during both the construction and operational periods.
- 20.1.2 Mitigation that has already been built into the design of the Proposed Development, such as design changes and relocation of buildings to avoid technical constraints has not been repeated here. These matters are addressed in Chapter 3 'Alternatives and Design Evolution' and in individual chapters where relevant, notably Chapter 7 'Landscape and Visual Impact Assessment'. This chapter does not provide a summary of the entire EIA Report. A Non-Technical Summary is available separately.
- 20.1.3 Planning Advice Note 1/2013 'Environmental Impact Assessment'¹ (amended June 2017) notes that where specific mitigations measures are required, these must be explicitly secured as part of the planning permission. It also notes that a schedule of mitigation may aid this process. This chapter responds to this best practice advice and summaries in a tabular format at Table 20.1 the mitigation measures identified in the various EIA Report chapters.
- 20.1.4 During the construction phase of the Proposed Development, on-site best practice measures would be implemented to ensure that, for example, construction activities are undertaken to minimise pollution. An Ecological Management Plan (EMP), Appendix 9.2, sets out the principles of these best practice measures that would be developed further in response to particular site conditions, should permission be granted.
- 20.1.5 Greater detail on the various mitigation measures can be found in each of the technical and environmental chapters of this EIA Report, which provide further detail on the identified impact(s) to which they have been prepared and the significance of residual impacts.

¹ Scottish Government, 2017. Planning Advice Note 1/2013 (Revision 1.0): Environmental Impact Assessment. Edinburgh: Scottish Government

Table 20.1 Summary of Proposed Mitigation Measures

Mitigation Item	Nature of Mitigation Measure	Timing of Mitigation
Chapter 7: Landscape and Visual Amenity		
<i>North Site (Detailed Application)</i>		
M7.1	As shown in Figure 7.6, extensive new tree planting is proposed along the A84 corridor and within the car park areas. Once mature this would have the effect of screening car park areas and softening the edges and lower floors of the new HQ building especially when experienced from the A84 corridor.	Construction & Operational
<i>Masterplan (PPiP)</i>		
M7.2	<p>As shown in Figure 7.7, extensive new tree planting is proposed at the following locations.</p> <ul style="list-style-type: none"> • North Site; tree planting along the A84 corridor and within the car park areas. Once mature this would have the effect of screening car park areas and softening the edges of the new HQ building especially when experienced from the A84 corridor. In addition, an existing area of rough grass to the west as far as the River Forth would be transformed into an informal parkland setting with native trees and shrubs. Existing mature and semi-mature trees would be retained and protected as much as possible. • Central Sub-Area; along the River Forth corridor, M9 corridor and within car park areas. Once mature these would screen and soften the edges of this part of the Proposed Development (PPiP Masterplan) and tie them into the existing Craigforth structure planting. Existing mature and semi-mature trees would be retained and protected as much as possible. • South Sub-Area; along the River Forth corridor; peripheral tree planting; and a large area of native woodland planting to the south. Once mature, these would screen and soften the edges of this part of the Proposed Development (PPiP Masterplan) and tie them into the existing Craigforth structure planting. 	Construction & Operational
Chapter 8: Cultural Heritage		
<i>North Site (Detailed Application)</i>		
	<p>In accordance with the requirements of PAN2/2011: Planning and Archaeology, the following mitigation works are proposed for the North Site.</p> <p>All mitigation works will be conducted by a professional archaeological organisation, and the scope of works will be detailed in one or more Written Scheme(s) of Investigation (WSI) developed in consultation with (and subject to the agreement of) Stirling Council's Archaeology Advisor. The WSI(s) will make provision for appropriate post-excavation analysis and dissemination of the results of the mitigation works, as well as for archiving of the project materials and records where necessary.</p>	

Mitigation Item	Nature of Mitigation Measure	Timing of Mitigation
M8.1	<p>Metal detecting</p> <p>Through scoping, the Council Archaeologist requested that a metal detecting survey should be carried out. The scope of any metal detecting survey that may be required as part of a planning condition will be agreed with the Stirling Council Archaeologist on behalf of the Council and set out in the WSI for the approval of the Council. The metal detecting survey would be carried out once the vegetation cover has been removed from the Proposed Development (Detailed Application) site, but prior to any soil removal. Metal detecting in areas of existing hardstanding (car parks) is not required.</p>	Pre-Construction
M8.2	<p>Archaeological investigations (trial trenching)</p> <p>Through scoping, the Council Archaeologist requested that a 5% sample trial trenching evaluation be carried out. The scope of any required trial trenching that may be required as part of a planning condition will be agreed with Council Archaeologist on behalf of the Council and set out in the WSI for the approval of the Council. Trial trenching would be carried out in advance of development works commencing. Trial trenching may be required in the undeveloped ground to the west of the existing car parking area, west of the proposed new office building. Trial trenching may also be required in areas of existing hardstanding (car parks).</p>	Pre-Construction
M8.3	<p>Watching briefs and excavation</p> <p>Following on from the archaeological trial trenching and metal detecting survey, it may be necessary to carry out further mitigation work; either through set piece excavations, in areas where trial trenching has shown that there are buried archaeological remains present, or through watching briefs, in areas where, in the opinion of the Council Archaeologist, there is potential for buried archaeological remains to be present. Any requirement for set piece excavations or watching briefs will be agreed in consultation with the Stirling Council Archaeologist after the initial evaluation phase. It is envisaged that the scope of any watching brief or set piece excavation mitigation will be carried out in advance of, or during the course of, construction works as appropriate. If significant discoveries are made during any archaeological excavations or watching briefs and preservation in situ of any sites or features identified is not possible, provision will be made for the excavation, where necessary, of any archaeological remains. This provision will include the consequent production of written reports on the findings, with post-excavation analyses and publication of the results of the work, where appropriate.</p>	Pre-Construction & Construction
<i>Masterplan (PPiP)</i>		
In accordance with the requirements of PAN2/2011: Planning and Archaeology, the following mitigation works are proposed for the Proposed Development (PPP Masterplan).		

Mitigation Item	Nature of Mitigation Measure	Timing of Mitigation
	<p>All mitigation works will be conducted by a professional archaeological organisation, and the scope of works will be detailed in one or more Written Scheme(s) of Investigation (WSI) developed in consultation with (and subject to the agreement of) Stirling Council's Archaeology Advisor. The WSI(s) will make provision for appropriate post-excavation analysis and dissemination of the results of the mitigation works, as well as for archiving of the project materials and records where necessary.</p>	
M8.4	<p>Metal detecting Through scoping, the Council Archaeologist requested that a metal detecting survey should be carried out. The scope of any metal detecting survey that may be required as part of a planning condition will be agreed with the Stirling Council Archaeologist on behalf of the Council and set out in the WSI for the approval of the Council. The metal detecting survey would be carried out once the vegetation cover has been removed from the Proposed Development (PPP Masterplan) site, but prior to any soil removal. Metal detecting in areas of existing hardstanding (existing road networks, car parks, building footprints, etc) is not required.</p>	Pre-Construction
M8.5	<p>Archaeological investigations (trial trenching) Through scoping, the Council Archaeologist requested that a 5% sample trial trenching evaluation be carried out. The scope of any required trial trenching that may be required as part of a planning condition will be agreed with Council Archaeologist on behalf of the Council and set out in the WSI for the approval of the Council. Trial trenching would be carried out in advance of development works commencing. Locations where trial trenching may be required include:</p> <ul style="list-style-type: none"> • The open ground to the south-west of Craigforth House, where parch marks visible on historic aerial photographs have indicated the presence of possible historic garden features (21 and 22); and, • The undeveloped farmland to the south and west of Craigforth Hill, where there is potential for buried archaeological remains as evidenced in possible cropmarks (23) parch marks visible on historic aerial photographs. 	Pre-Construction
M8.6	<p>Watching briefs and excavation Following on from the archaeological trial trenching and metal detecting survey, it may be necessary to carry out further mitigation work; either through set piece excavations, in areas where trial trenching has shown that there are buried archaeological remains present, or through watching briefs, in areas where, in the opinion of the Council Archaeologist, there is potential for buried archaeological remains to be present. Any requirement for set piece excavations or watching briefs will be agreed in consultation with the Stirling Council Archaeologist after the initial evaluation phase. It is envisaged that the scope of any watching brief or set piece excavation mitigation will be carried out in advance of, or during the course of, construction works as appropriate.</p>	Pre-Construction & Construction

Mitigation Item	Nature of Mitigation Measure	Timing of Mitigation
	If significant discoveries are made during any archaeological excavations or watching briefs and preservation in situ of any sites or features identified is not possible, provision will be made for the excavation, where necessary, of any archaeological remains. This provision will include the consequent production of written reports on the findings, with post-excavation analyses and publication of the results of the work, where appropriate.	
Chapter 9: Biodiversity		
<i>North Site (Detailed Application)</i>		
M9.1	The avoidance of adverse effects can be achieved through good pre-construction planning, site practices and adherence to relevant pollution prevention guidelines (PPGs) including: <ul style="list-style-type: none"> • PPG1: General Guide to the Prevention of Water Pollution; • PPG5: Works In, Near or Liable to Affect Watercourses; • PPG6: Working at Construction and Demolition Sites. 	Pre-Construction & Construction
M9.2	It is recommended that artificial lighting during construction and post construction is designed in such a way as to minimise light spill onto the River Forth. This is to safeguard otter, bats and fish from disturbance.	Construction & Operational
M9.3	Invasive Species Management Plan An Invasive Species Management Plan is required to avoid the illegal spread of species listed in Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) (giant hogweed and Himalayan balsam). Prior to any construction works being carried out, a tree management plan for the North Site will be devised ensuring that most ecologically valuable trees are maintained and any trees to be removed are subject to detailed bat surveys (Appendix 9.2). If any tree removal or other construction works are scheduled within the breeding bird season, a full breeding bird survey should be carried out to inform a breeding bird management plan.	Pre-Construction
<i>Masterplan (PPiP)</i>		
M9.4	The avoidance of adverse effects can also be achieved through good pre-construction planning, site practices and adherence to relevant pollution prevention guidelines (PPGs) including: <ul style="list-style-type: none"> • PPG1: General Guide to the Prevention of Water Pollution; • PPG5: Works In, Near or Liable to Affect Watercourses; • PPG6: Working at Construction and Demolition Sites. 	Pre-Construction & Construction
M9.5	It is recommended that artificial lighting during construction and post construction is designed in such a way as to minimise light spill onto the River Forth. This is to safeguard otter, bats and fish from disturbance.	Construction & Operational
M9.6	Bat Species Protection Plan	Pre-Construction

Mitigation Item	Nature of Mitigation Measure	Timing of Mitigation
	<p>Prior to any construction programme occurring, a detailed bat roost protection survey should be carried out and any buildings that show a possibility of bat impacts will need to be surveyed. The buildings to be surveyed, if modified, are shown in Error! Reference source not found.9, along with the survey requirements needed. It is recommended that these surveys be carried out prior to construction occurring so the construction programme can be informed by the most up to date information. Once the bat baseline is fully quantified, appropriate mitigation relating to the need for a derogation licence (to remove or disturb roosting bats), and the type and number of any replacement bat roosts can be implemented accordingly.</p>	
M9.7	<p>Otter Species Protection Plan As no water crossings are proposed, and all infrastructure is located at least 50m from watercourses, no pre-construction checking surveys for otter are proposed. However, in order to address disturbance to otter during construction works, escape ramps will be provided in any trenches or excavations where otters could be entrapped. Where construction works may be required at night, lighting will be designed to minimise spill onto watercourses.</p>	Construction
M9.8	<p>Badger Species Protection Plan Although the majority of habitats to be affected by the Proposed Development (PPiP Masterplan) are considered to be sub-optimal for badger, small areas of suitable habitat are present. A re-survey of suitable habitat will be undertaken prior to construction to search for new setts that may have been created. A licence will be applied for if any badger setts are identified that may be affected by the Proposed Development (PPiP Masterplan). In order to minimise harm to badger, escape ramps will be provided in any trenches or excavations where badger could be entrapped.</p>	Pre-Construction & Construction
M9.9	<p>Bird Management Plan It is recommended that construction is timed to either avoid the breeding season altogether, or scheduled to start before the breeding season starts (ideally before mid-March), so that birds returning to the area to breed can choose a territory/nest location away from potentially disturbing activities.</p>	Construction
Chapter 10: Flood Risk		
M10.1	<p>An Environmental Management Plan (EMP) will be produced and submitted to SEPA for approval prior to the commencement of construction. The EMP will detail best practice measures and site specific method statements to avoid or minimise potential adverse effects during the construction phase.</p>	Pre-Construction & Construction
M10.2	<p>Installation of temporary drainage systems / SuDS systems (or equivalent) as appropriate, including pre-earthworks drainage, with appropriate outfalls in place prior to any earthworks activities to control the rate of flow before water is discharged into a receiving waterbody.</p>	Construction

Mitigation Item	Nature of Mitigation Measure	Timing of Mitigation
M10.3	All temporary welfare facilities to be located in areas at a low risk of flooding and >10 m from any watercourse.	Construction
M10.4	All temporary storage areas to be located in designated areas at a low risk of flooding and >10 m from any watercourse.	Construction
Chapter 11: Drainage and Hydrology		
M11.1	<p>EMP: The appointed contractor will be required to prepare an Environmental Management Plan (EMP) prior to commencement of construction which will be adhered to for the duration of the construction phase, this will incorporate, but not be limited to, mitigation items M11.2 to M11.7 and contain the following supplementary documents:</p> <ul style="list-style-type: none"> • Pollution Prevention Plan (PPP), written in accordance with SEPA's Sector Specific Guidance: Construction Sites (WAT-SG-75) • Pollution Incident Response Plan (PIP), detailing emergency measures, contacts and responsible persons - to be complied with in the event of a pollution incident • Water Quality Monitoring Plan (WQMP), written in accordance with M11.7 	Pre-Construction & Construction
M11.2	<p>Construction site runoff and sedimentation: The appointed Contractor will adhere to SEPA GPPs/ PGGs and other good practice guidance and implement appropriate measures which will be detailed in a Pollution Prevention Plan to be prepared prior to the commencement of construction (M11.1). This will include, but may not be limited to:</p> <ul style="list-style-type: none"> • installation of temporary drainage systems / SUDS systems (or equivalent) as appropriate, including pre-earthworks drainage, with appropriate outfalls in place prior to any earthworks activities to control the rate of flow before water is discharged into a receiving waterbody. The temporary drainage design will include / take into account the following: <ul style="list-style-type: none"> - Incorporation of sediment and pollution management measures, including temporary SUDs basins (sized according to CIRIA & SEPA guidance) to separate clean and dirty water, to help reduce effects on the hydrological environment. Measures will depend on the nature of construction activities occurring in particular areas across the site, and will include silt fences, check dams, settlement lagoons, soakaways, geotextile silt mats and other sediment trap structures as appropriate. - The ability of clean stone and silt traps to effectively treat runoff will depend upon the volume of runoff within the drainage channel, the type of material used and the frequency of monitoring and replacement of the measures. Appropriate consideration will be given to these factors during the design and operation of the measures to ensure their optimal performance. - Control measures will be regularly inspected and recorded (so they are available for review), and maintained as necessary, particularly after prolonged heavy rainfall. 	Pre-Construction & Construction

Mitigation Item	Nature of Mitigation Measure	Timing of Mitigation
	<ul style="list-style-type: none"> • avoiding unnecessary stockpiling of materials and exposure of bare surfaces, limiting topsoil stripping to areas where bulk earthworks are immediately programmed. • protecting soil stockpiles using bunds, silt fencing and peripheral cut-off ditches, and locating stockpiles at distances >10 m from water features and in areas not liable to flood. • restoration of bare surfaces (seeding and planting) throughout the construction period as soon as possible after the work has been completed or protecting exposed ground with geotextiles if to be left exposed. • minimising the use of heavy plant on wet ground, which may disrupt the topsoil leading to the generation of silt laden waters, by restricting plant movements and using geotextile matting avoiding undertaking major construction works during heavy precipitation events. 	
M11.3	<p>Oil / fuel leaks and spillages: The appointed Contractor will adhere to SEPA GPPs / PPGs and other good practice guidance and implement appropriate measures which will be detailed in the CEMP and supporting documents (M11.1). This will include, but may not be limited to the following:</p> <ul style="list-style-type: none"> • where practicable, refuelling of vehicles and machinery will be carried out in designated areas at a low risk of flooding and >10 m from any watercourse, on an impermeable surface with spill kits available. • refuelling will be carried out by designated trained and competent operatives only. • stationary plant will be fitted with drip trays which will be emptied regularly. • plant machinery will be regularly inspected for leaks with maintenance as required. • only emergency maintenance to construction plant will be carried out on site, in designated areas, on an impermeable surface well away from any watercourse or drainage, unless vehicles have broken down necessitating maintenance at the point of breakdown, where extra precaution will be taken. • spillage kits will be stored at key locations on-site and detailed within the CEMP. • construction activities will comply with the PPIP. 	Construction
M11.4	<p>Chemical storage, handling, and reuse: The appointed Contractor will adhere to SEPA GPPs / PPGs and other good practice guidance, and implement appropriate measures which will include, but may not be limited to:</p> <ul style="list-style-type: none"> • chemical, fuel and oil storage will be undertaken within a designated area, which will be located on stable ground, at a low risk of flooding and >10 m from any watercourse. • chemical, fuel and oil stores will be stored in locked tanks of sufficient structural integrity, sited on impervious bases within a secured bund of 110% of the storage capacity. 	Construction

Mitigation Item	Nature of Mitigation Measure	Timing of Mitigation
M11.5	<p>Concrete, cement, and grout: The appointed Contractor will adhere to SEPA GPPs / PPGs and other good practice guidance, and implement appropriate measures which will include, but may not be limited to:</p> <ul style="list-style-type: none"> • concrete mixing and washing areas will: <ul style="list-style-type: none"> - be located in areas a low risk of flooding and >10 m from any watercourse - have settlement and re-circulation systems for water reuse - have a contained area for washing out and cleaning of concrete batching plant or ready-mix lorries • wash-water will not be discharged to the water environment and will be disposed of appropriately either to the foul sewer (with permission from Scottish Water), or through containment and disposal to an authorised site • if concrete pouring is required within a channel, a dry working area will be created • if concrete pouring is required within 10 m of a water feature or over a water feature, appropriate protection will be put in place to prevent spills entering the channel (e.g. isolation of working area, protective sheeting) • quick setting products (cement, concrete and grout) will be used for structures that are in or near to watercourses 	Construction
M11.6	<p>Sewage from welfare facilities: The appointed Contractor will ensure sewage is disposed of appropriately either to a foul sewer (with the permission of Scottish Water) or via appropriate treatment and discharge agreed with SEPA in advance of construction and in accordance with 'GPP04 Treatment and Disposal of Sewage'.</p>	Construction
M11.7	<p>Water Quality Monitoring: A programme of monitoring will be implemented in the Raploch Burn and River Forth to minimise effects on existing water quality downstream of the proposed development, this will be fully detailed in a WQMP, produced as part of the requirements of the EMP (M11.1). This will involve monitoring of surface water quality parameters including, but not limited to, total suspended solids (TSS) in line with the requirements of the CSL. It is recommended that additional appropriate chemical suites be included for the detection of relevant contaminants and/or as environmental quality indicators. The monitoring programme will include:</p> <ul style="list-style-type: none"> • surface water quality monitoring in the lower reaches of the Raploch Burn, in the River Forth immediately upstream and downstream of the Raploch Burn confluence and downstream of the site, and at control locations in the Raploch Burn and River Forth Burn upstream of the site • a period of pre-construction water quality monitoring to establish baseline conditions (preferably monthly sampling over a 12 month period as a minimum) • water quality monitoring for the duration of the construction period (comprising monthly sampling and regular visual inspections of watercourses as a minimum) • a period of post-construction water quality monitoring to ensure the effectiveness of permanent site drainage / SUDS 	Pre-Construction, Construction & Operation

Mitigation Item	Nature of Mitigation Measure	Timing of Mitigation
	During construction and post-construction monitoring results will be compared with baseline data and used – alongside details of antecedent weather conditions, site activity logs and visual observations at the time of sampling – to identify any degradation in water quality as a result the proposed development. This will allow mitigation measures to be assessed and improved as required.	
Chapter 12: Ground Conditions		
	No additional mitigation identified at this stage for either the Proposed Development (Detailed Application) or Proposed Development (PPiP) Masterplan. Should a requirement for additional mitigation be identified during the carrying out of the Site Investigation, this will be implemented as required.	
Chapter 13: Traffic and Transport		
<i>North Site (Detailed Application)</i>		
	No additional mitigation is required to support the Proposed Development (Detailed Application).	
<i>Masterplan (PPiP)</i>		
	No additional mitigation is required to support the Proposed Development (PPiP Masterplan) at this stage. Where required, mitigation will be addressed at the detailed stage.	
Chapter 14: Noise & Vibration		
M14.1	<p>The following measures are proposed to reduce impacts at new noise sensitive receptors:</p> <ul style="list-style-type: none"> • Relocation of the proposed nursesey away from the M9 to ensure that the facility has suitable, quiet outdoor play areas. The careful layout of the Proposed Development to protect the amenity of proposed residential areas from road traffic noise, including the adoption of appropriate mitigation measures in housing layout where private gardens shall be located on the sheltered elevations of buildings, to protect residential amenity. This shall be considered further at detailed planning stage; • The incorporation of acoustic insulation in proposed houses to ensure that noise levels from road traffic inside habitable rooms comply with the levels set out in Table 4 of BS 8233. This is likely to require closed windows with trickle vents on some exposed elevations. This shall be considered further at detailed planning stage; • Conducting a further acoustic assessment at detailed design stage to include a review of the potential adverse impacts from commercial and retail activities on adjacent noise sensitive uses. This shall include a review of the design and layout of the scheme, with appropriate buffer zones, careful siting of noise generating activities, procurement specifications and where necessary, restrictions in hours of operation e.g. for deliveries to retail and commercial premises; and 	Pre-Construction, Construction & Operational

Mitigation Item	Nature of Mitigation Measure	Timing of Mitigation
	<ul style="list-style-type: none"> Procurement specifications for all fixed plant to ensure that noise from residential space heating systems (e.g. heat pumps) and commercial and retail activities does not exceed the background sound + 5dB and where all fixed plant is free from tonal, impulsive or intermittent characteristics. 	
Construction Noise		
M14.2	<p>Noise during the demolition of existing buildings and construction has the potential to cause annoyance to existing noise sensitive receptors. The following procedures shall be adopted to ensure that noise impacts from construction operations are minimised, to protect local amenity:</p> <ul style="list-style-type: none"> Prior to the commencement of each phase of demolition, site clearance and construction, the appointed contractors shall prepare a method statement. This shall include an assessment of potential noisy operations and outline the noise mitigation measures proposed. The construction noise impact assessment shall be used to help inform the development of the detailed construction methods; The contractors shall be required to select the quietest item of suitable plant available for all site operations. The work programme on site shall also be phased to reduce the combined impacts arising from several noisy construction operations, to reduce adverse impacts. Where practicable, noise from fixed plant and equipment shall be contained within suitable acoustic enclosures or behind acoustic screens; Any plant and equipment required for operation at night (23:00 – 07:00) e.g. for dewatering and security lighting shall be mains electric powered where practicable; The site contractors shall conduct all site operations in accordance with accredited documented procedures. This shall include a complaint investigation procedure; and All sub-contractors appointed by the main contractor shall be formally required through contract to comply with all noise conditions. 	Pre-Construction & Construction
Chapter 15: Air Quality		
M15.1	The methods for controlling dust impacts during construction are presented in Technical Appendix 15.2.	Construction
Chapter 16: Socio Economics		
	No further mitigation beyond that built into the design of the Proposed Development (Detailed Application) and Proposed Development (PPiP Masterplan) is required.	
Chapter 17: Human Health		
	No further mitigation beyond that built into the design of the Proposed Development (Detailed Application) and Proposed Development (PPiP Masterplan) is required.	

Mitigation Item	Nature of Mitigation Measure	Timing of Mitigation
	Chapter 18: Sustainability & Climate Change	
	No further mitigation beyond that built into the design of the Proposed Development (Detailed Application) and Proposed Development (PPiP Masterplan) is required.	