



Former Carless Oil Terminal, Old Kilpatrick
Proposed Marine Fabrication Complex

EIA Volume 1

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For Malin Group Properties Ltd



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This report has been prepared by Peter Brett Associates LLP ('PBA') on behalf of its client to whom this report is addressed ('Client') in connection with the project described in this report and takes into account the Client's particular instructions and requirements. This report was prepared in accordance with the professional services appointment under which PBA was appointed by its Client. This report is not intended for and should not be relied on by any third party (i.e. parties other than the Client). PBA accepts no duty or responsibility (including in negligence) to any party other than the Client and disclaims all liability of any nature whatsoever to any such party in respect of this report.

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1 Introduction

1.1 Introduction

- 1.1.1 This Environmental Impact Assessment (EIA) Report has been prepared by Peter Brett Associates, now part of Stantec (PBA) to accompany applications for detailed planning permission and a marine licence in respect of the erection and operation of a marine fabrication complex ('the proposed development') on the western part of the former Carless Oil Terminal site, Old Kilpatrick ('the site'). This EIA Report formally accompanies an application for planning permission being submitted to West Dunbartonshire Council (the relevant local planning authority) and it is also submitted on a non-statutory basis in support of a marine licence application to the Scottish Ministers (Marine Scotland).
- 1.1.2 The EIA Report has been co-ordinated by PBA on behalf of the Applicant, with input from technical assessment specialists as detailed in **Section 1.7**.

1.2 Purpose of this EIA Report

- 1.2.1 The purpose of this EIA Report is to report the findings of an Environmental Impact Assessment (EIA) carried out for the proposed development. In doing so, this EIA Report identifies the likely significant environmental effects of the proposed development during construction and operation.
- 1.2.2 The EIA Report has been prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the TCPA EIA Regulations') which are applicable to the determination of the planning application for the proposed development. An EIA Screening Opinion adopted by the Scottish Ministers on 20th December 2017 confirmed that the element of the proposed development located below Marine High Water Springs (MHWS), namely the erection of a heavy lift quay ('the proposed marine works) do not constitute EIA Development. The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 are therefore not engaged by the proposed development.
- 1.2.3 The relevance and implications of the EIA Regulations are detailed further in **Chapter 4 – Assessment Methods**.

1.3 Overview of Site and Proposed Development

The Site

- 1.3.1 The site extends to approximately 4.88ha and forms part of the Applicant's wider landholding at the former Carless Oil Terminal on the north bank of the River Clyde, upstream and east of the Erskine Bridge. This is referred to as 'the wider Carless landholding'. A detailed description of the site and surrounding area is provided in **Chapter 2 – The Site and Surrounding Area**, with a Site Location Plan provided as **Figure 2.1** within **Appendix 2.1**.
- 1.3.2 The site is bounded to the north by a disused railway corridor, to the west by existing industrial premises, to the east by former oil terminal derelict land forming the wider Carless landholding, and to the south by the River Clyde.
- 1.3.3 The topography of the site is complex, comprising a relatively flat area of hardstanding at approximately 5m AOD and localised variations which reflect previous industrial uses within the site, as well as a sloping area of foreshore on the northern bank of the River Clyde.
- 1.3.4 Access to the site is taken from Erskine Ferry Road to the north west of the site.

The Proposed Development

- 1.3.1 The proposed development comprises the demolition of existing sub-surface structures and the construction and operation of a marine fabrication complex within the site. The proposed development will comprise the following elements:

- Fabrication building (3,300m² Class 5 floorspace);
 - Ancillary office accommodation (714m² Class 4 floorspace);
 - Yard areas for materials delivery, fabrication and storage;
 - A new heavy lift quay providing access to River Clyde (subject to additional marine licence from MS-LOT);
 - Associated access road and road upgrades from Erskine Ferry Road into the site;
 - Security gatehouse, perimeter fencing and lighting;
 - Staff car parking (provision of 80 spaces);
 - Associated landscaping, including a landscape buffer to River Clyde and the existing Logitech building;
 - Services, utilities and drainage infrastructure, including a substation.
- 1.3.2 The proposed development does not include remediation activities, as a separate non-EIA application (DC18/245) for proposed pre-construction remediation works ('the proposed remediation works') has already been submitted to WDC. The application was validated by WDC on 14th November 2018 and is expected to be determined by February 2019 in advance of the determination of the planning and marine licence applications for the proposed development. The remediated site therefore represents the 'future baseline scenario' considered in this EIA.
- 1.3.3 A detailed description of the physical, construction and operational characteristics of the proposed development is provided in **Chapter 3 – The Proposed Development** of this EIA Report. This is supported by a suite of layout and elevation drawings including a Site Layout Plan provided as **Figure 3.1**, all within **Appendix 3.1 – Figures**.

1.4 Terms and Definitions

- 1.4.1 For ease of reference, the following terms have been used in the EIA Report:
- The Applicant - Malin Group Properties Ltd;
 - The site – the 4.88ha area within the planning and marine licence application boundaries which this EIA Report relates to, as outlined in red on **Figure 2.1 - Site Location Plan (Appendix 2.1)**. The key characteristics of the site are detailed in **Section 2 – The Site and Surrounding Area**;
 - The proposed development – the proposed erection and operation of a marine fabrication complex as described in **Chapter 3 – The Proposed Development**;
 - The TCPA EIA Regulations - The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. These regulations are directly applicable to this EIA for the proposed development;
 - The MW EIA Regulations - The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017. These regulations are not engaged by the proposed development but are of indirect relevance;
 - The EIA Scoping Report – the EIA Scoping Report submitted to West Dunbartonshire Council on 13th October 2017 on behalf of the Applicant to request an EIA Scoping Opinion under Regulation 17 of the TCPA EIA Regulations;
 - The EIA Scoping Opinion – the EIA Scoping Opinion adopted by West Dunbartonshire Council on 14th March 2018 in response to the EIA Scoping Request;
 - The proposed marine works - the extent of works within the marine environment necessary to construct and operate the proposed development, namely the erection of a heavy lift quay. These works were subject to a negative EIA Screening Opinion issued by the Scottish Ministers (Marine Scotland) under the MW EIA Regulations on 20th December 2017.

- Proposed remediation works - the remediation works (detailed in **Chapter 6 – Ground Conditions**) necessary to make ‘the site’ (as defined above) suitable for intended future industrial use and to fulfil the Applicant’s site management obligations in respect of the Part IIA and Special Site contaminated land designations presently affecting the wider Carless landholding. The proposed remediation works presently subject to a separate, non-EIA planning application (DC18/245);
- The wider Carless landholding - The entire area, extending to approximately 17.7 hectares (ha), of the former Carless Oil Terminal which is under the control of the Applicant.

1.5 The EIA, ES and Related Documents

1.5.1 This EIA Report presents the findings of an EIA undertaken for the proposed development in accordance with the TCPA EIA Regulations.

1.5.2 Running concurrently with the design process, the EIA has sought to:

- Identify the likely environmental effects of the proposed development;
- Define appropriate design and construction measures and good practice to mitigate likely significant adverse environmental effects and maximise opportunities for environmental enhancements resulting from the construction and operation of the proposed development; and
- Determine the level and significance in the context of the TCPA EIA Regulations of the likely residual environmental effects from the proposed development remaining after all proposed mitigation and enhancement measures have been taken into account.

1.5.3 The ES comprises the following volumes:

- **Volume 1 – Main Text;**
- **Volume 2 – Appendices;** and
- **Non-Technical Summary.**

1.5.4 The other principal documents submitted with the planning application include:

- Planning and Marine Licence Application Drawings;
- ePlanning Application Forms and Landownership Certificate;
- Marine Licence (Construction Projects) Application Form;
- Design & Access Statement;
- Transport Assessment;
- Flood Risk Assessment;
- Pre-Application Consultation Reports (planning and marine licence); and,
- Planning Statement.

1.6 Stakeholder Consultation

1.6.1 A programme of engagement with relevant stakeholders has been undertaken to inform the design of the proposed development and the impact assessments reported in this EIA Report. This included a formal EIA Scoping exercise, as reported in **Section 4.4**, and consultation with the following consultees to discuss and agree the details of the proposed development and the scope of assessment:

- West Dunbartonshire Council
 - Environmental health
 - Transport
 - Planning

- Economic Development
 - Marine Scotland
 - SEPA
 - SNH
 - HES
- 1.6.2 Details of how stakeholder consultation activities have informed individual technical assessments are provided where relevant in **Subsection X.3 – Methodology** of **Chapters 6 – 16**.

1.7 Project Team

- 1.7.1 This EIA Report has been prepared for the Applicant, Malin Group Properties Ltd.
- 1.7.2 The organisations involved in the preparation of this EIA Report and the undertaking of individual topic assessments are listed below:
 - PBA – Project Management, EIA Co-ordination, Planning, Ecology, Hydrology & Flood Risk, Traffic & Transport, Noise & Vibration, Geo-environmental, Socio-economics, Air Quality and Risk Management;
 - APBmer Ltd - Marine Environmental Lead (Ecology & Geomorphology);
 - CgMs Heritage Ltd – Cultural Heritage Lead; and,
 - Land Use Consultants (LUC) Ltd – Landscape and Visual Lead.
- 1.7.3 In accordance with the EIA Regulations, a statement detailing the relevant qualifications and expertise of the individual members of the EIA project team is provided in **Appendix - 1.2**. In the context of the EIA Regulations, the EIA project team members are considered to be competent experts in relation to their specific contributions to this EIA Report.
- 1.7.4 The EIA project team has also been supported by GD Lodge Ltd as Project Architect, Arch Henderson Ltd as Marine Engineering Lead and PBA as Terrestrial Engineering (Civil & Structural) Lead.

1.8 Structure of the EIA Report

- 1.8.1 The remainder of this EIA Report is structured as follows:

Volume 1 – Main Report

- **Chapter 2** – provides a description of the site and the surrounding area;
- **Chapter 3** – provides a description of the physical, construction and operational characteristics of the proposed development, together with the consideration of alternatives;
- **Chapter 4** – provides an overview of the methodology and assessment methods adopted to undertake the EIA for the proposed development;
- **Chapter 5** - summarises the legislative and policy context applicable to this EIA. This includes both terrestrial and marine spatial planning policies of relevance to the site and to the proposed development;
- **Chapters 6 to 16** - comprise the technical assessment chapters;
- **Chapter 17** – confirms the likely significant effects deriving from the vulnerability of the proposed development to relevant environmental risks and major accident and disaster risks;
- **Chapter 18**: provides an assessment of impact interactions;
- **Chapter 19**: provides a consolidated schedule of all proposed mitigation measures and monitoring proposals; and

- **Chapter 20:** provides a glossary of terms.

Volume 2 – Technical Appendices

- 1.8.2 **Appendices 1.1 to 16.1** – provide further contextual, baseline and assessment information to support the assessment of likely significant effects as set out within **Volume 1 – Main Text**. In accordance with the TCPA EIA Regulations, Volumes 1 and 2 of this EIA Report are supported by a standalone **Carless Marine Fabrication Complex EIA Report Non-Technical Summary (NTS)** document.

2 Site and Surrounding Area

2.1 Overview

2.1.1 This chapter outlines the key environmental characteristics of the site and the surrounding area which have informed the EIA being undertaken for the proposed development. Details of the characteristics and sensitivities of the individual receptors which have been identified within relevant Study Areas and used to assess likely environmental effects from the proposed development are then provided in subsection 4 (Current Baseline Conditions) of **Chapters 6 – 16**.

2.2 The Site

Site Location, Context and Access

2.2.1 A Site Location Plan sufficient to identify the site in the context of neighbouring land and the surrounding area is provided as **Figure 2.1 – Site Location Plan** in **Appendix 2.1**. This figure shows the extent of the site and within this the areas above and below MHWS which are subject to planning and marine licence applications. This EIA Report supports both applications and therefore relates to the whole site.

2.2.2 The site forms the western part of the Applicant's landholding at the former Carless Oil Terminal (referred to as 'the wider Carless landholding'). The site extends to approximately 4.88ha¹ and is located on the north bank of the River Clyde, upstream and east of the Erskine Bridge.

2.2.3 The site has a single point of access from Erskine Ferry Road immediately north west of the site, which in turn links to the A814 Dumbarton Road. Erskine Ferry Road crosses the Forth and Clyde Canal to meet the A814 Dumbarton Road at a 4-way signalised junction. This road carries traffic from Bowling in the west towards Clydebank and on to Glasgow. The road runs parallel with the Forth & Clyde Canal and has street lighting, footways and bus stops close to the junction serving movements both east and west.

Site Use and History

2.2.4 The site was used as a Ministry of Defence strategic fuel depot in the first half of the 20th Century and suffered extensive bomb damage during the Second World War. The site was then used as an oil storage terminal before being decommissioned in 1992. Decommissioning and surface structure demolition works were then undertaken, although jetties protruding into the River Clyde, partial oil storage structures, areas of reinforced concrete hardstanding and extensive made ground remain on site.

2.2.5 In 2017, the site was acquired by Malin Group Properties Ltd (the Applicant) with the intention of developing a marine fabrication complex to accommodate their growing fabrication business. In this regard, the site benefits from industrial land allocations and includes a set of concrete jetties protruding from the foreshore into the River Clyde which can be converted into a modern industrial quay (the proposed development includes the erection of a heavy lift quay in this location).

Environmental Characteristics

2.2.6 The site is the western part of the wider Carless landholding (see below). As a former oil terminal and refinery, the site presently comprises scrubland and rough vegetation, interspersed with reinforced concrete hardstanding and remnant belowground structures. However, the implementation of the proposed remediation works prior to the construction of the proposed

¹ The site area was originally stated as 4.67ha within the Carless EIA Scoping Report (October 2017) and has been subject to refinement through the design process. The small increase in site area has arisen from clarification of the Applicant's landownership boundary at the northern edge of the site and due to refinements in the working area needed to construct the proposed heavy lift quay at the existing jetties.

development will result in the removal of vegetation, all concrete hardstanding and any subsurface structures (which represent potential contamination sources or pathways). The majority of the site will therefore be bare earth in the EIA future baseline scenario upon which the impacts of constructing and operating the proposed development will be assessed.

2.2.7 Relevant environmental sensitivities affecting the site and its immediate surroundings are:

- **Contamination** - The site is currently designated as contaminated land under Part IIA of the Environmental Protection Act 1990, with a small area at the east of the site also designated under the same legislation as a Special Site (as a result of the historical presence of an oil refinery within the central area). The primary reason for these designations is the known presence of hydrocarbon contaminants and known pathways for contaminated groundwater to migrate into the River Clyde;
- **Unexploded Ordnance** – Due to the site’s previous MOD usage it is known to have been a bombing target during the Second World War and risk assessments indicate a residual risk of unexploded ordnance (Zetica Ltd, April 2013);
- **Ecological Designations** - The site abuts the Inner Clyde SPA, Ramsar Site and SSSI, which are designated at European and national levels for non-breeding birds, in particular for wintering redshank, and for associated habitats. Additionally, the site is bounded to the north by a disused railway corridor which is designated locally by WDC as a Local Nature Conservation Site;
- **Flood Risk** - The site is bounded to the south west by the River Clyde, whilst the SEPA Flood Map (2015) indicates that parts of the site along the River Clyde foreshore have a high likelihood of flooding, as do the banks of the Auchentoshan Burn; and,
- **Neighbouring Land** - The site is bounded to the west by industrial uses including a Logitech manufacturing plant which may be sensitive to external noise and vibration. Bonded whisky warehouses located east of the site are a COMAH Top Tier Site and a HSE Notification Zone surrounds the warehouses. This Zone also covers a strip of land within the site where a High Voltage overhead power line and live electricity substation are present; and,
- **Residential Amenity** - The closest residential dwellings to the site are located approximately 120m north east of the site on Admiralty Grove. These dwellings are separated from the site by the FCC Scheduled Monument and towpath, a tree belt and a disused railway corridor.

2.2.8 These environmental sensitivities have directly informed the assessment of likely environmental effects from the construction and operation of the proposed development as presented in this EIA Report.

2.3 The Surrounding Area

The Wider Carless Landholding

2.3.1 **Figure 2.1 – Site Location Plan** shows both the location of the site and of neighbouring land within the control of the Applicant, namely the wider Carless landholding which the site forms part of. The wider Carless landholding extends to approximately 17.7ha and comprises two distinct parcels of land joined by a right of servitude over a connecting over-bridge:

- A small northern parcel adjacent to the Forth and Clyde Canal (FCC) towpath; and,
- A larger southern parcel bounded by a disused railway corridor to the north and the River Clyde to the south.

2.3.2 The site for the purposes of this EIA is located within the western part of the southern parcel of land only. The remainder of the southern parcel of land (i.e. land immediately east of the site) includes redundant concrete basins containing standing water. A small strip of land within this eastern area includes a High Voltage overhead power line and a live electricity substation.

2.3.3 As with the site, the wider Carless landholding is subject to a residual risk of unexploded ordnance and is currently designated as contaminated land under Part IIA of the Environmental Protection Act 1990, with a small area at the east also designated under the same legislation

as a Special Site (as a result of the historical presence of an oil refinery within the central area). The primary reason for these designations is the known presence of hydrocarbon contaminants and known pathways for contaminated groundwater to migrate into the River Clyde.

- 2.3.4 The wider Carless landholding is bounded to the south east by the Auchentoshan Burn, the banks of which are indicated on the SEPA Flood Map to be at high risk of flooding. Beyond this to the east are bonded whisky warehouses, which are a COMAH Top Tier Site.

The Wider Surrounding Area

- 2.3.5 The closest residential dwellings are located approximately 120m northeast of the site on Admiralty Grove. These dwellings are separated from the site by the FCC Scheduled Monument and towpath, a tree belt and a disused railway corridor which is designated by WDC as a Local Nature Conservation Site (LNCS). This LNCS bisects, but is located outwith, the wider Carless landholding.
- 2.3.6 The Inner Clyde Estuary Water Body Information Sheet (SEPA, 2014) notes that the stretch of the River Clyde adjacent to the site is heavily modified and has moderate ecological potential, with key pressures on the waterbody stemming from sewage disposal, aircraft transport and dredging rather than from development activities.

2.4 Cumulative Development

- 2.4.1 The TCPA EIA Regulations require likely significant cumulative effects from a development proposal in combination with other existing or approved developments to be described within an EIA Report. An overview of relevant existing, approved and proposed developments which have been considered in this EIA is provided below.

Existing Development

- 2.4.2 Existing development is considered as a receptor and/or impact source in relation to the proposed development where relevant within each technical assessment presented in **Chapter 6 – 16**.

Approved Development

- 2.4.3 As detailed in **Subsection X.3 – Methodology** within **chapters 6 – 16**, the majority of the technical assessments presented in this EIA Report have adopted Study Areas not exceeding 2km from the site boundary, as beyond this the potential for likely significant environmental effects to occur diminishes. **Table 2.1** below identifies approved developments which have been considered in this EIA.

Table 2.1: Relevant Approved Developments

Planning Reference	Application	OS Reference	Grid	Overview
DC18/122				Golden Jubilee Hospital: Erection of single storey & two storey extension to existing hospital & associated works.
DC18/230				Golden Jubilee Hospital: Placement of a CAT Laboratory Mobile Unit).
DC16/012				Erection of maritime survival training facility

Proposed Development

- 2.4.4 Whilst the TCPA EIA Regulations only require existing and approved developments to be considered in this EIA, it is also prudent to consider other relevant proposals at planning application stage which, in the event that they are consented in due course, could interact with the construction or operation of the proposed development. The only identified relevant proposed development is planning application DC18/245 for the proposed remediation works within the wider Carless landholding. This is considered to be of relevance as whilst all works within the site will need to be completed prior to the commencement of construction for the proposed development, remediation works (including monitoring and extraction of hydrocarbons from existing boreholes) elsewhere within the wider Carless landholding may be ongoing at this point. This could result in remediation and construction activities occurring simultaneously, giving rise to potential cumulative effects.

Marine Development

- 2.4.5 In addition, the following marine projects which have the potential to impact on marine receptors in combination with the proposed development have been considered within the marine geomorphology and marine ecology assessments provided in **Chapters 7 and 10** respectively:
- Clyde Waterfront Renfrew Riverside (CWRR): Planning permission for the erection of an opening bridge between Yoker and Renfrew and ancillary development was granted by the Scottish Ministers in November 2018, with construction expected to start at the end of 2019. Marine works subject to a marine license application to the Scottish Ministers include channel piling and dredging for a layby berthing structure;
 - Dumbarton Waterfront: Proposed housing development including a seawall upgrade at the Sandpoint Marina site and works to stabilise the basin and harbour walls at Castle Street; and,
 - Esso Bowling and Scott's Yard: Redevelopment of the area to increase business and industry opportunities. This includes works under planning application DC18/013 (for voluntary remediation works) to reinforce the Clyde riverbank.

3 The Proposed Development

3.1 Introduction

- 3.1.1 This chapter provides an overview of the key construction and operational characteristics of the proposed development.

3.2 Overview

- 3.2.1 The proposed development comprises the erection and operation of a marine fabrication complex at the site, including:

- Fabrication building (3,300m² Class 5 floorspace);
- Ancillary office accommodation (714m² Class 4 floorspace);
- Yard areas for materials delivery, fabrication and storage;
- A new heavy lift quay providing access to River Clyde (subject to additional marine licence from MS-LOT);
- Associated access road and road upgrades from Erskine Ferry Road into the site;
- Security gatehouse, perimeter fencing and lighting;
- Staff car parking (provision of 80 spaces);
- Associated landscaping, including a landscape buffer to River Clyde and the existing Logitech building;
- Services, utilities and drainage infrastructure, including a substation

- 3.2.2 The key physical elements of the proposed development are shown on **Figure 3.1 – Site Layout Plan** provided in **Appendix 3.1**. Additional drawings are also provided in support of the planning and marine licence applications to illustrate specific elements of the proposed development.

3.3 Key Physical Characteristics

Demolition and Site Clearance

- 3.3.1 As noted in **Chapter 2 – The Site and Surrounding Area**, the majority of the site will be cleared in advance of the construction of the proposed development through the undertaking of the proposed remediation works (presently subject to planning application DC18/245). Any vegetation or structures (surface or subsurface) remaining within the site following remediation will also be cleared at the start of the construction process to allow for piling works and the subsequent erection of new buildings, structures and hardstanding.

Proposed Site Layout

- 3.3.2 The site layout has been designed to accommodate the work flow through the facility, with raw materials being delivered from the west yard to and from the fabrication shed. Completed or partially completed vessels and equipment will then be transferred to the east yard for finishing as required and for transportation by river or road. The location of ancillary accommodation has been designed to account for this proposed work flow through the site.

Figure 3-1 – Proposed Site Layout



- 3.3.3 Access to the site will be taken from Erskine Ferry Road, which will be upgraded in the vicinity of the site to create an access road suitable for the travel needs associated with the proposed development and any future phases.
- 3.3.4 Site levels will generally be raised, and the required minimum floor level of buildings will be set at 5.27 m above OS datum to meet the needs of the 1 in 200-year flood risk.
- 3.3.5 The entirety of the proposed development will be secured by a 2.6 m perimeter security fence, which will incorporate sliding gates to provide access from the east yard to the heavy lift quay.
- 3.3.6 Additionally, the proposed layout is designed to facilitate the proposed development and allow for future expansion of the facility. Expansions is expected to occur both as a direct extension of the proposed buildings and in later phases of development at Carless on other lands within the applicant's control. As such, the enclosed plans show indicative locations for extension of the fabrication hall and construction of an output hall. To allow for this potential future expansion, the fabrication hall is centrally located within the site, and ancillary accommodation, proposed car parking, perimeter fencing and access roads haven also been located to allow for future phases of development.

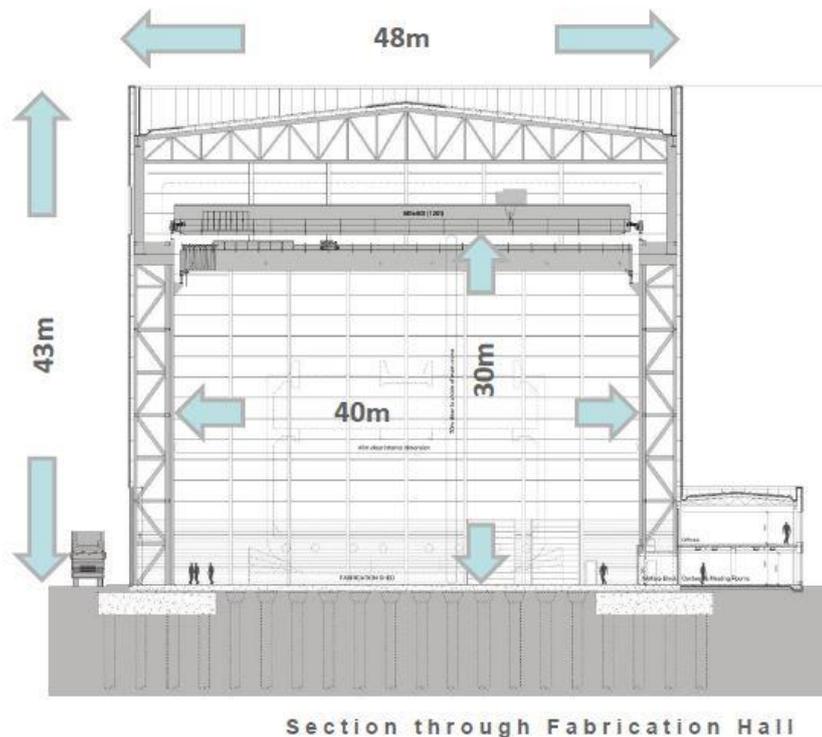
Buildings

- 3.3.7 The proposed development is centred upon the erection of two buildings to house industrial and associated office activities, providing total useable floorspace of approximately 4,014m².

Fabrication Building

- 3.3.8 The Marine Fabrication Building will be the focal point of the proposed development. The scale of the Marine Fabrication Building is dictated by the processes that will occur in the space (the design, fabrication and maintenance of large marine engineering products and vessels). To accommodate these processes a clear working area of 60 m x 40 m is required, whilst a clear height of 30 m below two heavy duty process cranes is also required. These operational requirements result in the building envelope of the Marine Fabrication Building totalling 68 m x 48 m x 43 m.
- 3.3.9 In tandem with creating a building of this scale comes an opportunity to create a landmark structure in the locale and an obvious indicator of the presence of the Scottish Marine Technology Park. The design rationale is discussed in full in the accompanying Design & Access Statement, however in summary the Marine Fabrication Building will be a unique, iconic building, that is a departure from a typical industrial shed.
- 3.3.10 The Marine Fabrication Building will be the initial phase of development and it will set a benchmark for future phases in terms of form, appearance, materials and build quality.

Figure 3.2 – Section through fabrication building and ancillary accommodation



- 3.3.11 Ancillary accommodation for the main fabrication building is located in a two-storey 'hub' formed along full length of the north-east façade of the building. This space will include the main public entrance, office space, a staff canteen and a workshop area.

Other Structures

Gate House

- 3.3.12 A masonry built gatehouse is proposed in the North east Corner of the site. This structure will be a security control room and will contain office accommodation welfare facilities for the gate staff. Visitors and deliveries will be required to sign in and out at this gatehouse, before passing through the secure fence into the site.

Sub-station and compound

- 3.3.13 A new substation is proposed on the eastern edge of the site adjacent to the proposed access road. The substation will be within the secure compound but will be accessible externally by Scottish Power for maintenance purposes. The proposed substation has been sized to supply this phase of development and further sub stations or an expansion of this one will be required in the future to supply other phases of development.

Cycle Shelter

- 3.3.14 A cycle shelter for employees' bicycles is to be provided adjacent to the substation, it will be contained within the secure perimeter of the site. The shelter has an indicated capacity of 20 bicycles.

Security Fence and Lighting

- 3.3.15 The existing security fencing around the site is expected to remain in place during the construction period to prevent unauthorised access to the site.
- 3.3.16 The proposed development also includes security measures specific to the nature of the proposed development. Further details regarding the specification and design of this fencing will be confirmed once a supplier has been confirmed. It can however be confirmed at this stage that security fencing is required to be 2.6 m in height and a suitable military grade specification.
- 3.3.17 The proposed lighting layout is shown on the enclosed site layout plan prepared by GD Lodge. The Lighting is generally placed at 8 m where it is attached to the building, on 6 m columns for lighting the car park and on 12 m columns elsewhere to light the yard areas. The lighting layouts and lux levels have been developed in consultation with the project ecologists and is directional, designed to minimise overspill to sensitive ecological designations and neighbouring properties. Lighting is to be used during operational hours which are not envisaged to be restricted, however it is not anticipated that these will be 24/7, and lights will be switched off when not needed. The lighting strategy is appended to the terrestrial ecology section of the EIA (Chapter 9).

Jetty

- 3.3.18 Existing jetty structures will be rebuilt to provide a heavy lift quay. Malin Group have an operational need to be able to lift vessels and equipment into and out of the Clyde, or on and off vessels that may tie-up at the quay. The presence of the existing jetties was a key element of the decision to locate at Carless and purchase the site. A rebuilt quay will provide a solid crane platform suitable for access by mobile heavy lift cranes. It is not currently proposed to install any permanent cranes at the quayside. As part of this proposed development the first two cells only will be rebuilt. The construction sequence and finished design is described in the drawings provided by Arch Henderson.
- 3.3.19 Please note that these drawings are being provided for information purposes only. The proposed works at the quayside and within the River Clyde will be subject to separate application(s) for a Marine License being made simultaneously to the Scottish Ministers via MS-LOT. However the enclosed EIA does include an assessment of the environmental impact of the proposed heavy-lift quay.

Access and Parking

- 3.3.20 Access and egress for all construction traffic, staff and visitors will be via Erskine Ferry Road. It is anticipated that once operational, staff and visitors will have a range of travel options to the site, including bus provision (notably along Dumbarton Road), rail provision (including Dalmuir and Old Kilpatrick railway stations) and active travel provision (particularly via the FCC).
- 3.3.21 The proposed development will provide 80 car parking spaces, a minimum of four of which will be disabled parking bays. A covered cycle shelter is proposed outside the main pedestrian entrance to the building, within the secure fenced-compound area of the site.

- 3.3.22 Established public transport provision includes bus stops on Dumbarton Road within 500 m walking distance and train provision at nearby Dalmuir and Old Kilpatrick rail stations, all of which offer connectivity to the public transport network serving Glasgow and the west.
- 3.3.23 In respect of active travel, both pedestrian and cycle access is available from Erskine Ferry Road. Future phases of the Scottish Marine Technology Park will incorporate connectivity to the existing blue and green network and the FCC designed at improving active travel linkages to and from the site.

Drainage Infrastructure

- 3.3.24 The proposed foul drainage layout network will comprise of a gravity closed pipe system located in the roads, verges and open spaces on-site. Long term, foul flows from the proposed development are proposed to connect into the existing Scottish Water Combined Sewer located to the east of the site boundary via a Scottish Water adopted pumping station upon completion of future phases. Initially, it is proposed that foul water from the development is connected to a private package Sewage Treatment Plant (STP) (e.g. Klargester BF BioDisc) for treatment of effluent, prior to consented discharge to the River Clyde, through a CAR Simple Licence.

3.4 Key Operational Characteristics

- 3.4.1 Once constructed, the proposed development will operate as a marine fabrication complex for the Applicant. Malin Fabrications Ltd (a sister company of the Applicant) presently operate from leased premises in Renfrew and, following the completion of the proposed development, the company will move to their operations to the site. Discussions are actively ongoing with third party marine engineering and industrial companies regarding complementary development options of the remainder of the wider Carless landholding.
- 3.4.2 Once operational the key characteristics of the development will be those normally associated with industrial development. The would include:
- Movement of people, cars, bicycles etc to, from and within the development;
 - Movement of goods vehicles in and out of the site making deliveries;
 - Noise, associated with the fabrication activities;
 - Permanent landscape change arising from the construction of structures where there presently are none.

3.5 Materials and Natural Resource Usage

- 3.5.1 The construction of the proposed development will utilise land and construction materials including bricks, roofing tiles, cement, concrete, timber, asphalt, piping, etc). Soil (reused from onsite resources wherever practicable) and seeded grass or turf will also be used for landscaping purposes. Once occupied the proposed development will use non-domestic energy and utilities infrastructure.
- 3.5.2 Where possible, excavated material will (depending on type) be used to backfill excavations and for site re-profiling purposes where appropriate. It is not expected that any material would be unsuitable for re-use in this way, though in the unlikely event that such material arises it will be disposed off-site in line with relevant waste disposal regulations.

3.6 Expected Residues, Emissions and Waste

- 3.6.1 Construction waste is expected to be restricted to normal non-hazardous materials such as off-cuts of timber, bricks, wire, fibreglass, cleaning cloths, paper, materials packaging and similar materials. These will be sorted and recycled if possible, or disposed of to an appropriately licensed landfill by the relevant contractor appointed (whether directly by the applicant or a sub-contractor).
- 3.6.2 Once completed and operational, the proposed development will be serviced by a commercial waste management and recycling contractor which will be appointed by the Applicants. The

proposed development has been designed to accommodate heavy goods vehicles in areas where access would be required for uplifting waste and delivering supplies. The quantity and type(s) of waste during the operational phase of the proposed development cannot be predicted at this stage, as this would depend on operational factors and the implementation of waste management legislation unrelated to the proposed development.

3.7 Proposed Construction Works, Programme and Management Arrangements

3.7.1 At this pre-consent stage it is anticipated that construction will take approximately 2 years (post remediation works within the site). Within this period the key construction activities are likely to include:

- Vegetation clearance, earthworks and soil preparation to prepare areas of the site for construction activities;
- Piling works;
- Construction of infrastructure including internal access routes, drainage pipes and SUDS swales;
- Construction of fabrication and office building shells and cladding;
- Erection of heavy lift quay;
- Installation of hardstanding in yard and car park areas;
- Erection of permanent gantry and jib cranes within fabrication building;
- Internal fit-out of fabrication and office buildings including fixtures, fitting and building services; and,
- Landscaping and road surfacing.

3.7.2 A Construction Environmental Management Plan (CEMP) will be implemented to reduce the risk of any likely significant adverse effects on environmental receptors as a result of construction activities and to minimise disturbance to the local residents.

3.8 Proposed Mitigation and Enhancement

3.8.1 In line with EIA best practice, the iterative EIA, planning and design processes for the proposed development have been undertaken in tandem, with close dialogue maintained between the Applicant, EIA project team, project architect and other advisers. This has allowed an overarching suite of mitigation measures and commitments to be incorporated into the proposed development from the outset, in order to both address potentially adverse effects and enhance its environmental performance. These are termed embedded mitigation measures.

3.8.2 The key embedded mitigation measures which have been integrated into the proposed development are:

- **Pre-Construction Remediation:** the undertaking and verification of the proposed remediation works within the site (as defined through planning application DC18/245) insofar as necessary to make the site suitable for future intended industrial use (i.e. for the proposed development);
- **Embedded Siting and Design Features:** all proposed structures and physical works have been sited to avoid or minimise adverse effects on sensitive environmental receptors, including in relation to:
 - Existing tree-belts along the site's southern boundary at the River Clyde;
 - The River Clyde and the qualifying ecological features of the Inner Clyde SPA, Ramsar Site and SSSI; and,
 - Notable habitat and species features of the LNCS.
- **Development and implementation of a Construction Environmental Management Plan (CEMP).** The CEMP will be submitted for the approval of WDC in consultation with

relevant consultees (e.g. SEPA and SNH). This will set out the methods by which construction will be managed to avoid, minimise and mitigate any adverse effects on the local and wider environment. The following measures will be included within the CEMP as standard and treated as embedded mitigation, with any other measures to be included in the CEMP identified as 'further mitigation' (not embedded) through the EIA:

- Measures to control construction traffic routing, site access/deliveries, parking, contractor management and parking; and,
 - Measures and procedures regarding fuels and materials storage, dust and noise suppression techniques and standard pollution prevention and control techniques.
- 3.8.3 Further specific mitigation has also been identified where necessary through the EIA process to prevent, avoid, minimise or offset significant adverse effects and to further enhance the environmental performance or wider benefits of the proposed development. This 'further mitigation and enhancement' is identified in **Subsection X.10 – Further Mitigation and Enhancement** within the technical assessments presented in **Chapters 6 – 16**.
- 3.8.4 A schedule confirming all proposed embedded and further mitigation and enhancement measures for the proposed development, as well as any proposed arrangements to monitor likely environmental effects, is provided in **Chapter 19 – Schedule of Mitigation and Monitoring**. This will enable WDC and the Scottish Ministers to easily secure this mitigation through conditions attached to any planning permission and marine licence granted for the proposed development. Owing to the overlapping planning and marine licence jurisdictions in the intertidal zone between MHWS and MHLs, any conditions relating to development activities in this zone will need to be carefully co-ordinated between WDC and the Scottish Ministers (Marine Scotland).

3.9 Consideration of Alternatives

- 3.9.1 Regulation 5(2)(d) of the TCPA EIA Regulations requires an EIA Report to include “*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*”. Schedule 4 of the TCPA EIA Regulations further requires an EIA Report to include “*a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects*”. As noted in both sections of the Regulations, only any alternative options which have actually been studied by the Applicant and are considered to be “*reasonable*” require to be described in the EIA Report, rather than all potential alternatives to the development proposal.
- 3.9.2 In 2017, the wider Carless landholding (including the site of the proposed development) was acquired by Malin Group Properties Ltd (the Applicant) with the intention of developing a marine fabrication complex on the western part to accommodate their growing fabrication business. In this regard, the site benefits from industrial land allocations and includes a set of concrete jetties protruding from the foreshore into the River Clyde. In this context, the consideration of alternative uses for the site is not relevant
- 3.9.3 Within the bounds of these key parameters, the reasonable alternatives considered in relation to the proposed development were
- Location of the fabrication hall further to the north, taking it away from the River Clyde and the adjacent SPA. This was rejected as the building interfered with the delivery and movement of products into and out of the site. It also compromised the ability to provide for future expansion of the building.
 - Increased building area of up to 5,760m² reflecting an overall fabrication building length of c.120m. This was rejected on the basis that such a building is unlikely to be needed in the immediate term and might be many years before it was required. The proposed building has been designed to be extendable should projects requiring a bigger building come forward.

- Addition of a further building to allow finishing and fit out of vessels outside of the main fabrication hall. This was rejected for budgetary reasons in this first phase of development.
 - Construction of the new heavy lift quay in the two most western cells of the existing jetties. This was rejected for reasons relating to constructability and ease of access during construction of other elements of the proposals. It furthermore would have resulted in a development that abutted the SPA. The proposals are removed from the SPA.
 - Consideration of various building design options including elevational treatment and materials. The current designs were felt to be the most appropriate for a building this size and in this location as noted in the Design & Access Statement.
- 3.9.4 The approach adopted to the design of the proposed development is discussed fully within the submitted **Design and Access Statement** (GD Lodge, 2019). In summary working with the constraints of the site and seeking to preserve the key environmentally sensitive areas, the proposed layout is considered to present the best balance of development on this allocated site.

4 Assessment Methods

4.1 Introduction

- 4.1.1 This chapter describes the process by which the EIA was carried out. It includes a discussion of the relevant TCPA EIA Regulations, the EIA process, consultations, and the assessment method adopted.

4.2 Overview of EIA

- 4.2.1 EIA is a process which aims to identify a project's likely significant environmental effects, identify mitigation measures to reduce the level of or avoid those effects, and assess the residual significance of predicted environmental effects taking account of all proposed mitigation and enhancement measures. This process helps to ensure that predicted significance effects, and the scope for reducing them, are properly understood by the public and relevant consenting authorities before determining an application for a development proposal. The requirement to systematically assess the effects of certain public and private projects on the environment (see **Section 4.3**) through undertaking an EIA was first introduced through European Council Directive 85/337/EEC, as amended and later codified in EU Directive 2011/92/EU. Substantive changes to EIA information and assessment requirements were then made through the Revised EIA Directive 2014/52/EU which was enacted in 2014.
- 4.2.2 An important tenet of EIA is that it is a process culminating in the submission and examination of an EIA Report as part of the consenting process. EIA therefore has a number of key characteristics; it is:
- **Systematic**, comprising a sequence of tasks defined both by regulation and best practice;
 - **Analytical**, requiring the application of specialist knowledge and skills from environmental sciences and policy;
 - **Impartial**, its objectives being to inform decision making and improve the environmental performance of projects rather than being to promote them;
 - **Consultative**, with provision being made for obtaining information and feedback from interested stakeholders and relevant consultees; and
 - **Iterative**, allowing opportunities for environmental concerns to be addressed during the planning and design of a project.
- 4.2.3 Typically, an iterative design process occurs in response to environmental constraints (identified during the EIA process) and other design objectives, taking account of project viability considerations and feedback from relevant consultees. This often results in a development proposal incorporating mitigation measures or design features to avoid, reduce or compensate for potential adverse effects, referred to as embedded mitigation. Additional mitigation is then identified where necessary to reduce or avoid residual significant environmental effects.

4.3 Statutory Provisions

- 4.3.1 The planning and marine licence applications submitted for the proposed development stand to be determined under the provisions of the Town and Country Planning (Scotland) Act 1997 and the Marine (Scotland) Act 2010 respectively and in accordance with the guidance set out in Scottish Government Planning Circular 1/2015². Corresponding statutory EIA requirements for certain planning and marine licence applications are set out within:
- The Town and Country Planning (Scotland) (Environmental Impact Assessment) Regulations 2017 ('the TCPA EIA Regulations'); and,

² Circular 1/2015 - The Relationship Between the Statutory Land Use Planning System and Marine Planning and Licencing

- The Marine Works (Scotland) (Environmental Impact Assessment) Regulations 2017 ('the MW EIA Regulations').

EIA Screening

- 4.3.2 Schedule 2 of the TCPA and MW EIA Regulations identify development types for which the requirement to undertake EIA is not always certain and therefore must be determined on a case-by-case basis. Whilst this list of development types is identical in both sets of regulations, the applicability of each to a given development proposal requires to be established to confirm which (if any) of the EIA regulations needs to be engaged in the determination of planning and/or marine licence applications. The jurisdictional limits of WDC as the local planning authority (MLWS) and Marine Scotland (MHWS) are also relevant in determining this.
- 4.3.3 Having regard to the nature of the proposed development and known environmental sensitivities within and surrounding the site, the Applicant is of the view that EIA is appropriately provided in relation to the planning application for the proposed development. Consequently, the proposed development is an EIA Development under Regulation 6(c) of the TCPA EIA Regulations by virtue of the submission of this EIA Report to accompany a planning application for the proposed development.
- 4.3.4 An EIA screening request was submitted by the Applicant to the Scottish Ministers (Marine Scotland) on 15th September 2017 specifically in respect of the proposed marine works forming part of the proposed development. The Scottish Ministers subsequently adopted a formal negative EIA Screening Opinion on 20th December 2017 to confirm that the proposed marine works³ are not likely to result in significant environmental effects and thus do not themselves constitute EIA Development, such that the MW EIA Regulations are not directly applicable to the proposed development.
- 4.3.5 The MW EIA screening request submitted to the Scottish Ministers considered the proposed erection and operation of a heavy lift quay comprising up to 2,400m² of reinforced concrete within the footprint of existing (derelict) jetties protruding from the site into the River Clyde. At the time of submission, the proposed design involved the creation of a solid structure quay through impervious sheet piling and the development of temporary bunds to allow construction outwards from the foreshore. As detailed in **Chapter 3 – The Proposed Development**, the design has subsequently evolved and now comprises the erection of a suspended deck supported by piled columns, without the need to create temporary construction bunds. As the footprint of the proposed heavy lift quay remains the same, the characteristics of the proposed marine works remains broadly similar with no change in associated likely environmental effects, and as the proposed marine works still fall within category 10(m) of the MW EIA Regulations as cited within the Applicant's MW EIA screening request, the negative EIA Screening Opinion issued by the Scottish Ministers on 20th December 2017 is considered to remain valid.
- 4.3.6 This EIA Report therefore formally accompanies a planning application submitted to WDC for all elements of the proposed development situated above MLWS, with the report also submitted on a non-statutory basis to the Scottish Ministers to provide relevant assessment information regarding the elements of the proposed development situated in the Scottish marine area below MHWS. WDC are therefore the single relevant competent authority for the purposes of this EIA.

EIA Scoping

- 4.3.7 To confirm the Applicant's intention to undertake a voluntary EIA and obtain clarity on the required scope of this EIA, a formal EIA Scoping Report (PBA, October 2017) was submitted to WDC as the relevant local planning authority on 14th October 2017. Subsequently, WDC adopted a formal EIA Scoping Opinion (PREAPP17/113) on 14th March 2018 to define the required scope of the EIA; this is provided in full in **Appendix 4.1**. This Scoping Opinion draws upon EIA scoping consultation responses provided by relevant consultees including SEPA,

³ The EIA screening request submitted to the Scottish Ministers considered the proposed erection and operation of a heavy lift quay comprising up to 2,400m² of reclaimed land within the footprint of existing (derelict) jetties protruding from the site into the River Clyde. At the time of submission, the proposed design involved the creation of a solid structure quay through impervious sheet piling. As detailed in Chapter 3 – The Proposed Development the design has subsequently evolved

SNH, Historic Environment Scotland, WDC (internal service departments), Clydeport and Marine Scotland.

- 4.3.8 In accordance with Regulation 5(3) of the TCPA EIA Regulations, this EIA Report is based on the EIA Scoping Opinion and includes the information which the Applicant considers to be reasonable required for reaching a reasoned conclusion on the significant effects of the proposed development on the environment, taking into account current knowledge and methods of assessment. Any material departures from the EIA Scoping Opinion are robustly justified within the appropriate technical assessment chapter of this EIA Report. As with the MW EIA Scoping Opinion, the evolution of the design of the proposed marine works forming part of the proposed development is not considered to affect the validity of the EIA Scoping Opinion adopted by WDC.

4.4 Information Requirements and Guidance

Information Requirements

- 4.4.1 Schedule 4 of the TCPA EIA Regulations prescribe the information which must be included within an EIA Report, including descriptions of:
- Relevant environmental baseline characteristics. Each of the technical assessments presented in **chapters 6 – 16** include current and future baseline sections to meet this requirement;
 - Physical characteristics of the whole development, which in this case means identifying the key characteristics of the construction and operational phases of the proposed development (refer to **Chapter 3 – The Proposed Development**);
 - Consideration of the reasonable alternatives studied by the developer (refer to **Chapter 3 – The Proposed Development**);
 - The main characteristics of the production or operational phase, including proposed materials and natural resource usage (refer to **Chapter 3 – The Proposed Development**);
 - An overview of expected residues and emissions (refer to **Chapter 3 – The Proposed Development**);
 - The assessment methodologies deployed in undertaking this EIA (refer to the technical assessment methodologies provided in **Subsection X.3** within **chapters 6 – 16**);
 - Likely significant effects from the proposed development (refer to the assessments presented in **Subsection X.7 – Assessment of Likely Effects**, **Subsection X.9 – Residual Effects** and **Subsection X.11 – Cumulative Assessment** within the technical assessments presented in **chapters 6 – 16**);
 - Mitigation measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment (refer to **Section 3.8 – Proposed Mitigation and Enhancement**, **Subsection X.6 – Embedded Mitigation** and **Subsection X.8 – Further Mitigation and Enhancement** within the technical assessments presented in **chapters 6 – 16**, and **Chapter 19 – Schedule of Mitigation and Monitoring**);
 - Any proposed monitoring arrangements in relation to any predicted significant adverse effects (refer to **Chapter 19 – Schedule of Mitigation and Monitoring**);
 - A non-technical summary of all of the above elements (refer to the standalone **Carless Marine Fabrication Complex EIA Report Non-Technical Summary**); and
 - A reference list detailing the sources used in the assessments (refer to the reference lists provided at the end of each technical assessment presented in **chapters 6 – 16**).

EIA Guidance

- 4.4.2 A range of reference material and guidance has been drawn upon in developing the EIA methodology adopted for the proposed development. Over and above the EIA Regulations, this guidance includes:

- IEMA. (2015) IEMA Environmental Impact Assessment Guide to Shaping Quality Development;
 - IEMA. (2016) IEMA Environmental Impact Assessment Guide to Delivering Quality Development;
 - Morris, P and Therivel, R. (2009) Methods of Environmental Impact Assessment; and
 - Institute of Environmental Management and Assessment. (2004) Guidelines for Environmental Impact Assessment (IEMA).
- 4.4.3 Topic specific guidance used in the preparation of the individual technical assessments presented in this EIA Report is noted where relevant in **Subsection X.2 of chapters 6 – 16**.

4.5 The EIA Process

- 4.5.1 The TCPA EIA Regulations emphasise that EIA is a process rather than output and involves the following stages:
- **Assessment work** culminating in the preparation of an ES in accordance with information requirements prescribed by the EIA Regulations;
 - **Public consultation on the application for planning permission, the ES and any other relevant information.** Consultation may be iterative rather than only occurring once in the EIA process;
 - **Examination** by the relevant authority of the information presented in the ES and other relevant information including that received through the consultation; and
 - The authority coming to a **reasoned conclusion** on the residual significant effects of the proposed development on the environment, prior to the determination of any related consenting application.
- 4.5.2 The EIA process therefore encompasses all stages of considering environmental issues associated with projects, from initial identification of relevant issues through to assessing the residual significance of **predicted** environmental effects and securing required mitigation. This ensures that all required mitigation is subsequently carried out in the implementation of projects. EIA therefore directly influences the design, construction, operation and, where relevant, decommissioning, of proposed projects, as well as providing information to decision makers.

4.6 EIA Methodology

Overview

- 4.6.1 Following the identification of the scope of the EIA in accordance with **Appendix 4.1 – Carless Marine Fabrication Complex EIA Scoping Opinion**, each environmental topic has been subject to investigation and assessment to identify and evaluate likely significant environmental effects. The survey and assessment methodologies deployed were based on recognised best practice and guidance relevant to each topic area, details of which are provided within relevant technical assessment ES chapters (**Chapters 6 – 16**). In general terms, the technical assessments undertaken for each topic area and EIA Report chapter include:
- Collation of existing baseline information regarding relevant aspects of the environment, together with surveys and fieldwork, as required, to fill any knowledge gaps or update historical information;
 - Use of the collated baseline to identify relevant trends, describe the baseline scenario and predict the evolution of this baseline scenario in the absence of the proposed development;
 - Consultation with relevant consultees in relation to the EIA scope and emerging findings;
 - Consideration of the potential effects of the proposed development on the baseline scenario (and its predicted evolution), followed by the identification of design changes, mitigation measures to avoid or reduce predicted significant adverse effects, and possible enhancement measures to improve environmental outcomes;
 - Assessment of the significance of predicted residual effects from the proposed development and consideration of any monitoring required in relation to predicted residual significant adverse effects;
 - Production of EIA Report chapter; and
 - Input into a consolidated schedule of required mitigation measures and proposed monitoring arrangements for the proposed development.
- 4.6.2 The detailed methodology adopted to undertake each individual technical assessment is presented in **Subsection X.3 – Methodology** within **chapters 6 – 16**.

Key Methodological Assumptions

- 4.6.3 The following key assumptions have been used to ensure that the EIA presented in this EIA Report has undertaken a proportionate assessment of the level and significance of likely effects from the proposed development:
- The EIA including the preparation of this EIA Report has been undertaken in full accordance with the applicable TCPA EIA Regulations. Whilst the MW EIA Regulations are not directly applicable to the proposed development, this EIA includes relevant impact assessment information to support concurrent planning and marine licence necessary to authorise all elements of the proposed development;
 - The proposed development has been assessed in relation to and will be built out in accordance with the drawings included in **Appendix 3.1 – Figures** within **Volume 2 – Technical Appendices**. This includes **Figure 3.1 – Site Layout Plan**. Any drawings submitted out with **Appendix 3.1** as part of this EIA Report or the wider planning and marine licence applications are for illustrative purposes only;
 - Planning law and policies require that remediation activities need to be undertaken to make the site suitable for future intended use prior to the construction of the proposed development then commencing. As such:
 - Planning application DC18/245 for the proposed remediation works will need to be positively determined by WDC prior to the determination of the planning and marine licence applications which this EIA Report accompanies for the proposed development;

- The remediated site therefore forms the ‘future baseline’ scenario for the purposes of this EIA upon which likely significant effects from the proposed development require to be assessed; and,
- The likely environmental effects from the implementation of the proposed remediation works have already been assessed in studies to accompany planning application DC18/245 and do not need to be re-assessed in this EIA Report. The Remediation Strategy which underpins planning application DC18/245 is however provided as **Appendix 6.2** in order to describe the whole development proposed.
- Pre-construction remediation activities within the site will be undertaken in 2019 – 2020, with construction of the proposed development then completed by 2022. Industrial operations are scheduled to commence in 2022 in accordance with the Applicant’s operational and commercial requirements;
- Relevant approved developments which have the potential to interact with the construction and/or operation of the proposed development are identified in **Section 2.4**. Only these approved developments have been considered within the assessment of cumulative effects presented in **Section X.11 – Cumulative Effects** in **chapters 6 – 16**. The assessment assumes that the identified relevant approved developments will be built out as set out in the planning applications, planning permissions and associated documents available in the public domain for these developments;
- In accordance with the TCPA EIA Regulations, an assessment of likely effects (including cumulative effects) from the proposed development has been carried out to identify, describe and assess any significant effects. As such, the assessment only considers possible effects which have some potential to be significant within the context of the TCPA EIA Regulations. Other possible effects which have no potential to be significant in EIA terms have necessarily been scoped out of this EIA; and,
- Suitable planning conditions and planning obligations will be attached to any planning permission granted for the proposed development to secure relevant mitigation measures proposed in this EIA Report (refer to **Chapter 19 – Schedule of Mitigation and Monitoring**). Any conditions necessary to implement relevant mitigation measures in respect of development in the intertidal zone between MHWS and MHLW will need to be replicated on any marine licence granted by the Scottish Ministers (Marine Scotland).

Consultation

- 4.6.4 In addition to formally requesting WDC to adopt an EIA Scoping Opinion in respect of the proposed development, additional consultation has been undertaken to provide information, discuss assessment methods and findings, and to agree mitigation measures and design responses. Consultation has been undertaken with stakeholders including (NB this is not an exhaustive list):
- West Dunbartonshire Council Roads Department;
 - West Dunbartonshire Council Environmental Pollution Group;
 - West of Scotland Archaeological Service;
 - Scottish Canals;
 - Scottish Natural Heritage;
 - Scottish Environment Protection Agency (planning, flood risk and contaminated land teams); and,
 - Scottish Water.
- 4.6.5 A programme of community engagement has also been undertaken, as detailed within the statutory **Pre-Application Consultation Reports** submitted in support of the planning and marine licence applications for the proposed development.

Establishing Baseline Conditions

Current Baseline

- 4.6.6 A range of site surveys and data collection exercises have been used to identify current environmental conditions at the site and the surrounding area. The surveys undertaken are reported in each of the topic chapters. Data has also been collated regarding relevant approved cumulative developments which need to be considered in this EIA (see **Section 2.4**).
- 4.6.7 The EIA has been based on technical surveys and assessments, the reporting of which is frequently too detailed and lengthy for incorporation into **Volume 1** of this EIA Report (e.g. ecology surveys). In such instances the technical survey and assessment reports are provided in full in **Volume 2 – Technical Appendices**, with a relevant summary and the reference for the full survey or assessment provided in **Volume 1**. The geographical scope of these appended surveys and assessments has been based on the likelihood for significant effects in accordance with the Carless EIA Scoping Opinion (WDC, March 2018).

Future Baseline

- 4.6.8 To ensure the site is suitable for the future intended industrial use the implementation of the proposed remediation works, resulting in a remediated site, forms the 'Future Baseline' upon which likely significant effects from the construction and operation of the proposed development must be assessed. It has therefore been necessary to develop a future baseline scenario to take account of the effects of the proposed remediation works which have already been applied for under planning application DC18/245. **Section X.5** within **chapters 6 – 16** therefore considers the impact of the proposed remediation works on current baseline conditions of relevant to this EIA, in particular to determine whether the implementation of the proposed remediation works is likely to alter the current physical characteristics, importance or sensitivity of identified receptors. The impact assessment presented in **sections X.7 – X.11** in **chapters 6 – 16** then considers the likely effects of the construction and operation of the proposed development upon this future baseline and the significance of such effects.

Types of Effect

- 4.6.9 Schedule 4 to the EIA Regulations requires consideration of a variety of types of effect, namely direct / indirect, secondary, cumulative, positive / negative, short / medium / long-term, and permanent / temporary. All identified effects need to be considered in terms of how they are predicted to arise, whether they are positive (beneficial) or negative (adverse), their temporal occurrence (i.e. when they are predicted to occur) and their duration once the effect does occur. This includes consideration of effects during both the construction and operational phases of the proposed development.
- 4.6.10 The EIA Report must also consider the potential for effects identified through one topic specific technical assessment to generate secondary or otherwise related effects of relevance to other environmental topics. In particular, likely noise effects, as predicted in **Chapter 13 – Noise & Vibration**, directly influence the likely ecological disturbance effects predicted in **Chapters 9 – Terrestrial Ecology** and **10 – Marine Ecology**. At the outset of this EIA it was also recognised that predicted traffic movements (from the proposed development, existing development and approved cumulative developments) would need to be taken account of in the transport, noise and air quality technical assessments presented in chapters 11 – 13 of this EIA Report. Traffic data calculated to inform the **Carless Marine Fabrication Complex Transport Assessment** provided in **Appendix 11.2** has therefore been used to inform other relevant technical assessments.
- 4.6.11 The spatial scope for the identification of likely significant environmental effects varies between environmental topic areas and a relevant Study Area(s) is therefore defined within each technical assessment EIA Report chapter (**chapters 6 – 16**). In general terms, this spatial scope depends on the location of relevant receptors and the existence of known pathways for effects from the proposed development to the identified receptors.

Uncertainty

- 4.6.12 The prediction of future effects inevitably involves a degree of uncertainty, in particular due to the reliance upon a future baseline scenario in this EIA. Where necessary, the technical assessments presented in **chapters 6 - 16** describe the principal factors giving rise to uncertainty in the prediction of effects and the degree of the uncertainty.
- 4.6.13 Confidence in the assessments presented in this EIA Report can be derived from the application of robust topic specific assessment methodologies, which have been developed and implemented in accordance with relevant technical guidance and standards (e.g. those detailed within Design Manual for Roads and Bridges, the Guidelines for Ecological Impact Assessment in the UK and British Standard Institute publications). Where the success of a mitigation measure is uncertain, the extent of this uncertainty is identified alongside the measure.

Mitigation and Enhancement Measures

- 4.6.14 The technical assessments presented in **chapters 6 – 16** of this EIA Report firstly identify predicted effects from the proposed development taking into account embedded mitigation measures, before identifying any required further mitigation and then reporting predicted residual effects.
- 4.6.15 The TCPA EIA Regulations require an EIA Report to include a description of “*measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment*”. **Subsection X.8** within each technical assessment presented in **chapters 6 - 16** therefore consider the need for further mitigation measures (beyond embedded mitigation features) to avoid significant adverse effects otherwise predicted to occur. Consideration is also given to further mitigation measures in order to reduce predicted ‘not significant’ adverse effects and to recommended enhancement measures to improve the environmental performance of the proposed development, including in respect of predicted beneficial environmental effects.
- 4.6.16 A schedule of all proposed mitigation measures is provided in **Chapter 19 – Schedule of Mitigation and Monitoring**. This schedule is provided to assist WDC as the relevant EIA component authority in securing all required mitigation measures and any proposed monitoring within the decision notice of any planning application granted for the proposed development.

The Significance of Likely Residual Effects

- 4.6.17 Residual effects are the environmental effects that will remain after the incorporation of both embedded and additional mitigation measures. It is these residual effects which should be considered when assessing the significance of the proposed development, rather than the unmitigated effects as unmitigated effects will not occur. For example, whilst the proposed development may affect protected species, appropriate mitigation has been identified to ensure that significant effects on such species do not occur.
- 4.6.18 To provide an objective assessment of residual effects, their significance has been determined and is identified in the ES, as detailed below. This allows for comparison of effects between topics, strengthens the assessment of impact interactions and allows decision makers to more easily examine and make a reasoned conclusion on the significant environmental effects of a project.
- 4.6.19 The two principal criteria for determining significance of an environmental effect are the magnitude of change and the sensitivity of an identified receptor to this change. The likelihood of the change occurring is also considered, as a constituent factor affecting the predicted magnitude of change.
- 4.6.20 The approach to assigning significance to predicted environmental effects is not itself detailed within the TCPA EIA Regulations, meaning that it is necessary to develop effect significance thresholds to underpin the assessments reported in this EIA Report. These thresholds are defined on a topic specific basis within **chapters 6 – 16**, taking account of relevant regulations, guidance, standards, the advice and views of consultees, and expert judgement. **Subsection X.3 – Methodology** within each technical assessment chapter explains the topic specific

methodology adopted to identify the level and associated significance of predicted effects with reference to relevant thresholds. Where relevant, this is based on the factors identified above and the generic criteria set out in **Table 4.1** below.

Table 4.1 Generic Significance Criteria

	Level of Effect	Criteria
Significant	Substantial	These effects are assigned this level of significance as they represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites and features of national or regional importance. A change at a district scale site or feature may also enter this category.
	Major	These effects are likely to be important considerations at a local or district scale and may become key factors in the decision-making process.
	Moderate	These effects, while important at a local scale, are not anticipated to be key decision-making issues.
Not significant	Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process.
	Negligible or No Effect	Either no effect or effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error. Such effects should not be considered by the decision-maker.

4.6.21 Effects that are described as ‘substantial’, ‘major’ or ‘moderate’ are determined to be significant, whereas effects that are described as ‘minor’ or ‘negligible’ are determined to be not significant.

4.7 Impact Interactions

4.7.1 **Chapter 18 – Environmental Interactions: Health & Amenity Effects** provides the assessment of impact interactions, i.e. receptors being affected by more than one environmental effect and therefore potentially being subject to a more significant combined effect than reported within the individual technical assessment EIA Report chapters (i.e. **chapters 6 – 16**). Details of the approach to identifying and assessing impact interactions is provided within **Chapter 18**.

4.8 Approach to Cumulative Impact Assessment

4.8.1 The TCPA EIA Regulations require likely significant cumulative effects from a development proposal in combination with existing and approved development to be described within an ES.

4.8.2 Existing developments are considered as part of the current baseline scenario within the technical assessments provided in **chapters 6 – 16** of this EIA Report, whilst approved developments are considered separately within subsection **X.11 – Cumulative Effects** in these chapters. Approved developments of relevance to this EIA Report are listed in **Section 2.4**.

5 Legislative and Policy Context

5.1 Introduction

- 5.1.1 This chapter sets out the key planning legislation, policies and other material considerations applicable to the proposed development which have informed the siting, design and environmental assessment processes. Consideration is given to the following matters in turn:
- Relevant statutory provisions;
 - The statutory Development Plan applicable to the site; and
 - Other material considerations, including the West Dunbartonshire LDP Proposed Plan (2015), the West Dunbartonshire LDP 2 Proposed Plan (2018), local planning guidance, relevant national policies, advice and guidance, and relevant national regional marine spatial plans.
- 5.1.2 The purpose of this chapter is to identify all legislative and policy requirements and considerations relevant to the technical assessments provided in **Chapters 6 – 16** of this ES. Appropriate cross-references are provided within **Subsection 2** of each technical assessment chapter to confirm which legislation and policies are applicable to the assessment.
- 5.1.3 This chapter is factual in nature and does not assess the proposed development's accordance with relevant planning policies. A separate Planning Statement explains the rationale for the proposed development and assess in detail how it accords with relevant Development Plan policies and other material considerations.

5.2 Relevant Statutory Provisions

- 5.2.1 The key planning legislation of relevance to this EIA comprises:
- The Town and Country Planning (Scotland) Act 1997 as amended ('the Principal Act');
 - The Marine and Coastal Access Act 2009, the Marine (Scotland) Act 2010 and associated secondary legislation;
 - The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the TCPA EIA Regulations');
 - The Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013; and,
 - Other relevant subject specific legislation, as identified within individual technical assessment chapters of the EIA report for the proposed development.
- 5.2.2 Under section 25 of the Principal Act, planning applications must be determined in accordance with the statutory Development Plan applicable to the site of a proposed development, unless material considerations indicate otherwise. Under section 15 of the Marine (Scotland) Act 2010, the determination of marine licence applications must be made in accordance with Scotland's National Marine Plan and any applicable regional marine plan unless relevant considerations indicate otherwise.
- 5.2.3 The relevance and implications of the TCPA EIA Regulations for this EIA Report are detailed separately in **Chapter 3 – Assessment Methods**.
- 5.2.4 It should be noted that the technical assessments presented in chapters 6 – 16 have also been prepared in accordance with a wide range of topic specific legislation, non-planning policies, technical guidance and standards, as detailed within a dedicated section of each chapter (**Subsection X.2**).

5.3 Development Plan

Overview

5.3.1 The statutory Development Plan applicable to the site presently comprises the approved Clydeplan Strategic Development Plan (2017) ('Clydeplan SDP') and the adopted West Dunbartonshire Local Plan (2010) ('the Local Plan'). However, the adopted Local Plan is only of limited relevance as it pre-dates current national and regional planning policies, with the more recent West Dunbartonshire LDP Proposed Plan (2015) and West Dunbartonshire LDP2 Proposed Plan (2018) providing up to date and relevant planning policies. The relevance of those documents to this EIA is considered in **Section 5.4** below.

Clydeplan Strategic Development Plan (2017)

5.3.2 The Clydeplan SDP was approved by the Scottish Ministers in July 2017, replacing the previously approved Glasgow and Clyde Valley SDP (2012).

5.3.3 The Clydeplan SDP (2017) identifies the site as forming part of the Clydebank Riverside Strategic Employment and Industrial Location (SEIL). Policy 5: SEILs requires local authorities to "*safeguard and promote investment in the SEILs to support their dominant role and function and to address the opportunities/challenges*". Whilst the Clydebank Riverside SEIL is identified in Schedule 3 of the Clydeplan SDP for 'Business and Financial Services/Life Sciences' uses, more broadly the SDP defines a Clyde Development Corridor along the River Clyde where the re-use of vacant/derelict land and "*large-scale economic activity*" is to be prioritised.

5.3.4 Other relevant policies within the Clydeplan SDP are:

- Policy 1: Placemaking – requires all development proposals to "*contribute towards the creation of high quality places*" and to accord with a suite of Placemaking Principles;
- Policy 12: defines Green Network Strategic Delivery Areas (SDA), including a linear corridor between Clydebank and Bowling, as the focus of Green Network development by member authorities.

West Dunbartonshire Local Plan (2010)

5.3.5 The Local Plan was adopted by WDC in March 2010. As such, it pre-dates the approval of both the Clydeplan SDP (2017) and the previous Glasgow and Clyde Valley SDP (2012), as well as relevant national planning policies including the Scottish Planning Policy (SPP) (2014).

5.3.6 Local Plan Policy LE 6: Strategic Employment Locations defines a Core Economic Development Area (CEDA) along the Clydebank Waterfront from Rothesay Dock westwards to the Erskine Bridge, thereby including the site. The policy promotes the development of this strategic location for business and industrial uses, whilst also seeking to improve environmental quality and amenity.

5.3.7 Related to Policy LE 6, Local Plan Policy GD 2(9): Carless, Old Kilpatrick specifically relates to the site. This policy identifies the site as vacant and derelict land and promotes the site as a 'redevelopment opportunity site' for 'industrial/business/residential/retail (ancillary to residential development)/leisure/open space.'

5.3.8 Within the Local Plan, the site is split into business (LE 1 (17)) and housing (H 2 (22)) uses. Concerning LE 1 (17) specifically, the policy states "*a presumption against the reduction in the area designated for industry and business uses below 6.0 Ha. The sites on Clyde riverside locations are situated adjacent to the Inner Clyde SSSI and Special Protection Area (SPA) which is subject to obligations under the Nature Conservation (Scotland) Act 2004 and the EU Birds Directive. With regard to these requirements, Local Plan Policy E 2A - International Nature Conservation Sites (Natura 2000) is relevant to this proposal.*"

5.3.9 The Local Plan sets out the overarching policies which apply to all development proposals, followed by a suite of subject specific policies. The Local Plan policies of most relevance to the proposal are Policy UR 1: Urban Renewal and Policy RP 1: Regeneration Priorities, as these

set the framework within which all environmental and wider planning issues are assessed through individual detailed policies.

- 5.3.10 Local Plan policies identified as having relevance to the proposed development are outlined in **Table 5.1** below.

Table 5.1 Relevant Policies within the West Dunbartonshire LDP (2010)

LDP Policy Title	Summary
SUS 1: Sustainable Development	Proposals should contribute to sustainable development and climate change mitigation, including through sustainable design and seek to minimise environmental impacts.
UR 1: Urban Renewal	Promotes the re-use of land and buildings within the urban area that become vacant, derelict or underused in order to stimulate the process of urban renewal and thereby enhance the Plan area as a place to live, work and visit.
RP 1: Regeneration Priorities	Promotes the redevelopment of underused, vacant and derelict land in order to bring forward development opportunities that support urban renewal.
GN 1: Green Network	Provides for the promotion, protection and improvement of the Green Network throughout West Dunbartonshire and seeks positive contribution to the protection and improvement of the green network in the wider Glasgow and Clyde Valley conurbation.
GD 1: Development Control	All new development is expected to be of a high quality of design and to respect the character and amenity of the area in which it is located. This includes the protection of the water environment and the recognition of the value of the historic and natural environment.
GD 2: Redevelopment Opportunities	Promotes the redevelopment of underused, vacant and/or derelict land for redevelopment, in particular sites listed in Schedule GD 2 which represent opportunities for redevelopment.
LE 1: Industrial and Business Use Sites	Within the existing and proposed industrial and business class sites designated on the Proposals Map there shall be a presumption in favour of uses which positively extend the permanent employment potential of the sites.
LE 10: Access and Design Quality of Industrial Estates and Business Sites	Development proposals should be of a high quality design offering appropriate high quality design that reflects the character of the surrounding area, whilst provision to public transport facilities via walking and cycling links should be provided.
T 2: Access Improvements	Provides support for development proposals which link to the existing road network, carparks and path networks.
T 4: Accessibility to New Development	Supports developments where sites are well integrated into walking, cycling and public transport routes, and should give priority to the positioning of footpaths, cycleways and bus stops at the main entrances to developments or within residential areas.

LDP Policy Title	Summary
E 1: Biodiversity Duty	Requires WDC to further the conservation of biodiversity through the planning system.
E 2A: International Nature Conservation Sites (Natura 2000)	Development likely to have a significant effect on a Natura 2000 site will be subject to an appropriate assessment. Where an assessment is unable to conclude that a development will not adversely affect the integrity of the site, development will only be permitted if a development meets a set of criteria.
E 2B: National Nature Conservation Site (Sites of Special Scientific Interest)	Development that affects a Site of Special Scientific Interest will only be permitted where an appraisal has demonstrated that there will not be any effect upon integrity or objectives of the designated area, or the significant adverse effects are clearly outweighed by social or economic benefits on national importance.
E 3A: Local Nature Conservation Sites	Promotes the protection of the natural environment, including protection of habitats, species and natural features which are vulnerable and/or specifically protected.
E 3C: Protection and Enhancement of the Fisheries Resource of the River Leven	New development proposals within the corridor, which are likely to significantly affect the river or its catchment area, should demonstrate that there will be no significant adverse impact either in terms of any undue disturbance to protected species or their habitats in the river or its catchment area, or any pollution of the river or its catchment area.
E5: Development Affecting Trees	New development proposed on sites with, or adjacent to, existing trees or woodlands will be assessed in accordance with best practice and should be taken account of as part of the design process.
E 9: Landscape Character	Development proposals are expected to positively contribute to the conservation or regeneration of landscape character. Development with the potential to detrimentally affect landscape character will not generally be supported unless supported by other Local Plan policies. And in any such event, appropriate mitigation measures should be proposed to minimise adverse impacts.
BE 2- Listed Buildings	Sets out protection for listed buildings including its setting, appearance and character to ensure it is not adversely affected by new development.
BE 5: Scheduled Ancient Monuments and other Archaeological Sites	Sets out protection for scheduled ancient monuments and other archaeological sites including the Forth and Clyde Canal.

LDP Policy Title	Summary
BE 6A Antonine Wall	States a presumption against development which could result in an adverse impact on the Frontiers of the Roman Empire (Antonine Wall) World Heritage Site as defined on the proposals map.
R 4(A): Forth and Clyde Canal	Sets out criteria requiring developments affecting the canal and adjacent areas to protect the character and general amenity of the Forth and Clyde Canal.
F 1: Flood Prevention	Developments must not increase the risk of flooding either locally or elsewhere in the catchment and have consideration for adverse effects on flood plains and flood attenuation areas.
F 2: Waste Water, Sustainable Urban Drainage, Drainage Impact Assessment and Culverts	Drainage of developments must satisfy the principle of Sustainable Urban Drainage Systems (SUDS) with details submitted at planning application stage.
F 3: Standards of Flood Protection	The Council will use the established standard of flood protection provided within the LDP which indicate the suitability of different types of development to the risk of flooding, for assessing development proposals.

Adopted Supplementary Guidance

5.3.11 The adopted West Dunbartonshire Local Plan (2010) is not accompanied by any relevant supplementary guidance.

5.4 Other Material Considerations

Overview

5.4.1 Other material considerations of relevance to the proposed development are:

- The West Dunbartonshire Local Development Plan Proposed Plan 2015;
- LDP Proposed Plan Supplementary Guidance (2015);
- The West Dunbartonshire Local Development Plan Proposed Plan 2018;
- National Planning Policies; and,
- Other National Policies, Advice and Guidance.

5.4.2 Each of these material considerations is outlined in turn below.

West Dunbartonshire Local Development Plan Proposed Plan (2015)

5.4.3 Whilst the West Dunbartonshire LDP Proposed Plan 2015 was not adopted by WDC as part of the statutory Development Plan, it remains an important material consideration in the determination of all planning applications. Applicable LDP proposed policies are therefore considered within this ES Chapter where relevant.

5.4.4 The spatial strategy which underpins the LDP Proposed Plan 2015 is focused around a set of 'changing places' and regeneration priorities, including the regeneration of Carless, Old Kilpatrick. Section 3.6 of the LDP Proposed Plan 2015 sets out a redevelopment strategy for the site, with an emphasis on the need for proposals to deliver appropriate remediation and to respect the site's environmental sensitivities. The redevelopment strategy for the site is in-line with that of the 2010 Adopted LDP and aims to deliver:

- *“new development resulting in the remediation of the site – a range of uses, including housing, business and industry will be suitable but retail will be limited to that required to serve any development on the site;*
- *green network enhancements, particularly along the Clyde waterfront, canal and former railway corridor; and*
- *access improvements including the provision of new road access to the site from Dumbarton Road (crossing Forth & Clyde Canal), enhancements to the access from Erskine Ferry Road and the provision of public transport within/close to the site.”*

5.4.5 The LDP Proposed Plan 2015 provides support for a range of uses that would contribute to the remediation of the site, with housing and business/industry uses preferred. As part of the Clydebank Riverside Strategic Economic Investment Location, the site is identified as an economic opportunity for investment in business, financial services and a range of other uses. To maximise the site's economic potential, a masterplan is required in order to guide development of the wider Carless site.

5.4.6 As with the adopted Local Plan, the need for development proposals to be accompanied by a project-level Habitats Regulations Appraisal (HRA) is required by the LDP Proposed Plan 2015, as the site lies within the Inner Clyde Site of Special Scientific Interest (SSSI) and is also a Special Protection Area (SPA). Development proposals must not have an adverse effect on Redshank, which are the qualifying interest of the SPA.

- 5.4.7 The LDP Proposed Plan 2015 expects development proposals at the site to include green infrastructure enhancements along the waterfront and to protect the setting and integrity of the Forth and Clyde Canal, which is a Scheduled Monument.
- 5.4.8 Relevant policies within the West Dunbartonshire LDP Proposed Plan (2015)⁴ are listed in **Table 5.2**.

Table 5.2: Relevant Proposed Policies within the West Dunbartonshire LDP Proposed Plan (2015)

Proposed Policy Title	Summary
DS1 - Successful Places and Sustainable Design	All development proposals are expected to contribute towards creating successful places, notably by having regard to the relevant criteria of the six qualities of successful place (Distinctive, Adaptable, Resource Efficient, Safe and Pleasant, Welcoming and Easy to get to/move around).
DS2 – Settlement Strategy	Development proposed outside of urban areas identified on the accompanying proposals maps is restricted to specific uses set out within policy DS2, including infrastructure with a specific locational need.
DS4 – Air Quality	Proposed development will not be permitted if it introduces new sources of air pollution that would impact on sensitive receptors, or introduce sensitive receptors close to areas with air quality problems, unless appropriate mitigation measures can be delivered.
DS6 – Flooding	Development proposals situated within a functional flood plain, a site that has a significant probability of being affected by flooding or increasing flood risk elsewhere will not be supported. Proposals are expected to include provision for SuDS where appropriate.
DS7 – Contaminated Land	Development proposals on potentially contaminated sites will need to be accompanied by a report setting out the nature of contamination on site. In scenarios where contamination is present, remediation will be required to facilitate the site for proposed future uses.
DS8 – Soil Resources	Development proposals are expected to make sustainable use of soils. Proposals that will affect peat and carbon rich soils are required to include measures to minimise soil disturbance, whilst enhancing such areas where possible.
GE1 - Opportunities for New and Expanding Businesses	Sites defined under Schedule 1 of the LDP Proposed Plan 2015 are reserved for business, industrial or storage and distribution uses. Any development proposals for alternative uses will be assessed against the criteria of Policy GE2.
GN2 – Green Infrastructure	Development proposals are required to follow the Integrating Green Infrastructure approach to design, notably by incorporating SuDS, open space, paths and habitat enhancements at a level proportionate to the scale of development.
GN3 - The Habitat Network and Geodiversity	Proposed development that will harm protected species or have an adverse impact on the integrity of sites designated for nature conservation will not be permitted, except in instances where: a) <i>“For Natura 2000 sites, where there are no alternative solutions and imperative reasons of overriding public interest exist; including those of a social and economic nature;</i>

⁴ A more detailed analysis of relevant policies and provisions will be provided within the subsequent ES and PPIp application to be submitted for the proposed development.

Proposed Policy Title	Summary
	<p>b) <i>for protected species, where relevant licensing tests or other legal provisions are met;</i></p> <p>c) <i>For SSSIs, where adverse effects are outweighed by social, environmental or economic benefits of national importance;</i></p> <p>d) <i>For Local Nature Conservation Sites, where adverse effects are offset or compensated in a way that adequately maintains the integrity of the interests affected; and</i></p> <p>e) <i>For local Nature Reserves, where impacts are offset or compensated in a way that maintains the integrity of the interests affected and maintains the involvement of people.”</i></p> <p>Development proposals are expected to enhance biodiversity as part of the green network.</p>
GN4 – Landscape Character	<p>Development proposals are required to consider the local landscape character of the area to ensure that the integrity is maintained or enhanced. Regarding the Kilpatrick Hills, development proposals that could affect this area will be required to protect, and where possible enhance, their special landscape qualities.</p>
GN6 – The Water Environment	<p>Policy GN6 sets out the measures to be employed to protect and improve the quality and enjoyment of the water environment. These measures include “supporting the objectives and actions of the River Basin Management Plan for Scotland and the Clyde Area Management Plan; minimising pollution of waters; requiring surface water to be treated by SuDS; minimising the risk of invasive non-native species contaminating the water environment; and encouraging access to, along and beside waterways, including for walking, cycling, water sports and fishing, except where this would adversely affect the habitat network or protected species.”</p> <p>Additionally, appropriate management of waste water is required, as set out within the policy.</p>
GN7 – Forth and Clyde Canal	<p>Policy GN7 requires development proposals situated along the Forth and Clyde Canal to enhance this green network asset. Should a proposed development have an adverse impact on the canal or its setting this will not be permitted.</p>
GN8- Outdoor Access	<p>Development which could result in the loss of a core path, right of way or other important route will not be permitted unless alternative provision can be made. The provision of paths will be expected in developments where these would enhance active travel or connectivity within the green network, and particularly where this would create routes to and along waterways.</p>
BH1-Antonine Wall	<p>Development that would have an adverse impact on the Antonine Wall or its setting will not be permitted. Proposals affecting the Wall will be considered in relation to further information and detail to be provided in supplementary guidance.</p>
BH2- Scheduled Monuments and Archaeological Sites	<p>Development proposals that will have an adverse effect on a Scheduled Monument or its setting will not be permitted. Any other archaeological sites are expected to be preserved in-situ where possible. In situations where this is not possible, appropriate recording, analysis, publication and archiving is required.</p>
BH3-Listed Buildings	<p>Demolition or development which would adversely affect the special interest, character or setting will not be permitted. Appropriate enhancement of listed buildings will be supported which is proportionate in scale and appropriate in terms of design and use subject to conditions or a legal agreement ensuring the restoration of the listed building.</p>
SD1 – The Transport Network	<p>Policy SD1 sets out the transport requirements for development proposals, notably stating that “development should avoid adversely affecting the road network by complying with Roads Development Guidelines and relevant parking standards; avoiding unacceptable congestion; and providing or</p>

Proposed Policy Title	Summary
	contributing to improvements to the transport network that are necessary as a result of the development.

LDP Proposed Plan Supplementary Guidance (2015)

5.4.9 The Our Green Network LDP Supplementary Guidance (2015) was published by WDC to support the implementation of proposed policies GN1 and GN2 within the West Dunbartonshire LDP Proposed Plan (2015). The document identifies the characteristics of the green network within West Dunbartonshire and outlines potential enhancement measures which could be facilitated through development.

The West Dunbartonshire Local Development Plan 2 Proposed Plan (2018)

5.4.10 When it became clear in 2016 that the West Dunbartonshire LDP Proposed Plan 2015 could not be adopted without substantive modifications not supported by WDC elected members, the Council commenced work to prepare a new LDP. Once the West Dunbartonshire Local Development Plan 2 Proposed Plan (2018) ('the LDP Proposed Plan (2018)') is adopted, the new emerging LDP will replace the adopted Local Plan as part of the statutory Development Plan (alongside the approved Clydeplan SDP (2017) and the West Dunbartonshire LDP Proposed Plan 2015.

5.4.11 Following the submission by PBA on behalf of the Applicant of a representation in respect of the West Dunbartonshire LDP2 Main Issues Report (2017), WDC have engaged with the Applicant to collaboratively define a mutually acceptable strategy to underpin the remediation and redevelopment of the site. This strategy recognises the need for greater flexibility in the phasing of remediation and redevelopment proposals for the site, both for viability reasons and as remediation must be designed to make each area of the site suitable for future intended uses.

5.4.12 Whilst the content of the West Dunbartonshire LDP2 Proposed Plan (2018) is broadly supported by the Applicant, a formal representation has been submitted by PBA on behalf of the Applicant to seek a number of clarifications in respect of individual proposed policies.

5.4.13 The Applicant has worked with WDC to define a new strategy for the redevelopment of the site and broadly supports the content of the LDP Proposed Plan (2018). As part of ongoing dialogue the Applicant has submitted a further representation in advance of the end of the LDP Proposed Plan consultation period to convey this support whilst seeking a number of minor clarifications to the wording of individual proposed policies.

Carless Site-Specific Policies

5.4.14 A new development strategy for the wider Carless landholding is set out within the Carless spatial priority section of the LDP Proposed Plan (2018), based around a development strategy and four specific proposed policies within the 'Delivering Our Places' section of the plan ('. This development strategy calls for a flexible and long-term approach to:

- *“Redevelopment of the Carless site for business and industrial uses, appropriate commercial uses and, where appropriate and justified, housing and day-to-day convenience retail uses;*
- *To provide a secondary access point to the site and upgrade the existing access;*
- *To use development of the site to enhance the Green Network;*
- *To protect the Forth and Clyde Canal and its setting; and*
- *To protect the qualifying interests and qualities of the Special Protection Area and SSSI*

5.4.15 This development strategy is based around four site specific policies (Carless policies 1 – 4) within the 'Delivering Our Places' section of the LDP Proposed Plan (2018). Of relevance to this EIA for the proposed development:

- **Carless Policy 1** provides support for development proposals comprising Class 4, 5 and 6 (business or industrial use) on the site (the western part of the wider Carless landholding); and,
- **Carless Policy 4** requires development proposals on the wider Carless landholding (including the site) to delivery “habitat, access, green and open space enhancements site” (sic green network enhancements).

5.4.16 Carless Policies 2 and 3 respectively set out requirements regarding mixed use and residential development proposals on land within the wider Carless landholding which are neither applicable to the proposed development nor to the site.

Other Relevant Proposed Policies

5.4.17 Other proposed policies within the LDP2 Proposed Plan (2018) of relevance to the proposed development are set out in **Table 5.3** below.

Table 5.3: Relevant Proposed Policies within the West Dunbartonshire LDP2 Proposed Plan

LDP Policies	Summary
WD1 Waterfront Development	<p>Policy WD1 requires development proposals adjacent to waterfront assets, including the River Clyde, to adhere to a range of criteria, including the delivery of an enhanced waterfront frontage, and protected or enhanced access to the waterfront.</p> <p>Development proposals are expected to demonstrate appropriate design, massing and scale of built form whilst ensuring delivery of a coordinated approach to development.</p>
Policy FCC1 – Forth & Clyde Canal	Development proposals adjacent to the Forth and & Clyde Canal are expected to enhance this asset.
CP1 – Creating Places	Similar to policy DS1 (2015), proposals for new development are expected to contribute towards successful places by having regard to the relevant criteria of the six qualities of successful place.
CP3 Masterplanning and Development briefs	Policy CP3 sets out the types of proposed development that are to be accompanied by a masterplan. Masterplans are required “to set out a phasing and delivery strategy which is realistic to market conditions. Development proposals should be brought forward in line with the proposed phasing.”
BE1 Scheduled Monuments and Archaeological Sites	Similar to policy BH2 (2015), development proposals that will have an adverse effect on a Scheduled Monument or its setting will not be permitted. Any other archaeological sites are expected to be preserved in-situ where possible. In situations where this is not possible, appropriate recording, analysis, publication and archiving is required.

LDP Policies	Summary
BE2- Listed Buildings	Development proposals that will adversely affect the special interest, character or setting of a listed building and its setting will not be permitted. Appropriate enhancement of listed buildings will be supported in accordance with other relevant policies of the plan; which is proportionate in scale and appropriate in terms of design and use subject ; to conditions or a legal agreement ensuring the restoration of the listed building.
ENV1 Nature Conservation	Similar to policy GN3 (2015), development proposals that will harm protected species or have an adverse impact on the integrity of sites designated for nature conservation will not be permitted, except in specific instances. Development proposals are expected to enhance biodiversity as part of the green network.
ENV2: Landscape Character	Development proposals are expected to take account of the local landscape character whilst ensuring that the integrity of landscape character is maintained or enhanced.
ENV5- Water Environment	Similar to policy GN6 (2015), the quality and enjoyment of the water environment will be protected and improved by a range of measures, including minimisation of pollution, avoidance of adverse effects on the water environment and management of waste water as set out within the policy.
ENV6 – Flooding	Similar to policy DN6 (2015), proposed development situated within a functional floodplain or deemed as having a significant probability of being affected by flooding will not be supported. Provision for SuDS should be considered where appropriate.
ENV8- Air, Light and Noise Pollution	Developments which would have significant adverse impacts upon air, light or noise quality standards will not be permitted unless set criteria is met.
ENV9- Contaminated Land	Similar to policy DS7 (2015), development proposals are required to establish the nature of contamination on site. Where contamination is present, appropriate remediation will be required to make the site suitable for the proposed future use.
ENV10- Implementation of the SEA Environmental Report	Enhancement and mitigation measures identified within the SEA Environment Report need to be implemented accordingly.
CON1 Transportation Requirements for New Development	Developments must accord with Designing Streets the National Roads Development Guidelines and be in alignment with the provisions of the Regional and Local Transport Strategies, unless significant

LDP Policies	Summary
	justification can be provided against compliance.
CON3- Core Paths and Natural Routes	Development proposals that improve and reinstate core paths and new access routes will be encouraged and supported by WDC. Disruption of access to these routes is to be avoided; where unavoidable appropriate diversions and signage must be provided.
ZW1 Sustainable Waste Management	Development is required to meet the aims of the Zero Waste Plan and the principles of the Waste Hierarchy.

National Planning Policies

- 5.4.18 National planning policy is contained within both the National Planning Framework 3 (NPF3) and Scottish Planning Policy (SPP), both of which were published in June 2014. Whilst the applicable statutory Development Plan includes the West Dunbartonshire Local Plan (2010) which pre-dates current national planning policies, the more relevant West Dunbartonshire LDP Proposed Plan 2015 and the West Dunbartonshire LDP Proposed Plan 2018 have both been prepared with consideration of the requirements set out within the NPF3 and the SPP.
- 5.4.19 Section 25 of the Principal Act requires planning applications to be determined in accordance with the Development Plan, unless material considerations indicate otherwise. Whilst reasonable weight should be provided to the relevant policies and guidance contained within the aforementioned plans, particularly the provisions of the 2015 and 2018 proposed Local Development Plans, national planning policy should be afforded appropriate weight in the determination process for the proposed development.

National Planning Framework

- 5.4.20 The NPF3 provides a statutory framework around which to orientate Scotland’s long-term spatial development. The Framework highlights the spatial planning implications of multiple national policy documents and commitments. In overall terms the NPF3 emphasises the Scottish Government’s commitment to increasing sustainable economic growth across all areas of Scotland and orientates the efforts of Scotland’s planning system towards this purpose.
- 5.4.21 The introduction to the NPF3 notes the importance of maintaining an economically active and vibrant city region whilst building upon the *“collective strengths of the city regions and on the opportunities which are unique to each”*. The NPF3 identifies the Glasgow and the Clyde Valley as Scotland’s biggest economic region with key opportunities to drive forward regeneration along the Forth and Clyde Canal Corridor demonstrating the scope to secure investment to transform the area and bring underused, vacant or derelict sites back into use. At the same time the NPF3 expects Development Plans to safeguard their *“exceptional environmental quality”*.
- 5.4.22 The national spatial strategy of the NPF3 is structured around four key themes, namely: a successful, sustainable place; a low carbon place; a natural, resilient place; and a connected place. These themes are presented as ‘planning outcomes’ within the SPP (2014).
- 5.4.23 With respect to the Glasgow and Clyde Valley City Region (which includes West Dunbartonshire and therefore in local authority terms; Old Kilpatrick) the NPF3 focuses on efforts to regenerate post-industrial areas and provides support for proposals which increase employment and economic development. It also identifies the Central Scotland Green Network (CSGN) as a National Development, encourages the remediation of derelict land, promotes active and sustainable travel and supports the protection and enhancement of green infrastructure.

Scottish Planning Policy

- 5.4.24 The SPP (2014) is a material consideration that carries significant weight. It sets out the Scottish Government's expectations regarding the treatment of specific planning issues within development planning and development management. The document aims to contribute to the achievement of the Scottish Government's overarching purpose of achieving sustainable economic growth.
- 5.4.25 The SPP's Principal Policy on Sustainability (paragraphs 24-35) includes a presumption in favour of development that contributes to sustainable development, which relates to the identification of the need for and acceptability of the development. To implement this policy presumption, the SPP (paragraph 29) identifies 13 sustainable development principles which should guide planning policies and decisions, of which 10 are relevant to the proposed development:
- *“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 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 natural heritage, including green infrastructure, landscape and the wider environment;*
 - *avoiding over-development, protecting the amenity of new and existing development and*
 - *considering the implications of development for water, air and soil quality”.*
- 5.4.26 The SPP's other Principal Policy, on Place making (paragraphs 36-57), seeks to direct new development to the right location and to encourage a design-led approach to development in order to create high quality places. The SPP (under paragraph 40) states that high quality development which demonstrates the following six qualities of successful places should be supported: *“Distinctive, Safe and Pleasant, Welcoming, Adaptable, Resource efficient, and Easy to move around and beyond”*. As noted in **Section 5.4** above, these six qualities are referenced in policies DS1: Successful Places and Sustainable Design and CP1: Creating Places within the Proposed Plan 2015 and 2018 respectively.
- 5.4.27 Subject specific provisions within the SPP of relevance to the proposed development are outlined in **Table 5.2** below.

Table 5.2 Relevant Subject Policies within the Scottish Planning Policy (2014)

Subject Policy	Relevance
Supporting Business and Employment (Paragraphs 92 – 108)	This section highlights the need to <i>“give due weight to net economic benefit of Proposed Development”</i> (paragraph 93). The SPP sets out a need for development plans to identify support for business and industrial development that both increases economic activity and safeguarding and enhancing the natural and built environments as national assets (paragraph 93).
Valuing the Historic Environment (Paragraphs 135 – 151)	This section states that planning should promote the care and protection of the designated and non-designated historic environment and should take account of all aspects of the historic environment. Detailed policy provisions are set out in order to protect and enhance different types of historical assets.
Archaeology (Paragraph 150)	This paragraph states that <i>“planning authorities should protect archaeological sites and monuments as an important, finite and non-renewable resource and preserve them in situ wherever possible”</i> . In-situ preservation is encouraged, but in cases where this is not possible conditions or legal obligations should be used to ensure archaeological assets are recorded and analysed before development proceeds.
Valuing the Natural Environment (Paragraphs 193 - 233)	This section identifies a number of planning principles related to natural heritage protection and ecological resilience. Principles (paragraph 194) of relevance to the Proposed Development include that planning should: <i>“facilitate positive change while maintaining and enhancing distinctive landscape character; conserve and enhance protected sites and species... promote protection and improvement of the water environment...in a sustainable and co-ordinated way; 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...”</i>
Protecting Designated Sites (Paragraph 196)	This paragraph requires designated areas and sites to be identified and appropriately protected through development plans, without the use of buffer zones. It also states that <i>“the level of protection given to local designations should not be as high as that given to international or national designations”</i> .
Development Management Decisions (Paragraphs 202 - 203)	This section states that planning decisions <i>“should take account of potential effects on landscapes and the natural and water environment, including cumulative effects”</i> (paragraph 202). It further states that <i>“planning permission should be refused where the nature or scale of proposed development would have an unacceptable impact on the natural</i>

Subject Policy	Relevance
	<i>environment</i> ” (paragraph 203). The same paragraph notes that whilst effects on statutorily protected sites will be an important consideration, this “ <i>does not impose an automatic prohibition on development</i> ”.
Non-Native Species (Paragraph 210)	This paragraph states that “ <i>where non-native species are present on site, or where planting is planned as part of a development, developers should take into account the provisions of the Wildlife and Countryside Act 1981 relating to non-native species</i> ”.
National Designations and Protected Species (Paragraphs 212 - 214)	Reflecting legislative requirements, these paragraphs identify criteria to safeguard nationally designated sites and protected species from adverse effects.
Woodland (Paragraph 218)	This paragraph refers to and aligns directly with provisions set out in the Scottish Government’s Control of Woodland Removal Policy 2009.
Maximising the Benefits of Green Infrastructure (Paragraphs 219 - 233)	This section identifies a number of planning principles related to the protection, enhancement and promotion of green infrastructure including core paths and other important routes.
Managing Flood Risk & Drainage (Paragraphs 254-268)	This section promotes a precautionary approach to flood risk management. Where relevant, flood risk assessments and the deployment of SUDs are required (paragraph 255).
Promoting Sustainable Transport and Active Travel (Paragraphs 269-291)	This section includes a requirement for development proposals to consider traffic impacts including cumulative effects (paragraph 286).

Other National Policies, Advice and Guidance

Scottish Historic Environment Policy Statement (2016)

- 5.4.28 This document takes account of the Historic Environment (Scotland) Act 2014 and explains how provisions within the SPP (2014) relating to the management of the historic environment should be interpreted. The document does not set out any new or different planning policies or development management assessment criteria, however it does retain the “*presumption in favour of preservation of individual historic assets and also the pattern of the wider historic environment*” previously set out in the now superseded Scottish Historic Environment Policy (2011).

Government Economic Strategy (2015)

- 5.4.29 The overall purpose of the Scottish Government’s Economic Strategy is to deliver increased sustainable growth. In order to deliver this, one of the key priorities is securing sustainable investment. This includes investment in business and infrastructure. The Strategy highlights that it is important to foster an environment that supports business growth. Investment in sectors in which Scotland has an advantage, including tourism, is encouraged. In addition, the Strategy calls for businesses to be resource efficient and low carbon in order to improve efficiency and productivity.
- 5.4.30 Annex C of the Policy specifies acceptability criteria for demonstrating significant net additional public benefit either in the absence of, or with, CP. The criteria regarding acceptability in the absence of CP include benefits derived from land use change (whether or not the intended direct result of a development proposal) as well as other environmental and public safety factors.
- 5.4.31 The policy is supported by implementation guidance (March 2015) for Forestry Commission Scotland staff. This document notes that the need for any compensatory planting should be minimised and that compensatory planting “*should be seen as the final option once all other solutions have been exhausted*”.

Creating Places - A policy statement on architecture and place for Scotland (2013)

- 5.4.32 This document sets out the Scottish Government’s overall policy statement on architecture and place. The document defines ‘good design’ as “*an innovative and creative process that delivers value*” and provides a detailed explanation of the six qualities of successful places which are now embedded within the SPP (2014).

National Planning Advice and Circulars

- 5.4.33 National planning policy is supported by numerous Scottish Government Planning Circulars, Planning Advice Notes (PANs), Advice Sheets, Ministerial/Chief Planner Letters to Planning Authorities, as well as guidance documents prepared by Key Agencies of the Scottish Government. Annexe A to Scottish Government Planning Circular 3/2013: Development Management Procedures (Revision 1.0) confirms that amongst other considerations, the types of documents listed above are all potential material considerations in the determination of a planning application depending on the individual context of the case.
- 5.4.34 The following guidance and advice documents are considered to be of relevance to the proposed development and have been considered where appropriate in undertaking this EIA:
- SEPA’s Development Management Guidance: Flood Risk (July 2017);
 - Online Planning Advice regarding Flood Risk (June 2015);
 - PAN 1/2013: Environmental Impact Assessment (August 2013);
 - PAN 2/2011 Planning and Archaeology (July 2011);
 - Planning Circular 1/2017: The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017;
 - PAN 1/2011 Planning and Noise (March 2011);
 - PAN 60 Planning for Natural Heritage (2000, revised January 2008);
 - PAN 81 Community Engagement (March 2007);

- PAN 51 Planning, Environmental Protection and Regulation (Revised October 2006);
- PAN 79 Water and Drainage (September 2006);
- PAN 75 Planning for Transport (August 2005);
- PAN 68 Design Statements (August 2003);
- PAN 61 Planning and Sustainable Urban Drainage Systems (July 2001); and
- PAN 33 Development of Contaminated Land.
- Marine Scotland: The protection of Marine European Protected Species from injury and disturbance. Guidance for Scottish Inshore Waters (2014)

Marine Planning

Scotland’s National Marine Plan (2015)

- 5.4.35 The Marine (Scotland) Act 2010 established new systems of marine spatial planning and marine licensing across Scotland’s territorial waters and marine exclusive economic zone. In accordance with sections 15 and 58 of the Marine and Coastal Access Act (2009), the marine licence application for the extent of the proposed development located below Mean High Water Springs (MHWS) must be determined in accordance with the appropriate marine policy documents, unless relevant considerations indicate otherwise.
- 5.4.36 The Carless site lies adjacent to the Forth & Clyde Canal which is a designated Scheduled Monument. A marine licence application will be required to authorise the proposed marine works which form part of the proposed development, and this application will be determined in accordance with Scotland’s National Marine Plan (SNMP) (2015) alongside other relevant considerations.
- 5.4.37 Chapter 4 of the SNMP sets out a core set of general policies applicable to all current, proposed and potential future marine activities. These policies consider the sustainability of proposed developments and marine activities. Chapters 6-16 of the Plan then sets out sectoral policies of relevance to specific development or marine activity sectors. Relevant policies from the Plan will be taken account of in this EIA and in the design of the proposed marine works as part of the proposed development. Specific policies of relevance to the proposed development are outlined in **Table 5.4** below.

Table 5.4: Relevant Policies within Scotland’s Marine Plan (2015)

SNMP Policies	Summary
GEN1 General Planning Principle	There is a presumption in favour of sustainable development and use of the marine environment when consistent with the policies and objectives of this Plan.
GEN2 Economic Benefit	Sustainable development and use which provides economic benefit to Scottish communities is encouraged when consistent with the objectives and policies of this Plan.
GEN5 Climate Change	Marine planners and decision makers must act in the way best calculated to mitigate, and adapt to, climate change.
GEN6 Historic Environment	Development and use of the marine environment should protect and, where appropriate, enhance heritage assets in a manner proportionate to their significance.
GEN7 Landscape/seascape	Marine planners and decision makers should ensure that development and use of the marine environment take seascape, landscape and visual impacts into account
GEN8 Coastal process and flooding	Developments and activities in the marine environment should be resilient to coastal change and flooding, and not have

SNMP Policies	Summary
	unacceptable adverse impact on coastal processes or contribute to coastal flooding
GEN9 Natural Heritage	Development and use of the marine environment must: Comply with legal requirements for protected areas and protected species. Not result in significant impact on the national status of Priority Marine Features. Protect and, where appropriate, enhance the health of the marine area.
GEN 11 Marine Litter	Developers, users and those accessing the marine environment must take measures to address marine litter where appropriate. Reduction of litter must be taken into account by decision makers.
GEN12 Water Quality and Resource	Developments and activities should not result in a deterioration of the quality of waters to which the Water Framework Directive, Marine Strategy Framework Directive or other related Directives apply.
GEN13 Noise	Development and use in the marine environment should avoid significant adverse effects of man-made noise and vibration, especially on species sensitive to such effects.
GEN14 Air Quality	Development and use of the marine environment should not result in the deterioration of air quality and should not breach any statutory air quality limits
GEN 17 Fairness	All marine interests will be treated with fairness and in a transparent manner when decisions are being made in the marine environment.
GEN18 Engagement	Early and effective engagement should be undertaken with the general public and all interested stakeholders to facilitate planning and consenting processes.
GEN19 Sound Evidence	Decision making in the marine environment will be based on sound scientific and socio-economic evidence.
GEN21 Cumulative Impacts	Cumulative impacts affecting the ecosystem of the marine plan area should be addressed in decision making and plan implementation.
Transport 1	Navigational safety in relevant areas used by shipping now and in the future will be protected, adhering to the rights of innocent passage and freedom of navigation contained in UN Convention on the Law of the Sea (UNCLOS). The extent of interference with existing or planned routes used by shipping, access to ports and harbours and navigational safety should be assessed when making a decision.
Transport 2	Marine development and use should not be permitted where it will restrict access to, or future expansion of, major commercial ports or existing or proposed ports and harbours which are identified as National Developments in the current NPF or as priorities in the National Renewables Infrastructure Plan (Map 10 and 11) such as the Clyde.
Transport 4	Maintenance, repair and sustainable development of port and harbour facilities in support of other sectors should be supported in marine planning and decision making.

SNMP Policies	Summary
Transport 5	Port and harbour operators should take into account future climate change and extreme water level projections, and where appropriate take the necessary steps to ensure their ports and harbours remain viable and resilient to a changing climate. Climate and sea level projections should also be taken into account in the design of any new ports and harbours, or of improvements to existing facilities.
Transport 6	Marine planners and decision makers and developers should ensure displacement of shipping is avoided where possible to mitigate against potential increased journey lengths (and associated fuel costs, emissions and impact on journey frequency) and potential impacts on other users and ecologically sensitive areas.
Transport 7	Marine and terrestrial planning processes should co-ordinate to: Provide co-ordinated support to ports, harbours and ferry terminals to ensure they can respond to market influences and provide support to other sectors with necessary facilities and transport links. Consider spatial co-ordination of ferries and other modes of transport to promote integrated and sustainable travel options.
WILD FISH 1	Marine planning and decision-making processes should take the impact and use of the marine environment on diadromous fish species into account. Where evidence of impacts on diadromous species including salmon is inconclusive, mitigation measures and further impacts on diadromous species from monitoring of developments should be used to inform subsequent marine decision making.

Clyde Regional Marine Plan

The Scottish Government intends for marine planning to be implemented at a local level within defined Scottish Marine Regions, extending out to 12 nautical miles from MHWS level, through the adoption of Regional Marine Plans. The Clyde Marine Planning Partnership was constituted in February 2016 to prepare the Clyde Regional Marine Plan, although this has not yet been published. The preparation of the pre-consultation draft Clyde Regional Marine Plan including early stage work to inform the Sustainability Appraisal including Strategic Environmental Assessment (SEA) is scheduled to take place between February 2019 and April 2019. At the time of writing (Early March) the pre-consultation Draft is not yet available to review. Subject to the timing of its publication, this document may be considered where relevant in the determination of this application.

UK Marine Policy Statement (2011)

- 5.4.38 The Marine Policy Statement (MPS) was prepared and adopted in accordance with section 44 of the Marine and Coastal Access Act 2009. The MPS sets out the framework for decision making which could potentially affect the marine environment and provides guidance on preparing Marine Plans. The Act requires all public authorities taking authorisation or enforcement decisions⁵ which have the potential to or will affect the UK marine area to do so in accordance with the MPS. Area specific Marine Plans must set out how marine resources can best be managed in order to achieve plan outcomes, policies and objectives. Responsibility for Marine Plans in Scotland are held with Scottish Ministers for the Scottish offshore region.

⁵ Excepting decisions on applications for an order granting development consent under the Planning Act 2008 i.e. for nationally significant infrastructure projects. In these cases, decisions have to have regard to the Marine Policy Statement.

5.5 References

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- Great Britain Parliament. (1997) The Town and Country Planning (Scotland) Act (1997) as amended: ([accessed January 2018](#)).
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- Scottish Government. (2013) Creating Places - A policy statement on architecture and place for Scotland: ([accessed January 2018](#)).
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- Scottish Government. (2015) Scotland's Economic Strategy (2015): ([accessed January 2018](#)).
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- The Scottish Parliament. (2017) The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations (2017) as amended: ([accessed October 2018](#))
- The Scottish Parliament. (2013) The Town and Country Planning (Development Management Procedure) (Scotland) Regulations (2013) as amended: ([accessed January 2018](#)).

6 Ground Conditions

6.1 Introduction

- 6.1.1 This chapter of the EIA Report provides an assessment of the likely significant effects from the proposed development on the terrestrial ground conditions, incorporating aspects of geology, hydrogeology, contamination and ground stability. The assessment is based on the characteristics of the site and surrounding area and the key parameters of the proposed development detailed in **Chapter 2 – Site and Surrounding Area** and **Chapter 3 – The Proposed Development** respectively.
- 6.1.2 This chapter has been prepared by PBA. In accordance with Regulation 5(5)(b) of the EIA Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this EIA Report is provided in **Appendix 1.1**
- 6.1.3 The aims of this chapter are to:
- Identify the relevant context in which the ground conditions assessment has been undertaken;
 - Describe the methods used to undertake the assessment;
 - Outline the current and expected future (post-remediation) baseline conditions at the site and surroundings;
 - Identify the potential direct and indirect effects of the proposed development on future baseline ground conditions, including with respect to geology, hydrogeology, contamination and ground stability;
 - Identify mitigation and enhancement measures (where required) to address identified likely effects;
 - Assess likely residual effects; and,
 - Assess likely cumulative effects on ground conditions from the proposed development in combination with other relevant developments.
- 6.1.4 This chapter is supported by the following figures and technical reports provided in **Appendices 6.1 – 6.4**:
- **Appendix 6.1 - Figures (Figure 6.1 - Preliminary Remedial Strategy Diagram);**
 - **Appendix 6.2 - Site Investigation (SI) Interpretive Report;**
 - **Appendix 6.3 - Remediation Strategy, and,**
 - **Appendix 6.4 - Ground Investigation Report (Geotechnical).**

6.2 Policy Context, Legislation, Guidance and Standards

Legislation

- 6.2.1 The overarching legislative framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Subject specific legislation of relevance to this assessment is:
- Environmental Protection Act 1990 (Part IIA) (as amended);
 - The Contaminated Land (Scotland) Regulations 2000 (as amended);
 - The Environment Act 1995 (Section 57);
 - EU Water Framework Directive 2000/60/EC (“the WFD”);
 - Groundwater Daughter Directive to the WFD 2006/118/EC;
 - The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended);

- Water Environment and Water Services (Scotland) Act 2003.

Policy

6.2.2 The planning policy framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Planning policy considerations of specific relevance to this assessment are:

6.2.3 Planning policy considerations of specific relevance to this assessment are:

- **Adopted West Dunbartonshire Local Plan (2010)**, in particular policies:
 - GD1: Development Control; and,
 - GD 2(9): Carless, Old Kirkpatrick;
- **West Dunbartonshire LDP Proposed Plan 2015**, in particular:
 - ‘Changing Places’ Carless Redevelopment Strategy (Section 3.6); and policies:
 - DS7: Contaminated Land; and,
 - DS8: Soil Resources;
- **West Dunbartonshire LDP2 Proposed Plan (2018)**, in particular proposed policies:
 - Carless Policy 1 – Business and Industrial Development
 - Policy ENV9: Contaminated Land; and,
 - ENV10 - Implementation of the SEA Environmental Report.
- National Planning Framework 3 (NPF3 (2014)), in particular the priorities identified for the Glasgow and Clyde Valley City Region in respect of remediating derelict land.
- Scottish Planning Policy (SPP) (2014), in particular the Principal Policy on Sustainability (paragraphs 24-35).
- Scottish Government Planning Advice Note (PAN) 33 Development of Contaminated Land.

6.2.4 In accordance with sections 15 and 58 of the Marine and Coastal Access Act (2009), the marine licence application for the proposed marine works (i.e. the extent of the proposed development located below MHWS) must be determined in accordance with the ‘appropriate marine policy documents’, unless relevant considerations indicate otherwise. Taking account of the terrestrial focus of this assessment (as opposed to **Chapter 7 – Marine Geomorphology**), appropriate marine policy documents which are of relevance to this assessment comprise:

- **UK Marine Policy Statement (2011)**;
- **Scotland’s National Marine Plan (2015)**, in particular policies:
 - GEN1 - General Planning Principle;
 - GEN12 - Water Quality and Resource;
 - GEN19 - Sound Evidence; and,
 - GEN21 - Cumulative Impacts.

Guidance and Relevant Technical Standards

6.2.5 The following guidance and technical standards have informed this assessment:

- The Model Procedures for the Management of Contaminated Land, Contaminated Land Report 11 (also known as CLR11), Environment Agency, 2004. CLR11 is the UK industry technical framework used for applying a risk management process when dealing with land impacted by contamination;
- BS 5930:2015 Code of practice for ground investigations;

- BS 10175:2011+A1:2013 Investigation of potentially contaminated sites – Code of practice; and
- SEPA Guidance for Pollution Prevention (GPPs) including GPP 2 (above ground oil storage tanks), GPP 5 (works and maintenance in or near water), GPP 8 (safe storage and disposal of used oils), GPP 21 (pollution incident response planning), GPP 22 (dealing with spills) and PPG 26 (safe storage - drums and intermediate bulk containers).

6.3 Methodology

Overview

Assessment Scope

- 6.3.1 This chapter presents an assessment of likely significant effects on ground conditions, in relation to both geo-technical and geo-environmental effects, from the proposed development. The assessment has been prepared in accordance with the TCPA EIA Regulations and is based on an EIA Scoping Opinion (PREAPP17/113) adopted by WDC in respect of the proposed development at the site.
- 6.3.2 The principal aspects considered within this assessment are:
- The likely effects of the construction and operational phases of the proposed development on the environment, human health and the proposed structures in relation to ground conditions, contamination and stability; and,
 - The likely effects of the environment on the proposed development itself, again in relation to ground conditions, contamination and stability.
- 6.3.3 In accordance with the Carless Marine Fabrication Complex EIA Scoping Report and subsequent EIA Scoping Opinion provided in **Appendix 4.1**:
- Likely effects on ground conditions from the implementation of the proposed remediation works have been scoped out of this EIA. EIA Screening Opinion PREAPP17/106 adopted by WDC confirmed that the proposed remediation works themselves do not constitute EIA Development and these works have therefore already been subject to a separate planning application (DC18/245), which included relevant supporting information and was validated by WDC on 14th November 2018 (determination expected March 2019). The Remediation Strategy which underpins the proposed remediation works is however included in **Appendix 6.2** to allow this EIA Report to provide a full description of the whole development proposed at the site in accordance with the TCPA EIA Regulations; and,
 - Potential effects on surface water drainage and marine geomorphology (including water and sediment quality) have been scoped out of this assessment, as they are addressed elsewhere in the assessments provided in **Chapter 7 – Marine Geomorphology** and **Chapter 8 – Hydrology and Flood Risk**. An assessment of the implications of the proposed development for the objectives of the Water Framework Directive (WFD) and the Scotland District RBMP is provided separately within the submitted **WFD Assessment**.

Assessment Process

- 6.3.4 This assessment builds upon recent work undertaken to define the need for and key parameters of the proposed remediation works, as applied for under planning application DC18/245 (validated by WDC on 14th November 2018). In doing so, the assessment has been informed by *earlier* work including:
- Pre-remediation site investigations;
 - Remedial options appraisal, including extensive dialogue with WDC and the Scottish Environment Protection Agency (SEPA) as contaminated land regulators; and,
 - Development of a Remediation Strategy, originally submitted to WDC to underpin planning application DC18/245 on 1st November 2018 and subsequently submitted in revised form on 5th February 2019.
- 6.3.5 In undertaking this assessment, the following activities have been carried out:

- EIA Screening, Scoping and post-scoping consultation with relevant statutory bodies (see below);
- Detailed studies and site work to establish current and future baseline site conditions;
- Identification of the likely effects of the proposed development under future baseline site conditions;
- Evaluation of the level and significance of likely effects by considering the sensitivity of identified receptors within the future baseline scenario, the likely magnitude of ground conditions effects and the probability of these effects occurring based;
- Identification of proposed measures to avoid or minimise likely adverse effects resulting from the proposed development; and,
- Evaluation of the residual significance of likely ground conditions effects following mitigation.

Assessment of Geo-Environmental Effects

6.3.6 The assessment of geo-environmental conditions at the site and likely effects from the proposed development has been undertaken following a tiered approach as recommended within industry guidance (CLR11), as outlined below:

- Tier 1 – Preliminary risk assessment: a qualitative assessment of historical and published information, together with a site reconnaissance, undertaken in order to develop a preliminary conceptual site model and inform a preliminary risk assessment;
- Tier 2 – Generic quantitative risk assessment: an assessment of ground condition data using published generic assessment criteria to screen the site and establish whether there are actual, or potential, unacceptable risks; and (if required); and,
- Tier 3 – Detailed quantitative risk assessment (DQRA): involving the generation of site specific assessment criteria (SSAC).

6.3.7 The three tiers of assessment have been completed at the site, including through the undertaking and interpretation of an intrusive Site Investigation (SI) in 2018, as reported within **Appendix 6.2 –SI Interpretive Report**. The interpretive report included DQRA. Subsequently, a Remedial Options Appraisal was undertaken and an outline approach to remediation was determined, as reported within **Appendix 6.3 – Remediation Strategy**. In line with the EIA Scoping Opinion, the assessment of likely geo-environmental effects from the construction and operation of the proposed development are based on the likely future baseline scenario following the implementation of the proposed remediation works.

Assessment of Geo-Technical Effects

6.3.8 It is also recognised that certain soils can be a cause of land instability, either as a result of natural processes or as a result of historical activities such as excavation, resulting in landslides or slips, soil creep, and ground compression. Where there are reasons for suspecting instability, appropriate assessment including site investigations and geotechnical appraisal is undertaken to determine whether:

- The land is capable of supporting the loads proposed to be imposed;
- The development will be threatened by unstable slopes on or adjacent to the site;
- The development will initiate slope instability which may threaten its neighbours;
- The site could be affected by ground movements due to natural cavities; or
- The site could be affected by ground movements due to past, present or foreseeable future mining or excavation activities.

6.3.9 Details of potential land instability at the site are discussed in **Appendix 6.2 - SI Interpretive Report** and **Appendix 6.4 – Ground Investigation Report (Geotechnical)** with details of how the proposed remediation works will address instability issues provided in **Appendix 6.3 – Remediation Strategy**. In line with the EIA Scoping Opinion, the assessment of likely geo-technical effects from the construction and operation of the proposed development has been

undertaken on top of a likely future baseline scenario which accounts for the implementation of the proposed remediation works.

Consultation

6.3.10 This assessment has been informed by an EIA Scoping Report (PBA, October 2017) and subsequent EIA Scoping Opinion issued by WDC (March 2018) in respect of the EIA for the proposed development. The EIA Scoping Opinion, which is provided in full in **Appendix 4.1**, set out a list of standard requirements for consideration and included comments in relation to this assessment from WDC's Environmental Pollution Group and SEPA. In particular, the following should be noted:

- The EIA Scoping Opinion acknowledged and accepted the proposed approach of assessment the likely effects from the proposed development (construction and operation) based on the likely future baseline scenario following implementation of the proposed remediation works;
- The proposed remediation works must take account of additional factors such as site loading, piling, and ground improvement and the effect of this on underlying contamination (and its potential mobility). If not undertaken as part of the remediation, this would need to be assessed as part of the EIA for the proposed development, as further remediation may be necessary;
- The potential exists for hydrocarbon contamination to have migrated from terrestrial land within the site and the wider Carless landholding to foreshore sediments. To date, foreshore sediments have yet to be investigated, however, intrusive investigations, sampling and assessment of the foreshore sediments will be undertaken in conjunction with investigative works to facilitate the development of the existing jetty structures.;
- The proposed remediation works should incorporate protective measures to prevent the potential creation of new contaminant mobilisation pathways through the construction of the proposed MFC.
- Any materials won from the site and proposed for deposition as part of the proposed MFC will need to be tested to confirm they are not contaminated and their re-use would not cause adverse environmental impacts.

6.3.11 The above comments have been acknowledged and addressed in **Appendix 6.2 - Site Investigation Interpretive Report and Appendix 6.3 - Remediation Strategy** which have informed the preparation of this assessment.

6.3.12 Following the adoption of the EIA Scoping Opinion, additional relevant consultation has been undertaken as follows:

- Additional consultation has been undertaken as necessary with WDC's Environmental Pollution Group and SEPA regarding detailed aspects of the proposed assessment methodology. Discussions have already taken place with both stakeholders regarding the planned approach to the design, assessment and construction of the proposed development; and.
- Separate to this EIA, the Applicant has had extensive dialogue with WDC's Environmental Pollution Group and SEPA to inform the design of the proposed remediation works and the content of planning application DC18/245. Dialogue will be maintained with both consultees throughout the determination of the planning and marine licence applications for the proposed development to ensure they are content with the approach being taken to the assessment of likely significant environmental effects.

Study Area

6.3.13 The Study Area adopted for this assessment comprises the site and immediate (adjoining) land, including the wider Carless landholding to the east. This has been chosen for the assessment based on professional judgement as it is considered to incorporate all potential receptors that could be impacted by likely significant ground conditions effects both from the proposed

development, and activities that may impact on the proposed development itself (i.e. historical development in the local area, potentially contaminative activities etc.).

- 6.3.14 Whilst the footprint of the quay, access road and heavy lift quay now extends beyond the area where intrusive remediation is proposed under planning application DC18/245, this strip of land was covered by the 2018 SI reported in **Appendix 6.2**. The interpretation of the site investigation did not indicate the presence of potentially mobile hydrocarbon contamination within this strip of land along the River Clyde frontage behind jetty cells 3 and 4 and therefore no additional remediation is required to make this land suitable for the future intended use

Information Sources

Pre-Remediation Site Investigation

- 6.3.15 A pre-remediation Site Investigation has been undertaken to gather information on environmental and geotechnical conditions at the site for the development of a Remediation Strategy and proposed development building foundation design. This has been reported in the Site Investigation Interpretive Report (**Appendix 6.2**). This site investigation comprises a desk-based study which presents and evaluates environmental and geological information on the site based on publicly available information, historical information, walkover surveys and previous investigations of the site.
- 6.3.16 The desk-based research informed an intrusive site investigation, which comprised field work which was carried out in several phases between November 2017 and May 2018. The site investigation was undertaken in general accordance with the British Standards (BS) set out in paragraph 6.2.4 above. A Tier 2 risk assessment of concentrations of contaminants of potential concern (CoPC) was undertaken together with a Tier 3 DQRA of the water environment.

Remediation Strategy

- 6.3.17 An understanding of expected future baseline conditions has been gained through and the development of a Remediation Strategy covering the wider Carless landholding, including the site. This has allowed a future baseline scenario to be developed for use in this EIA.
- 6.3.18 **Figure 6.1** illustrates the site investigation locations where free product was encountered. Mobile NAPL (Non-Aqueous Phase Liquid, also known as free phase hydrocarbon) may be present on groundwater and associated with soils in these locations.
- 6.3.19 Other key information sources include:
- Historical third party reports – for a full list see Section 1.4 of the Site Investigation Interpretive Report (**Appendix 6.2**);
 - PBA (2018) Ground Investigation Report for Phase 1;
 - British Geological Survey (BGS) Digital geology of Britain viewer 1:50,000 scale;
 - Ordnance Survey historical maps obtained from Landmark Information Group; and,
 - Email correspondence, office based and on-site meetings and discussions with representatives from SEPA and WDC.

Approach to Assessment

Consideration of Relevant Receptors

- 6.3.20 Based on the information sources outlined above, the current and likely future baseline characteristics of site and the surrounding area was characterised. This led to the identification of relevant sensitive receptors to consider within the assessment, as detailed within **Section 6.4 – Baseline Conditions**. **Table 6.1** below sets out the criteria used to define the sensitivity to potential ground conditions effects of identified relevant receptors.

Table 6.1 Criteria Used in Ground Conditions for Classifying Receptor Value or Sensitivity

Classification	Definition
High Receptor of national or international importance	Human health: Residential and uses where children are present Surface water: SEPA ecological status of High Groundwater: Aquifer productivity class is High or Very High Ecology: Special Areas of Conservation (SAC and candidates), Special Protection Areas (SPA and potentials) or wetlands of international importance (RAMSAR) Buildings: World Heritage Site or Conservation Area
Moderate Receptor of county or regional importance	Human health: Employment Surface water: SEPA ecological status of Good or Moderate Groundwater: Aquifer productivity class is Moderate Ecology: SSSI, National or Marine Nature Reserve (NNR or MNR) County Wildlife Sites (CWS) Buildings: Area of Historic Character
Low Receptor of local importance	Human health: Transient or Limited Access. Unoccupied/Industrial land use and construction workers* Surface water: SEPA ecological status of Poor or Bad Groundwater: Aquifer productivity class is Low and Very Low Ecology: Local habitat resources or no designation Buildings: Replaceable/local value

***assuming that construction workers will adopt appropriate health and safety and personal protective equipment (PPE) procedures*

Impact Assessment Methodology

- 6.3.21 The likely occurrence, level and significance of ground conditions effects during the construction and operational phase of the proposed development was determined by considering likely changes in geo-technical and geo-environmental risk levels from the likely future baseline scenario (i.e. following the implementation of the proposed remediation works). This assessment, reported in **Section 6.7**, took account of the future baseline scenario and all relevant proposed embedded mitigation, but without any further mitigation measures in place. Any need for further mitigation to reduce or avoid likely significant adverse effects was then identified, as reported in **Section 6.8**.
- 6.3.22 Under both a future baseline scenario and ‘with development’ scenario, likely geo-environmental and geo-technical risks were identified and evaluated with reference to their likely probability of occurrence and severity of impact using the criteria and approach defined in **Tables 6.2 – 6.5** below. This generated different levels of potential risks to identified receptors under each scenario.

Table 6.2 – Criteria for Classifying Risk Likelihood / Probability

Likelihood / Probability	Definition
High	There is a source-pathway-receptor relationship and an event either appears very likely in the short-term and almost inevitable over the long-term.
Likely	There is a source-pathway-receptor relationship and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.

Likelihood / Probability	Definition
Low	There is a source-pathway-receptor relationship and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter- term.
Unlikely	There is a source-pathway-receptor relationship but circumstances are such that it is improbable that an event would occur even in the very long-term.
No Likelihood	There is no source-pathway-receptor relationship present. No further consideration of risk is therefore required (i.e. the risk is scoped out from resulting in likely environmental effects and is not taken forward to the assessment matrix detailed in Table 6.5 below.

Table 6.3 – Criteria for Classifying Risk Impact Severity

Severity of Impact	
Severe	Acute (short term) risks to human health. Catastrophic damage to buildings / property. Major pollution of the water environment (watercourse or groundwater) or atmosphere.
Medium	Chronic (long-term) risk to human health. Pollution of the sensitive water environment (surface waters or aquifers) or atmosphere. Measurable adverse effects on sensitive ecosystems or species. Major structural damage to buildings or structures.
Mild	Pollution of non-selective waters (e.g. groundwater in non-productive strata) or atmosphere. Limited structural damage to buildings or structures.
Minor	Damage to non-selective ecosystems or species e.g. existing poor quality surface water bodies. Minor damage to buildings or structures e.g. minor cracks which do not effect structural integrity.
Negligible	Potential damage to non-selective ecosystems or species or potential damage to buildings or structures that is beneath the level of perception. No further consideration of risk is therefore required (i.e. the risk is scoped out from resulting in likely environmental effects and is not taken forward to the assessment matrix detailed in Table 6.5 below.

Establishment of Effect Significance

6.3.23 The probability and severity of consequences from identified likely geo-environmental and geo-technical risks has been considered together using a standard EIA matrix, as shown in **Table 6.4** below. This matrix has been applied to define the level of pre-mitigation and post-mitigation risks associated with the proposed development.

Table 6.4 – Matrix for Establishing Risk Level and Significance

		Severity			
		Severe	Medium	Mild	Minor
Probability	High	Substantial	Major	Moderate/minor	Minor
	Likely	Major	Moderate	Minor	Negligible
	Low	Major/moderate	Moderate/minor	Minor	Negligible
	Unlikely	Moderate/minor	Minor	Minor	Negligible

6.3.24 **Table 6.4** is also used in the final stage of the assessment, where the level and significance of likely environmental effects as a result of identified risks will be determined. This was achieved by comparing the predicted residual level of risk from the construction and operational phases of the proposed development with the same possible risks (but potentially with different probability and severity of impact) under the likely future baseline scenario, using the matrix provided in **Table 6.5** below. This demonstrates the additive impact of the proposed development upon the likely future baseline scenario. The shaded cells within **Table 6.5** indicate the levels of likely effects which will be considered significant within the context of the TCPA EIA Regulations.

Table 6.5 – Determining Significance of Potential Effects (Relative to Future Baseline Conditions)

		Significance of Likely Effect				
		Substantial Adverse	Major Adverse	Moderate Adverse	Minor Adverse	Negligible
Risk Related to Proposed Development	Substantial	Substantial Adverse	Major Adverse	Moderate Adverse	Minor Adverse	Negligible
	Major	Major Adverse	Moderate Adverse	Minor Adverse	Negligible	Minor Beneficial
	Moderate	Moderate Adverse	Minor Adverse	Negligible	Minor Beneficial	Moderate Beneficial
	Minor	Minor Adverse	Negligible	Minor Beneficial	Moderate Beneficial	Major Beneficial
	Negligible	Negligible	Minor Beneficial	Moderate Beneficial	Major Beneficial	Major Beneficial
		Negligible	Minor	Moderate	Major	Substantial
Risk Related to Future Baseline Conditions						

6.3.25 Where any pre-mitigation risks are identified that are considered likely to result in significant adverse effects (as defined by **Table 6.5** above), additional mitigation measures beyond those already identified as embedded mitigation have been identified to reduce likely risks and effects levels to acceptable and not significant levels in the context of the EIA Regulations.

Approach to Cumulative Impact Assessment

6.3.26 From reviewing the relevant cumulative developments listed in **Section 2.4**, it considered that there is no potential for significant cumulative effects to occur on ground conditions, including geology, soil resources, groundwater, and hydrogeology. This is due to the physical separation of the site from the relevant cumulative developments. The one exception is the proposed remediation works within the site, which for EIA purposes represent a relevant cumulative development in relation to the proposed development. The purpose of the proposed remediation work is to inherently improve the geology, ground conditions and hydrogeological conditions at

the site and is not considered to have any potentially adverse effects on human health, the water environment, the built environment and ecological systems

- 6.3.27 A cumulative impacts assessment is therefore not required and has been scoped out of this assessment.

Assumptions and Limitations

- 6.3.28 Site Investigations are designed to provide an understanding of representative conditions and to target any specific areas of concern and to enable the development of a remediation strategy. As with any site investigation, there are always areas that have not been investigated and the potential exists for the existence of hitherto undetected contaminant sources. The investigation within the proposed development area was relatively unconstrained with most of the site available for investigation. The remediation strategy includes activities covered under a separate planning application (not subject to an EIA) and comprising a site strip across the proposed development area which will entail the removal of concrete hardstanding and decommissioning and remediation of any previously unrecorded sources of contamination (such as tanks, pipes or soils with mobile contaminants). This phase of work will be done under the watching brief of an experienced environmental advisor. In addition to facilitating the remediation, this phase will also reduce outstanding uncertainties regarding subsurface conditions.
- 6.3.29 It is assumed that the proposed remediation works will be implemented and thus that the site will be remediated in accordance with the Remediation Strategy submitted under planning application DC18/245 (details are set out in **Section 6.5** below). In consequence, appropriate verification will be needed that specific land within the site is made suitable for the intended future use (a marine fabrication/industrial complex) prior to construction activities being undertaken on this specific land.
- 6.3.30 As detailed in **Chapter 7 – Marine Geomorphology**, the need to undertake a SI and implement any subsequent remediation works within the footprint of the proposed marine works prior to the construction of these works is acknowledged by the Applicant. Conditions requiring the undertaking of a marine SI and any necessary subsequent remediation works are therefore expected to be attached to any planning permission granted for the proposed development.
- 6.3.31 Land within the wider Carless landholding to the east of the site contains areas of standing water where SI to date has been constrained. The Remediation Strategy (**Appendix 6.2**) which underpins the proposed remediation works includes a commitment from the Applicant to undertake continued monitoring and future investigation in these areas (which would be subject to remediation in due course, if required).
- 6.3.32 Historical maps and aerial photographs used as part of the studies provide a ‘snap shot’ in time about conditions or activities at the site, and as such cannot be relied upon as indicators of any events or activities that may have taken place at other times.
- 6.3.33 It is assumed that (under the future baseline scenario) ground stability risks will be addressed by the Principal Contractor as part of the design of new buildings and structures located on the site in accordance with the respective design codes and controls such as appropriate British Standards and Building Control. Therefore, potential effects associated with buildings and ground instability are not considered as part of the proposed development during the construction or operational phases.

6.4 Current Baseline Conditions

- 6.4.1 This section describes the current baseline environmental characteristics for the site and surrounding areas with specified reference to ground conditions, geology, hydrogeology, contamination and ground stability. The description draws upon desk-based information currently publicly available and information within the obtained historical maps (see Appendix B of the **Site Investigation Interpretive Report** in **Appendix 6.2**).

The Site

Current Land Use

- 6.4.2 The site is currently vacant and derelict, with most above ground structures associated with previous use having been demolished. There are no official current site users and the site has been secured with fencing and signage put up stating “keep out” and identifying potential dangers, nevertheless the site continues to be accessed on a regular basis by members of the public without permission (dog walkers etc.). The site is accessible from the north west off Erskine Ferry Road.
- 6.4.3 Decommissioning and surface structure demolition works were undertaken after the site closure in around 1992, although a jetty structure protruding into the River Clyde, areas of reinforced concrete hardstanding, some subterranean structures associated with the depot/refinery and extensive made ground remain on site.
- 6.4.4 The jetty structure stands in the south of the site adjacent to / within the River Clyde and measures approximately 140m in length and comprises six jetty legs.
- 6.4.5 A sloping concrete structure, assumed to have been a slipway associated with the former harbour, was encountered below ground during the site investigation work. The continuous structure was exposed and measured for 71.5m along the northwest/southeast axis (parallel with the river).
- 6.4.6 A stockpile presumably composed of demolition rubble is located in the centre of the site and much of the centre of the site is covered with hard standing with several piles of demolition rubble are scattered across the site.
- 6.4.7 Below the surface, shallow buried structures including, pipes and concrete including foundations are known to be present associated with the site’s former land use. To date, no buried tanks have been encountered.
- 6.4.8 The site is currently designated as contaminated land under Part IIA of the Environmental Protection Act 1990 (as amended), with a central area adjacent to the jetty and including the jetty itself also designated under the same legislation as a Special Site (the special site status is a result of the land use in the central area being designated as an oil refinery). The primary reason for these designations is the known presence of hydrocarbon contaminants and known pathways for contamination in groundwater to migrate into the River Clyde.

Historical Land Use – Onsite

- 6.4.9 Historical maps indicate that the site was first developed around 1918. A shipbuilding yard immediately north of the site appears to encroach the north of the site, particularly a large building and railway sidings which intrude from the north west and a separate large building situated by the northern site boundary. A chimney (“chy”) and water mains or weigh machine (“WM”) is situated in the northern corner of the site. The remainder of the site is labelled as rough grazing and is presumed to be unused at this stage.
- 6.4.10 The site and its surrounding area were subjected to bombing during the ‘Clydebank Blitz’ of March 1941 and significant post World War II reconstruction took place in the vicinity of the site.
- 6.4.11 Aerial photographs and maps produced between 1943 and 1966 show the presence of a dock feature and harbour wall to the west of the jetties. The feature appears to have been infilled by 1962, although remnants of the corner of the harbour wall and bollards are still evident on the site.
- 6.4.12 By 1960s mapping shows the depot’s oil terminal was shown on the site. Three tank farms each containing several cylindrical tanks were situated on the site, Tank Farm 1 (thought to contain degassed transformer oil) in the centre, Tank Farm 2 (wet transformer oil) in the north west and Tank Farm 3 (dry transformer oil) in the south east.
- 6.4.13 Historical maps show office buildings on the eastern site boundary.

Geological Information

- 6.4.14 The baseline geology, ground conditions and hydrogeological data of the site has been gathered from the sources listed in **Section 6.2** above including the site investigations undertaken by PBA in 2018 and other parties before that.

Superficial Geology

- 6.4.15 The geological succession at the site was found to be boulder clay overlain by river alluvium, which in turn was overlain by made ground. The boulder clay was found below mean river level and is considered to restrict downward groundwater flow, effectively keeping shallow groundwater within the river alluvium and made ground.
- 6.4.16 The surface of the Raised Tidal Flat Deposits was found at depths of between 0.10m and 5.00m below ground level (bgl) corresponding to reduced levels of 6.12m and -0.57 m above ordnance datum (AOD). The typical thickness was found to be around 3.00m.
- 6.4.17 Raised Marine Beach Deposits were encountered across the site area, typically underlying the Raised Tidal Flat Deposits. The surface of the Raised Marine Beach Deposits was found at depths of between 2.60m and 8.90m bgl, corresponding to reduced levels of 2.14m and -4.54m AOD. Typical thickness was found to be around 3.00m.

Made Ground

- 6.4.18 Made ground was found to be highly variable in both thickness and composition, and included reworked natural alluvium and clay used as bunds in the main storage tank area, bricks, concrete and roofing tile rubble, and furnace ash and waste. Made ground was found to be approximately 2.0m thick in most areas, although at the in-filled dock area south of Tank Farm 3 was found to be as thick as 11.5m bgl.

Bedrock Geology

- 6.4.19 Bedrock was not encountered in previous investigations, however, according to the BGS online map, bedrock beneath the site comprises the Lawmuir Formation sandstone further described by the BGS as a cyclothemic sequence of mudstone, siltstone, sandstone with seatearths, coals and marine limestones. Marine bands in upper part, conglomerate in lowest part in some areas. The lower boundary rests on volcanic detritus (Kirkwood Formation) in type section; on Clyde Plateau Volcanic Formation in some areas and the upper boundary is at base of Hurler Limestone (base of Lower Limestone Formation) as in type section.

Hydrogeology

- 6.4.20 The groundwater configuration at high, mean and low tide indicates that the general groundwater flow below the site is south westerly. Tidal variations cause a slight reversal of flow inland in areas close to the river at high tide.
- 6.4.21 Groundwater levels have been found at depths ranging between around 1.5m and 8m bgl within the made ground and alluvium, with the mean groundwater level being 2m AOD.
- 6.4.22 Given the proximity of the River Clyde to the site, shallow groundwater is regarded as being within a major discharge zone, i.e. shallow groundwater discharge to the River Clyde. Estimated daily discharges are between 200 m³ to 300 m³ of groundwater into the River Clyde.
- 6.4.23 It is considered that the shallow alluvial aquifer is in hydraulic continuity with the River Clyde and will be subject to tidal variations. Groundwater levels have been found to vary with the tide in close proximity to the Clyde. The tidal effect is reduced further back into the site.
- 6.4.24 The risk to the deep bedrock aquifer has been ruled out as a potential receptor due to the presence of significant thicknesses of low permeability deposits, and the fact that the shallow groundwater is part of a major discharge zone to the River Clyde.
- 6.4.25 It is possible that structures or materials in the subsurface – such as low permeability deposits, or sheet piles – could be causing restrictions to the natural flow of groundwater. High permeability deposits (such as crushed brick or tile used as fill) or pipe runs have the potential to act as preferential pathways.

Water Quality

Groundwater

- 6.4.26 The site lies on the Clydebank groundwater body (bedrock aquifer of Good status) and the Clydebank Sand and Gravel (superficial aquifer of Good status) groundwater body. Research and site investigations undertaken to date have concluded that there is no direct hydraulic connectivity between the site and the bedrock aquifer as a result of the presence of significant thicknesses of low permeability drift deposits overlying the bedrock and the fact that groundwater in the shallow aquifer preferentially discharges to the River Clyde.
- 6.4.27 There are no known existing groundwater abstractions onsite.

Surface Water

- 6.4.28 There are no watercourses situated within the site boundary. Surface water quality for offsite watercourses is described in paragraph 6.4.50-6.4.52 below.
- 6.4.29 There are no known existing surface water abstractions onsite.
- 6.4.30 Hydrological conditions are discussed in more detail in **Chapter 8 – Hydrology and Flood Risk**.

Ground Stability and Subsidence Hazards

- 6.4.31 The site investigation confirmed that soft, loose made ground was encountered from surface at the site and underlying soft tidal flat deposits are not considered a suitable bearing stratum and will be prone to settlement under the weight and loading of structures. Near surface obstructions including belowground concrete, and pipes (and tanks if present) may result in differential settlement.
- 6.4.32 The proposed development will require piled foundations and ground improvement. Engineering solutions are discussed in the PBA Phase 1 Ground Investigation Report (2018).
- 6.4.33 Elevated sulphate and low pH (acidity) in soils can create an aggressive environment for buried concrete. The results in the Site Investigation report (**Appendix 6.1**) indicate that soils pose no significant risk of possible acid or sulphate attack on buried foundation concrete.

The Surrounding Area

Current Land Use

- 6.4.34 Industrial and commercial land users on Erskine Ferry Road immediately to the north west of the site are the site's closest neighbours.
- 6.4.35 The River Clyde lies immediately to the west and flows in a north westerly direction past the site. The intertidal areas and salt marsh are within the Inner Clyde Special Protection Area (SPA), Site of Special Scientific Interest (SSSI) and Ramsar site. Auchentoshan Burn is situated approximately 270m east of the site flows on a north east to south west axis before entering the River Clyde. Bonded warehouses are beyond that.
- 6.4.36 Immediately to the north east are the Forth and Clyde Canal and Dumbarton Road, and residential development beyond them.
- 6.4.37 The wider Carless landholding extends immediately to the south east of the site and also comprises industrial land associated with the former use as an oil terminal and MOD fuel storage area. Several large depressions which once contained the cylindrical tanks one are visible across the site which have become flooded and overgrown. A former processing area is situated immediately north of the jetty and includes a pump house, sump and associated pipework. This feature is currently flooded. It was previously drained during the site investigation work however it quickly filled with water again.
- 6.4.38 Further to the south east is a plot of land occupied by bonded warehouses.

Historical Land Use – Offsite

- 6.4.39 The first available historical maps indicate that the land in the vicinity of the site was first developed in the 1890s and comprised the Forth and Clyde Canal on the northern boundary of

the site and the Lanarkshire and Dunbartonshire Railway (constructed ~1894) running adjacent to the east of the site. The larger North British Railway (NBR) mainline is shown approximately 0.5km north east of the site.

- 6.4.40 Immediately to the south east of the site a tank farm contained up to twenty cylindrical 9,000 m³ storage tanks which were separated by containment bunds. This tank farm site was operated by the MOD and its precursors until 1980. British Petroleum also operated on the western portion of the site until the late 1980s.
- 6.4.41 It is understood that the oil fuel depot was damaged during the Clydebank Blitz, including the destruction of one of the fuel storage tanks.
- 6.4.42 Additional tank farms of similar scale, identified as Mountblow and Royal Navy Fuel Depot Dalnottar, were present to the north east of the site. These sites represent a potential off-site source of contamination, albeit, the sites are separated from Carless by the Forth and Clyde Canal which will cut of the potential shallow groundwater pathway. Dalnottar oil fuel depot remained operational until the 1960s when it was closed and eventually redevelopment for residential land use. The tank farm site and oil terminal on the site were bought by Carless for use as an oil refinery. The railway was dismantled by 1984.
- 6.4.43 The site has since remained unchanged since completion of the demolition work, albeit with vegetation encroachment.
- 6.4.44 By 1995 the 16 large fuel storage tanks on the site had been removed, and demolition of the site by Whiteinch Demolition Ltd was underway.

It should be noted that militarily significant land uses (such as this) were often not shown on historical mapping, hence the record of this site on ordnance survey mapping may be inaccurate.

Geological Information

- 6.4.45 The BGS online map shows the bedrock in the surrounding area to the north east, south and west comprises the Lawmuir Formation sandstone according to the BGS 1:50,000 scale online interactive GeolIndex map. The bedrock to the north west of the site by the Erskine Bridge comprises basalt of the Strathgryfe Lava Member. A BGS borehole (NS47SE2111) record shows that this was encountered at 44m depth overlain by surficial deposits (glacial till, silts, sands and gravels).

Hydrogeology

- 6.4.46 Auchentoshan Burn is situated approximately 270m east of the site flows on a north east to south west axis before entering the River Clyde. The burn is considered to be hydraulically cross gradient to the site and no contaminants of concern have been detected in water samples collected from the burn as part of recent and historical site investigations.
- 6.4.47 The Forth and Clyde Canal is thought to be clay lined and as such the construction would mean that the canal is either hydraulically isolated from shallow groundwater or the canal is leaking water to the underlying water body.

Water Quality

Groundwater

- 6.4.48 The groundwater quality for the site and the surrounding area is stated in paragraph 6.4.25 above.
- 6.4.49 There are no known existing groundwater abstractions in the vicinity of the site.

Surface Water

- 6.4.50 The site is located on the northern bank of the River Clyde, which is classified at this location as a Transitional Estuary and is Heavily Modified. It is classified as having Moderate Ecological Potential.
- 6.4.51 The Forth and Clyde Canal is thought to be clay lined and either hydraulically isolated from shallow groundwater or the canal is leaking water to the underlying water body.

- 6.4.52 The Auchentoshan Burn flows north east to south west approximately 200m to the south eastern boundary of the site. The burn is not classified by SEPA. The burn is not considered to be at risk on the basis that the burn is hydraulically cross gradient to the site and no contaminants of concern have been detected in samples of water from the burn.
- 6.4.53 There are no known existing surface water abstractions in the vicinity of the site.
- 6.4.54 Hydrological conditions are discussed in more detail in **Chapter 8 – Hydrology and Flood Risk**.

Ecological Systems

- 6.4.55 As detailed fully within **Chapter 9 – Terrestrial Ecology** and **Chapter 10 – Marine Ecology**, three ecologically important resources border the south west of the site. The intertidal areas and salt marsh are within the Inner Clyde Special Protection Area (SPA), Site of Special Scientific Interest (SSSI) and Ramsar site. The sites are designated for non-breeding birds and, in particular, are recognised as internationally important for numbers of wintering redshank. The EU Habitats Regulations (Council Directive 92/43/EEC) provide strong precautionary protection to the redshank and their habitats, even from activities well outside the SPA.

Potentially Contaminative Land Uses

- 6.4.56 The 2018 SI has identified sources of potentially mobile oily free product (also known as Light Non-Aqueous Phase Liquid – LNAPL) as floating product on top of groundwater or as soils with concentrations of petroleum hydrocarbons in excess of their theoretical residual saturation limits. In general, the site investigation data showed that the presence of LNAPL on groundwater and the presence of potentially mobile LNAPL in soils were closely linked. Potentially mobile LNAPL in soils was closely associated with the smear zone (i.e. the vertical range through which groundwater and floating LNAPL moves during the tidal cycle).
- 6.4.57 The site investigation included a detailed quantitative risk assessment of the potential impact of dissolved phase organic and inorganic contaminants in shallow groundwater, and concluded that dissolved contamination does not present a risk to the River Clyde. This includes contaminants present in the soil with the potential to become dissolved in groundwater.
- 6.4.58 **Figure 6.1** provided in **Appendix 6.1 – Figures** illustrates the locations of the boreholes where free product was encountered. Mobile NAPL may be associated with soils in these locations.
- 6.4.59 Some of the flooded features immediately to the east of the site contain elevated concentrations of hydrocarbons and heavy metals (zinc). Dissolved phase contamination in water in the flooded features does not present a potentially significant risk to the River Clyde. These features will be drained to enable further investigation, remediation and development to proceed, any free product (sheen) on the water will require to be removed through treatment prior to gaining agreement from SEPA to discharge to the River Clyde.
- 6.4.60 **Table 6.6** below lists land uses identified which have potential to have caused contamination of the site and have the potential to migrate offsite. The table also details contaminant groups potentially present as a result of these land uses. Land uses beyond the Forth and Clyde Canal, the River Clyde, Auchentoshan Burn the business park to the north west of the site are not considered as they are unlikely to affect or be affected by the site.

Table 6.6 – Likely Sources of Contamination

Process/Land Use	Location	Contaminant Groups Potentially/Known to be Present
Tank Farm 1, Tank Farm 2 and Tank Farm 3	Onsite (central, north west and south east)	Free phase mobile hydrocarbons
Pipes and unknown buried structures	Central and south	

Process/Land Use	Location	Contaminant Groups Potentially/Known to be Present
(potentially including tanks)		
Former office blocks	North east site boundary	Asbestos containing materials
Pipe canal	Offsite immediately to the east within the former tank farm. Potential connectivity with the site has not been ruled out pre remediation.	Free phase mobile hydrocarbons
Former tank farm – tank bases and bunds	Offsite immediately to the east extending for 200m to the east	
Former oil terminal - processing area, pump house, sump	Immediately east (offsite)	Free phase mobile hydrocarbons Asbestos containing materials

Conceptual Site Model

- 6.4.61 On the basis of the information above and following the 2018 SI a conceptual site model (CSM) has been developed for the site. The CSM identifies identified potentially significant Source-Pathway-Receptor (SPR) pollutant linkages. The identification of such potential “pollutant linkages” is a key aspect of the evaluation of potentially contaminated land.
- 6.4.62 The CSM identified contaminants of potential concern, receptors and potential pollutant linkages associated with the site are detailed within **Table 6.7** below.

Table 6.7 – CSM Identifying Sensitive Receptors and 7 Potentially Significant Pollutant Linkages (from Appendix 6.2 – SI Interpretive Report)

SPR No.	Source	Pathway	Receptor	SPR Requires Mitigation
1	Free phase hydrocarbons (specifically LNAPL) on shallow groundwater and potentially mobile hydrocarbon contamination in soils*	Lateral migration of LNAPL within shallow groundwater towards the Clyde	River Clyde	Yes (Part IIA)
2		Migration of vapours from volatile organic compounds	Human Health: Employees and Maintenance Workers	Yes (TBC** following remediation)
3	Hydrocarbon contamination in soils / made ground above saturation limit*	Migration via shallow groundwater as LNAPL to the River Clyde	River Clyde	Yes (Part IIA)
4	Free Phase hydrocarbons in pipes, tanks or drains*	Migration via conduits (drains and pipelines) leading offsite towards the Clyde.	River Clyde	Yes (Part IIA)
5	Asbestos contamination in soils / made ground	Inhalation of respirable fibres	Human Health: Employees and Maintenance Workers	Yes (Planning requirement, but mitigation intrinsic to the development)
6	Ground gases	Ground gases such as carbon dioxide and methane may be produced in the subsurface. Gases may migrate into future buildings and enclosed spaces	Human Health: Employees and Maintenance Workers	Yes (TBC** following remediation)
7	Hydrocarbon contamination in soils within the unsaturated zone*	Migration to shallow groundwater	Shallow groundwater	Yes (GWDD)

*Note that although shallow groundwater below the site was initially ruled out as a receptor, under the Groundwater Daughter Directive (GWDD) there is an obligation to prevent the entry of hazardous substances (hydrocarbons) to groundwater where feasible. The Remediation Strategy gives consideration to the obligations imposed by the GWDD.

6.5 Baseline Evolution and Expected Future Baseline

Current Baseline Evolution

- 6.5.1 The TCPA EIA Regulations require that the EIA Report must describe the likely evolution of the baseline scenario in the absence of the proposed development. In the absence of any development activities current baseline conditions, including extensive hydrocarbon contamination of soils and groundwater, would be likely to remain relatively unchanged, except for natural growth of existing vegetation within the site.
- 6.5.2 For the purposes of this EIA, the likely evolution of the baseline is predicated upon the approval and implementation of proposed remediation works before the commencement of the proposed

development (the construction of the proposed development). Prior remediation will be needed to:

- Reduce to an acceptable level the risk to human health and environmental receptors both on and off the site from hydrocarbon and other contamination in soil;
- Reduce to an acceptable level the risk to the River Clyde from mobile contamination within soils and contaminants floating on and dissolved within the groundwater; and therefore,

6.5.3 Remediation is therefore required both owing to the site's current contaminated land and Special Site designations under Part IIA of the Environmental Protection Act 1990 and to make the site suitable for the future intended use (i.e. the construction and operation of the proposed development). As such, a 'no development' baseline evolution scenario is not considered to merit further consideration in this EIA. In addition to intrusive works within the site, the proposed remediation works include a commitment by the Applicant to undertake further SI and subsequent remediation works on land to the east within the wider Carless landholding.

Expected Future Baseline

Overview

6.5.4 The expected future baseline scenario comprises the implementation of the proposed remediation works subject to planning application DC18/245 to address known contamination within the current baseline scenario. A detailed description of the proposed remediation works is provided in **Appendix 6.3 – Remediation Strategy**, which was submitted to underpin planning application DC18/245 and is appended to this EIA Report to allow for a full description of the whole development proposed at the site to be provided in accordance with the EIA Regulations.

6.5.5 It should be noted that the footprint of the proposed development – specifically the quay access to jetty cells 3 and 4 and the proposed heavy lifting quay – now extends beyond the area included in the remediation planning application. However, following the assessment of the 2018 SI, no remediation was proposed in this strip of land as no potentially mobile contamination was encountered.

Consenting of Proposed Remediation Works

6.5.6 As detailed within the **Appendix 6.3 - Remediation Strategy**, it is expected that any planning permission granted by WDC under planning application DC18/245 will include conditions requiring:

- i. Submission and approval of an **Updated Remediation Strategy** following the completion of further testing and remediation trials (in order to confirm remedial targets);
- ii. Submission, approval and implementation of a **Remediation Scheme**, incorporating method statements and a Verification Plan, in accordance with the Updated Remediation Strategy (to be submitted and approved as per condition i above, to confirm remedial targets). Approval of the Remediation Scheme will confirm the detailed remediation specification and implementation arrangements at the time of undertaking each element of the proposed remediation works. The Remediation Scheme incorporating method statements should include confirmation of drainage, pollution prevention and environmental mitigation measures to be adopted in connection with each element of the proposed remediation works;
- iii. Implementation of the proposed remediation works in accordance with the submitted and approved **Planning Statement** accompanying planning application DC18/245, an **Updated Remediation Strategy** (as per condition i above) and **Remediation Scheme** (as per condition ii above); and,
- iv. Post works verification reporting undertaken in accordance with the Verification Plan in the approved **Remediation Scheme** (as per condition ii) to confirm that the proposed remediation works have successfully remediated the site to the target levels defined in the **Updated Remediation Strategy** (as per condition i).

6.5.7 This proposed sequence of events has been agreed between the Applicant, SEPA and WDC's Environmental Pollution Group and is expected to be reflected in the conditions attached to any planning permission granted by WDC under planning application DC18.

Physical Characteristics of Proposed Remediation Works

6.5.8 In overall terms, the proposed remediation works (within both the site and the wider Carless landholding) that will result in the creation of a future baseline scenario comprise:

- i. Removal of concrete hardstanding and shallow services / utilities within western and central areas of the site, with a watching brief for previously undetected mobile NAPL and potential undetected sources such as pipes and tanks. Any encountered structures presenting a contamination source or pathway risk will be removed;
- ii. Extraction of mobile NAPL and other contaminants via borehole, sump and/or bulk excavation methods as appropriate (no deep excavations are proposed) in accordance with the submitted **Remediation Strategy**. Planning permission is sought to undertake extraction as follows:
 - a. Borehole extraction: Drilling of up to 80 wells within the large pink area and up to 3 wells in each of the small pink areas shown on the submitted **Site Layout Plan** (additional monitoring and extraction will also take place by pumping from existing boreholes previously developed for SI purposes);
 - b. Sump extraction: Shallow excavation of up to 30 trenches or sumps within the large pink area and 1 each for the small pink areas shown on the submitted **Site Layout Plan**; and,
 - c. Bulk excavation: Soil excavation to below waterline within areas where LNAPL/NAPL has been recorded (pink areas on the submitted **Site Layout Plan**). Clean and contaminated soils segregated, stored and treated as required. Mobile NAPL to be extracted from base of excavations.
- iii. Installation of up to 220m long hanging wall with extraction wells on northern side – requirement and extent to be confirmed following NAPL removal phase. This is indicated by the dark blue line close to the shore on the submitted **Site Layout Plan**.
- iv. Onsite treatment of contaminated soils, likely through bio-remediation;
- v. Onsite treatment of contaminated water resulting in discharge of uncontaminated water via swales and settlement pond (subject to SEPA approval⁶) and offsite controlled disposal of extracted LNAPL;
- vi. Onsite stockpiling of clean soils on suitable land above impermeable barrier until completion of the works;
- vii. Placement of clean soils on remediated land to reinstate existing ground levels; and,
- viii. In line with site management obligations, existing boreholes within the eastern area and around the periphery of the site will continue to be monitored by the Applicant. If necessary, LNAPL extraction will be undertaken on a localised basis; and,
- ix. A commitment by the Applicant to undertake further SI and subsequent remediation works on land within the eastern part of site (where intrusive works are not presently proposed).

6.5.9 Under the WFD, there is an obligation to prevent the entry of hazardous substances (including hydrocarbons) to groundwater, unless achieving this would be technically or economically unfeasible. At this site, the absolute prevention of access of hydrocarbons to groundwater is likely to be unfeasible, however, the proposed remediation works (summarised above) will reduce the contaminant loading on the shallow groundwater, therefore achieving a betterment for shallow groundwater quality. The Remediation Strategy submitted under planning application DC18/245 sets out preliminary remedial targets – to be agreed with SEPA – which once finalised will satisfy the Applicant's obligations under the WFD.

⁶ Subject to any planning permission granted by WDC, applications will be made to SEPA to obtain Controlled Activities Regulations (CAR) and mobile plant (waste management) licences for the proposed remediation works.

Expected Changes in Conditions within Site

- 6.5.10 In overall terms, the effect within the site of implementing the proposed remediation works in relation to ground conditions would be:
- Removal of concrete hardstanding;
 - Reduction of free phase hydrocarbons (specifically LNAPL) on shallow groundwater and potentially mobile hydrocarbon contamination in soils (where hydrocarbons are above the saturation limit);
 - Removal of shallow utilities and previously unknown belowground structures including tanks (if present) resulting in reduced free phase hydrocarbons in pipes, tanks or drains;
 - Removal of risks associated with asbestos contamination in made ground and soils (risks will generally be mitigated through the installation of hardstanding);
 - Reduced ground gas and vapour risk due to the removal of the hydrocarbon source. However, a further ground gas and vapour monitoring and risk assessment will be undertaken post remediation;
 - Ground improvement within the contaminated shallow soil conditions to support the external yard and jetty access route foundation loadings; and
 - Piled foundations to support the foundation loads of the proposed fabrication shed floor slab and superstructure.
- 6.5.11 The proposed remediation works include an element of hydrocarbon source removal. Whilst no identified remedial technique could feasibly achieve the complete prevention of entry of hazardous substances to groundwater, reducing the impact of contamination on shallow groundwater has been a key consideration in the selection of a preferred approach and thus the design of the proposed remediation works.

Expected Changes in Conditions outside the Site

- 6.5.12 In overall terms, the effect outside of the site of implementing the proposed remediation works in relation to ground conditions will be to reduce contaminant source term – specifically hydrocarbon LNAPL, which will reduce the potential for adverse effects on surface water receptors and (ultimately) on shallow groundwater.

Predicted Future Baseline Conditions

- 6.5.13 The proposed remediation works will aim to remove the source/recover mobile LNAPL, resulting in a reduction of the concentration of hydrocarbons to an acceptable level. The proposed remediation works will reduce the source of mobile contamination capable of reaching identified surface water receptors.
- 6.5.14 Potential risks associated with ground gases and vapours are likely to be reduced as a result of the inherent remediation works, however residual organic hydrocarbons in the soils may generate ground gas and vapour, and as such, further gas and vapour risk assessment and possibly mitigation will be required.
- 6.5.15 Ground improvement techniques will be deployed as part of the proposed remediation works to stabilise loose and soft shallow made ground material and soft natural soils, thereby preventing any risk of settlement/instability. Ground improvement techniques will take cognisance of relevant information within **Appendix 6.2 – SI Interpretive Report**, **Appendix 6.3 - Remediation Strategy** and **Appendix 6.4 – Ground Investigation Report (Geotechnical)** as well as any remediation Verification Report (if available at the time), and will be carried out in accordance with appropriate method statements and risk assessments such that they do not create conditions for adverse environmental impact.

Predicted Future Receptor Sensitivities and Vulnerabilities

- 6.5.16 Notwithstanding the objectives of the proposed remediation works in terms of removing contamination sources and pathways within the site and the wider Carless landholding, the sensitivity and vulnerabilities of identified receptors from the current baseline scenario are not themselves expected to change materially under the future baseline scenario (see **Table 6.8** below).

Summary of Receptor Sensitivity / Importance and Consideration in this Assessment

6.5.17 **Table 6.8** below summarises the receptors that have been considered in this assessment. The sensitivity of relevant receptors under the likely future baseline scenario has been determined with reference to the criteria listed in **Table 6.1**.

Table 6.8 – Assessed Sensitivity of Identified Receptors

Receptor	Development Phase Affected	Future Baseline Sensitivity/ Importance	Comment/Rationale
Human Health – construction workers and offsite businesses	Construction phase only	Low	Assuming that construction workers will adopt appropriate health and safety and PPE procedures.
Human Health – employees, maintenance workers and offsite businesses	Operational phase only	Moderate	See Table 6.1 above
Groundwater (shallow) – Clydebank Sand and Gravel aquifer	Construction and Operational Phases	Low	The shallow groundwater has been impacted by contamination historically, is likely to be affected by salinity from the tidal estuary (River Clyde) and is not used as a resource and is therefore considered to be of Low sensitivity. Nevertheless, there is an obligation under the WFD to mitigate the entry to hazardous substances to this groundwater body (see paragraph 6.5.8, above)
Buildings – temporary construction	Construction phase only	Low	See Table 6.1 above
Buildings associated with the proposed development including the fabrication shed, workshop and offices	Operational phase only	Low	See Table 6.1 above
Surface Water – River Clyde	Construction and Operational Phases	Moderate	Current overall status (2016) is classified by SEPA as Moderate ecological potential. In hydraulic continuity with shallow groundwater body

Receptor	Development Phase Affected	Future Baseline Sensitivity/ Importance	Comment/Rationale
Ecological Systems – offsite Ramsar Site, SSSI and SPA sites (associated with the River Clyde)	Construction and Operational Phases	High	Statutory designated ecological sites offsite but near to the site

6.6 Embedded Mitigation

- 6.6.1 As detailed in **Chapter 3 – The Proposed Development**, a number of design features and embedded mitigation measures have been incorporated into the design and construction of the proposed development which will avoid, prevent or minimise significant adverse environmental effects and to enhance beneficial effects.
- 6.6.2 As above, the implementation of the proposed remediation works is considered to form an integral part of the likely future baseline scenario. The works will need to have been completed to the extent necessary to demonstrate that the specific land where construction activities are proposed (for the proposed development) has been made suitable for the future intended use, prior to the commencement of such activities. In consequence, whilst the proposed remediation works are not strictly a form of embedded mitigation in respect of the proposed development itself, they can effectively be considered as such for the purposes of assessing likely significant effects from the implementation of the proposed development.
- 6.6.3 Embedded mitigation measures of relevance to this assessment are detailed below.

Construction Phase

- 6.6.4 Following the extraction of mobile LNAPL/treatment of contaminated soils and ongoing groundwater monitoring, if LNAPL is continuing to migrate into the River Clyde the installation of the LNAPL barrier (described in paragraph 6.5.5) may be required as part of the proposed remediation works to create a barrier between the remaining hydrocarbon source (if any) and the River Clyde. If required, abstraction wells on northern (landward) side will extract the LNAPL for collection and off-site disposal. This will be implemented as required under planning permission DC18/245 for the proposed remediation works.
- 6.6.5 Over and above the proposed remediation works, the construction of a large ground slab, concrete hard standing and landscaping within the proposed development will introduce a physical break in the potential pathway and prevent the upward migration of vapours (if present).
- 6.6.6 Piling and / or ground improvement techniques will be designed with cognisance of the findings of **Site Investigation Interpretive Report** provided in **Appendix 6.2**, the **Remediation Strategy provided in Appendix 6.3** and in accordance with the recommendations in the **Ground Investigation Report (Geotechnical)** provided in **Appendix 6.4**. Safe piling and / or ground improvement techniques will be required in order to prevent the potential creation of preferential pathways for the migration of residual contamination. The methodologies associated with piling and / or ground improvement will be included in the detailed design and agreed with regulators through building warrant process.
- 6.6.7 All construction work will be undertaken in general accordance with the relevant SEPA GPPs (see paragraph 6.2.4 above).
- 6.6.8 The construction will be undertaken in accordance with Controlled Activities (Scotland) Regulations (CAR).
- 6.6.9 A watching brief must be maintained during the construction phase in the event that large and significant quantities of visible asbestos and / or suspected asbestos containing materials (ACMs) are encountered in the subsurface. In the event that asbestos is encountered, work should be paused pending further assessment.;
- 6.6.10 A Construction Environmental Management Plan (CEMP) will be developed, submitted for the approval of WDC and thereafter implemented throughout the construction phase of the proposed development. Of relevance to this assessment, the CEMP will include measures relating to the following as standard:
- Procedures and methods to manage any previously unidentified residual contamination;
 - Working methods and physical controls to segregate construction activities from any remediation activities still ongoing within the site or within the wider Carless landholding;
 - Contractor management;
 - Materials storage;

- Construction traffic and parking management;
 - Standard construction dust mitigation measures as detailed in relevant IAQM Guidance and identified within **Chapter 12 – Air Quality**;
 - Standard measures and procedures to manage sources of potential pollution (e.g. fuel and other chemical spillages, concrete contamination, sediments, silts, grits and other pollutants) such that no pollution would be capable of reaching the water environment; and,
 - The standard pollution prevention measures to be implemented through the CEMP will include the use of construction phase SuDs to ensure no detriment to water quality arises from surface water discharges during the construction phase. More detail on proposed construction phase SuDS is provided within **Chapter 8 – Hydrology and Flood Risk**.
- 6.6.11 Prior to commencing groundworks or construction, potential construction workers should be made aware of the findings of the **Site Investigation Interpretive Report** provided in **Appendix 6.2**. Risk Assessments and Method Statements (RAMS) should be prepared accordingly and work will be undertaken in accordance with the RAMS. The provision of appropriate personal protective equipment (PPE) to be worn by site workers (as specified in RAMS). The adoption of safe working practices and use of PPE in accordance with appropriate RAMS will provide adequate protection to construction workers.
- 6.6.12 Construction activities will be carried out in full compliance with appropriate health and safety legislation, at current amendments, and with reference to appropriate guidance documents and approved codes of practice published by the Health and Safety Executive (HSE).
- 6.6.13 To minimise the risk of coming into contact with potentially contaminated materials, contractors should comply with the measures set out in the following documents:
- Protection of Workers and the general public during the development of contaminated land (HSE 1991), if applicable;
 - A guide to safe working on contaminated sites R132 (CIRIA 1996), if applicable in relation to potentially ongoing remediation works on parts of the site.

Operational Phase

- 6.6.14 The monitoring of the groundwater levels and LNAPL thickness will be required on an ongoing basis for at least 2 years under the proposed remediation works (further details are in paragraph 6.5.7 above).
- 6.6.15 Gas and / or vapour protection measures will be incorporated within the proposed MFC buildings (i.e. fabrication shed, workshop and offices, unless monitoring undertaken following remediation demonstrates that these protection measures will not be required).
- 6.6.16 If required, further mitigation and enhancement measures identified through the EIA process are detailed in **Section 6.8** below before likely residual effects from the proposed development are then stated in **Section 6.9**.

6.7 Assessment of Likely Effects

- 6.7.1 This section presents an assessment of likely significant effects on ground conditions, in relation to both geo-technical and geo-environmental effects, from the proposed development under a future baseline (post remediation) conditions
- 6.7.2 The principal aspects considered within this assessment are:
- The likely effects of the construction and operational phases of the proposed development on the environment, human health and the proposed structures in relation to ground conditions, contamination and stability; and,
 - The likely effects of the environment on the proposed development itself, again in relation to ground conditions, contamination and stability.
- 6.7.3 The 2018 SI risk assessment has identified contamination at the site associated with the site's history, including:

- Presence of asbestos within the Made Ground and soils;
- Elevated concentrations of hydrocarbons / LNAPL in the soil and groundwater; and
- Potentially elevated hazardous ground gas concentrations.

Construction Phase

Impact on Human Health from Asbestos

- 6.7.4 The presence of asbestos within the made ground and soils at the site has the potential to directly affect the human health of future construction workers (Low sensitivity) through the respiration of fibres (if the fibres become airborne) during excavations and ground disturbance during the construction phase.
- 6.7.5 Construction workers will be operating in accordance with RAMS developed specifically to mitigate risks associated with belowground conditions at this site. These RAMS are considered to be embedded mitigation which make the probability of exposure unlikely. The potential impacts in relation to human health are anticipated to result in a Negligible Adverse effect for construction workers.
- 6.7.6 It is considered that post-remediation, and subject to implementation of the embedded mitigation described in **Section 6.6**, offsite receptors are unlikely to be exposed to asbestos derived from soils at the site. Potential effects on offsite human health (Moderate sensitivity) in relation to soils contaminated with asbestos are therefore anticipated to result in a Negligible Adverse effect.
- 6.7.7 Asbestos is not considered to impact on environmental receptors (other than human health).

Impact from Contamination in the Soil

- 6.7.8 Construction workers (Low sensitivity) have the potential to come into direct contact with contaminated soils during the construction phase. Due to embedded mitigation and the short duration of potential exposure, potential effects in relation to human health are anticipated to result in a Minor Adverse effect for construction workers.
- 6.7.9 It is considered that post-remediation, the potential pathway for mobile hydrocarbon contamination in soils to reach and impact the Clyde will have been eliminated and therefore the potential impacts on surface water receptors (Moderate sensitivity) will be Negligible Adverse.
- 6.7.10 Prior to remediation, shallow groundwater at the site is in contact with hydrocarbon contamination in soils. During the construction phase, under the future baseline (post remediation), the hydrocarbon loading within the soils will have been reduced. Whilst it will not be feasible to remove all hydrocarbon contamination from soils with the potential to impact shallow groundwater, the remediation will have achieved a betterment. Post-remediation, following the removal of hydrocarbon saturated soils, it is anticipated that the potential effect on the shallow groundwater receptor (Low sensitivity) will be Minor Adverse.
- 6.7.11 The potential impact on the remaining receptors identified for the site in relation to contaminated soils are anticipated to result in a Negligible Adverse effect.
- 6.7.12 The proposed development will include raising ground surface levels and the construction of a large, heavily loaded structures. These aspects of the development will have the effect of increasing loading on soils which may in turn affect the mobility of contaminants in soils. The majority of the loads associated with the proposed buildings will be transferred to deeper, uncontaminated natural clays. The potential effect of the residual increases in loading (generally due to the placement of material to raise levels) on contaminant mobility have been considered within the 2018 SI interpretive report. The preliminary remedial targets developed in the 2018 SI report and Remedial Strategy are based on SSAC which take account of the increased loading under the proposed development scenario.

Impact from Ground Gas and Vapours

- 6.7.13 The primary source of ground gas at the site is considered to be the microbial decomposition of hydrocarbon contamination in the subsurface. Following remediation, which will include the

removal of the LNAPL, much of the source of potential ground gas generation will be removed. However, there is potential for residual hydrocarbon to generate gas/vapours which can be inhaled by construction workers (Low sensitivity). Given the lack of enclosed spaces during construction phase, the potential impacts of ground gas and vapours in relation to human health (construction workers) are anticipated to result in a Negligible Adverse effect.

- 6.7.14 In relation to temporary construction building receptors (Low sensitivity), providing such buildings are raised off the ground or include a void beneath the building to prevent gas from entering and accumulating (embedded mitigation), the potential impact from ground gas and vapours is predicted to result in a Negligible Adverse effect.
- 6.7.15 It is considered that post-remediation, the potential impacts on remaining receptors identified for the site in relation to ground gas and vapours are anticipated to result in a Negligible Adverse effect.

Impact from Contamination in the Groundwater

- 6.7.16 Development of the proposed remediation works in accordance with the Remediation Strategy (**Appendix 6.3**) will aim to remove hydrocarbons from saturated soils and groundwater. The potential impacts in relation to human health are anticipated to result in a Negligible Adverse effect for construction workers, a Negligible Adverse effect for off-site human health.
- 6.7.17 Post remediation there will be a Negligible Adverse effect from dissolved phase contamination in shallow groundwater to the River Clyde.
- 6.7.18 It is anticipated that, subject to implementation of the embedded mitigation described in **Section 6.6** in relation to residual contamination following remediation, the potential impacts are anticipated to result in a Negligible Adverse effect.

Impact from Construction Work

- 6.7.19 Pollution releases during construction works have the potential to affect groundwater and surface water. Construction works will be undertaken in accordance with CAR construction licence (see paragraph 6.6.8). Although there is an unlikely potential that new sources of contamination may be introduced into the environment (for instance, leaks and spills from machinery), the potential impacts are anticipated to result in a Negligible Adverse effect.

Operational Phase

- 6.7.20 Potential impacts during the operational phase of the proposed development (including expected maintenance activities) are detailed below.

Impact from Asbestos and Contaminated Soil

- 6.7.21 Once the proposed development has been constructed and is in operation, the likelihood of employees and maintenance workers coming into contact with asbestos in the made ground and soils and contaminated soil is considered to be unlikely.
- 6.7.22 The construction/placement of permanent cover (i.e. ground slab, hardstanding and landscaping) will block the pathway between source contamination and human health receptors. Therefore, potential human health effects in relation to employees and maintenance workers on-site and others off-site are likely to be Negligible Adverse.
- 6.7.23 It is considered that post-remediation, and subject to implementation of the embedded mitigation described in **Section 6.6**, the potential impacts on remaining receptors identified for the site in relation to asbestos are anticipated to result in a Negligible Adverse effect.
- 6.7.24 Prior to remediation, shallow groundwater at the site is in contact with hydrocarbon contamination in soils. During the operational phase, under the future baseline (post-remediation), the hydrocarbon loading within the soils will have been reduced. Whilst it will not be feasible to remove all hydrocarbon contamination from soils with the potential to impact shallow groundwater, the remediation will have achieved a betterment. Post-remediation, following the removal of hydrocarbon saturated soils, it is anticipated that the potential effect on the shallow groundwater receptor (Low sensitivity) will be Minor Adverse.

- 6.7.25 In relation to the built environment receptors (shed, workshop and offices), sulphate and pH concentrations/levels are not expected to create an aggressive environment for buried foundation concrete or piles. Therefore, the potential impacts in relation to buildings are anticipated to result in a Negligible Adverse effect

Impact from Ground Gas and Vapours

- 6.7.26 The primary source of ground gas at the site is considered to be the microbial decomposition of hydrocarbon contamination in the subsurface. The site is conservatively considered to have a Moderate gas hazard. The proposed development including industrial workshop and office spaces is considered to be a Moderate sensitivity end use. Remediation, will include the removal of the hydrocarbon LNAPL, much of the source of potential ground gas generation will be removed. At this stage, it is considered prudent to incorporate the inclusion of gas / vapour protection measures into the design of the buildings. Following remediation, further gas and vapour monitoring and assessment will be undertaken and may potentially conclude that the protection measures are not required. With this in mind, the potential impacts in relation to human health (employees and maintenance workers) and proposed buildings within the site are anticipated to result in a Negligible Adverse effect. A Negligible Adverse effect is also predicted for off-site human health.

Impact from Contamination in Groundwater

- 6.7.27 Following remediation and implementation of the embedded mitigation described in **Section 6.6**, the potential impacts on surface waters in relation to mobile LNAPL are anticipated to result in a Negligible Adverse effect.
- 6.7.28 The potential impacts on remaining receptors identified for the site in relation to contamination in groundwater are anticipated to result in a Negligible Adverse effect.

Geotechnical Effects

- 6.7.29 In relation to the future proposed buildings, the potential ground instability and geotechnical constraints will be resolved inherently through piling, ground improvement and building design (see paragraph 6.6.6). As such it is anticipated that there will be no potential during the operational phase effects associated with geotechnical constraints to be significant (refer to the embedded mitigation).

6.8 Further Mitigation and Enhancement

Construction Phase

- 6.8.1 With the implementation of the proposed remediation works under the future baseline scenario and all embedded mitigation identified in **Section 6.6**, no construction phase adverse ground conditions effects at a level that would be considered significant in the context of the EIA Regulations are considered likely. Nevertheless, given the known presence of contamination sources and pathways within the site at present, the following further mitigation measures are proposed:
- As detailed in **Chapter 7 – Marine Geomorphology**, a SI will be needed in respect of riverbed sediment within the footprint of the proposed remediation works. As detailed in **Chapter 8 – Hydrology and Flood Risk**, a SI will also be needed on land proposed to accommodate the required compensatory flood storage within the wider Carless landholding (likely to be along the western bank of the Auchentoshan Burn as shown in **Figure 8.1**) to evaluate the potential for disturbance of contamination (if present) and creation of pathways.
 - In both cases, any remediation works necessary to address identified contamination sources or pathways and to make these areas suitable for future intended use (as a heavy lift quay and compensatory flood storage respectively) will need to be implemented and verified prior to the construction of these elements of the proposed development. Conditions requiring the undertaking of this SI and any necessary subsequent remediation works are therefore expected to be attached to any planning permission and marine licence granted for the proposed development.

- Construction methods such as appropriate piling techniques to minimise the risk of mixing of groundwater bodies through the creation of new pathways would form part of the further mitigation. Contractors should comply with appropriate method statements and risk assessment such as those set out in EA guidance 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination' (EA, 2001).
- Where ground improvement techniques are required, the risk of residual contamination on-site following the implementation of the proposed remediation works must be carefully considered to ensure that pathways are not created for residual contaminants to travel from the upper strata downwards. Cognisance of the site conditions following remediation will be required and method statements produced accordingly for any ground improvement works.

Operational Phase

- 6.8.2 With the implementation of the proposed remediation works under the future baseline scenario, all embedded mitigation identified in **Section 6.6** and the further construction phase mitigation outlined above, no operational phase adverse ground conditions effects at a level that would be considered significant in the context of the EIA Regulations are considered likely. Further operational phase mitigation is therefore not anticipated to be required at this stage.

6.9 Residual Effects

6.9.1 Taking account of proposed mitigation and enhancement measures, the likely residual effects from the construction and operation of the proposed development are identified in **Table 6.9** below. In all cases, the likely residual effect level and EIA significance remains the same as assessed in **Section 6.7**.

Table 6.9 – Summary of Likely Residual Effects

Development Phase	Receptor	Mitigation	Likely Residual Effects	Likely Residual Significance
Construction	Human Health (construction workers)	<p>Implementation of the CEMP</p> <p>Embedded mitigation measures to reduce exposure to asbestos and mobile hydrocarbon contamination in soils by use of appropriate PPE (standard and specific, e.g. respiratory equipment) and good work practices e.g. dust suppression.</p> <p>The proposed construction will remove or cap some asbestos affected made ground with permanent cover.</p> <p>Mitigation measures to reduce exposure to accumulations of hazardous ground gases by use of appropriate PPE (standard and specific), good working practices.</p>	Negligible Adverse to Minor Adverse	Not significant
	Human Health (off-site)	<p>Implementation of the CEMP</p> <p>Mitigation measures will reduce exposure through appropriate dust management and appropriate working practices during construction, in accordance with the CEMP.</p>	Negligible Adverse	Not significant
	Buildings (temporary construction)	Where required, temporary confined spaces/construction buildings would include void space below them to allow for passive ventilation (embedded mitigation).	Negligible Adverse	Not significant
	Shallow Groundwater	Implementation of the CEMP	Minor Adverse	Not significant

Development Phase	Receptor	Mitigation	Likely Residual Effects	Likely Residual Significance
		<p>Implementation of construction SuDS</p> <p>Appropriate pile design and methods should be informed by the Environment Agency recommended risk assessment framework (EA, 2001).</p>		
	Surface Water	<p>Working within good practice guidelines, in accordance with the CEMP to prevent the release of any contamination (i.e. spillages and leaks from construction plant/onsite oil storage).</p> <p>Implementation of construction SuDS</p> <p>Following remediation, if residual hydrocarbon contamination is found to be mobile, the installation of the LNAPL barrier (embedded mitigation) and extraction wells will prevent mobile hydrocarbons from entering the surface waters.</p>	Negligible Adverse	Not significant
	Ecological Systems	Implementation of the CEMP	Negligible Adverse	Not significant
Operation Adverse	Human Health (employees and maintenance workers)	<p>The proposed construction (embedded mitigation) will cap asbestos affected made ground and contaminated soils with permanent cover (i.e. the large ground slab, hardscaping and landscaping).</p> <p>In areas of soft landscaping where made ground material is to remain in place, a clean cover system would be provided.</p> <p>If required, gas protection measures will be installed to protect employees and maintenance workers against ground gases and vapours from residual hydrocarbon contamination following remediation.</p>	Negligible Adverse	Not significant

Development Phase	Receptor	Mitigation	Likely Residual Effects	Likely Residual Significance
	Buildings (shed, workshop and offices)	If required, gas protection measures will be installed to protect buildings against ground gases and vapours from residual hydrocarbon contamination following remediation.	Negligible Adverse	Not significant
	Shallow Groundwater	Following remediation, if residual hydrocarbon contamination is found to be mobile, the installation of the LNAPL barrier (embedded mitigation) and extraction wells will prevent mobile hydrocarbons from entering the surface waters.	Minor Adverse	Not significant
	Surface Water	Following remediation, if residual hydrocarbon contamination is found to be mobile, the installation of the LNAPL barrier (embedded mitigation) and extraction wells will prevent mobile hydrocarbons from entering the surface waters.	Negligible Adverse	Not significant

6.10 Monitoring

- 6.10.1 No monitoring is considered to be proportionate or required specifically in relation to the predicted residual (not significant) effects of the proposed development. More widely, the Applicant has already committed to undertaking monitoring of boreholes at the periphery of the site (and on the wider Carless landholding) through planning application DC18/245 for the proposed remediation works. Boreholes in these locations will continue to be monitored to confirm the absence of hydrocarbon free product migrating to the River Clyde. It is provisionally envisaged that monitoring will take place every 2 months for 2 years with the ongoing frequency and duration to be evaluated at that stage as required.
- 6.10.2 In the event that the hanging wall barrier forming part of the proposed remediation works needs to be installed, new monitoring and extraction boreholes are likely to be required on the northern land-side. Extraction boreholes will be necessary to remove free product trapped by the barrier. Wells and pumps will require operation and maintenance. It is provisionally envisaged that monitoring, extraction and maintenance will take place every 2 months for 2 years with the ongoing frequency and duration to be evaluated at that stage as required.

6.11 Cumulative Effects

- 6.11.1 For the reasons stated in **Section 6.3** there is no potential for likely significant cumulative ground conditions to arise from the proposed development in combination with relevant cumulative developments.

6.12 Summary

- 6.12.1 An assessment has been undertaken to assess the effects of the proposed development on terrestrial ground conditions, considering the geology, hydrogeology and ground stability within and in the immediate vicinity of the site. The assessment also provides details of the geological conditions and the presence of potentially contaminated land and hazardous materials.
- 6.12.2 The site's former land use included a harbour associated with an offsite ship works, and latterly an oil terminal and fuel depot operated, including up to 20 large cylindrical fuel storage tanks which were situated immediately to the east of the site associated. In 2003 the site was identified as Contaminated Land according to Part IIA of the Environmental Protection Act 1990 and latterly the south west of the site was designated a Special Site by WDC. An intrusive site investigation was undertaken at the site and the immediate land to the east (the wider Carless landholdings) to build on several previous historical site investigations to inform the requirement and approach to the remediation and development of the site.
- 6.12.3 The following baseline conditions have been identified through this assessment:
- Ground conditions – comprise Made Ground, overlying Alluvial Tidal Flat deposits, Alluvial Raised Beach Deposits, and Devensian Glacial Till. Bedrock was not encountered in previous investigations.
 - Water environment – the site lies on the Clydebank Groundwater body (bedrock aquifer of Good status) and the Clydebank Sand and Gravel (superficial aquifer of Good status). The River Clyde flows south east to north west past the site and the Auchentoshan Burn is situated to the south east.
 - Ecological systems - there are three ecologically important resources bordering the south east of the site. The intertidal areas and salt marsh are within the Inner Clyde Special Protection Area (SPA), Site of Special Scientific Interest (SSSI) and Ramsar site. The sites are designated for non-breeding birds.
 - Contamination – The site investigation has identified sources of potentially mobile oily free product (hydrocarbon), a legacy of the site's former use and an oil terminal and fuel depot. The hydrocarbon product is floating on top of groundwater or situated in the soils. Asbestos contamination is present in the made ground material and soils.

- Ground stability - the soft, loose made ground and underlying soft tidal flat deposits are not considered a suitable bearing stratum and will be prone to settlement under the weight and loading of structures. Buried structures may also pose a stability/settlement risk.
- 6.12.4 Embedded mitigation will be undertaken through the implementation of a Construction Environmental Management Plan (CEMP) which will set out procedures to protect environmental receptors and minimise of the impacts on humans and the environment during the construction phase of the development.
- 6.12.5 Additional mitigation will be required and will include further site investigation to obtain a better understanding of the ground conditions by at the river side of the jetty structure. It is understood that further investigations will also be undertaken by the Applicant offsite adjacent to the Auchentoshan Burn to evaluate the potential for disturbance of contamination.
- 6.12.6 Construction workers and site visitors have the potential to come into direct contact with contaminated soils during the construction phase, presenting a Minor Adverse effect. Post-remediation, following the removal of hydrocarbon saturated soils, it is anticipated that the potential effect on the shallow groundwater receptor will be Minor Adverse. No other residual effects have been identified due to the embedded mitigation inherent within the design and additional mitigation discussed in **Sections 6.5** and **6.8** respectively.

6.13 References

- BS 5930:2015 Code of practice for ground investigations, BSI Standards Institution, London.
- BS 10175:2011+A1:2013 Investigation of potentially contaminated sites – Code of practice, BSI Standards Institution, London.
- CIRIA (1996) A Guide for Safe Working on Contaminated Sites, R132.
- Environment Agency (2001) Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention. NC/99/73
- EA (2004) The Model Procedures for the Management of Land Contamination, CLR11.
- Peter Brett Associates (2018) Carless Remediation Strategy.
- Peter Brett Associates (2018) Carless Site Investigation Interpretive Report.
- Peter Brett Associates (2018) Phase 1 (Fabrication Shed, External Access Space, Jetty Access) Ground Investigation Report.

7 Marine Geomorphology

7.1 Introduction

- 7.1.1 This chapter of the EIA Report provides an assessment of the likely significant effects from the proposed development on marine geomorphology, including water and sediment quality. The assessment is based on the characteristics of the site and surrounding area and the key parameters of the proposed development detailed in **Chapter 2 – Site and Surrounding Area** and **Chapter 3 – The Proposed Development** respectively.
- 7.1.2 This chapter has been prepared by ABPmer. In accordance with Regulation 5(5)(b) of the EIA Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.1**.
- 7.1.3 The aims of this chapter are to:
- Identify the relevant context in which the marine geomorphology assessment has been undertaken;
 - Describe the methods used to undertake the assessment;
 - Outline the relevant baseline conditions currently existing at the site and surroundings;
 - Consider how the implementation of the proposed remediation works would affect current baseline conditions, resulting in a likely future baseline scenario;
 - Identify the likely direct and indirect marine geomorphology (including water and sediment quality) effects of the proposed development;
 - Identify mitigation and enhancement measures required to address likely effects;
 - Assess likely predicted effects; and,
 - Assess likely cumulative effects on marine geomorphology from the proposed development in combination with other relevant cumulative developments.
- 7.1.4 This chapter is supported by the following technical reports provided in **Appendices 7.1 - 7.2**:
- **Appendix 7.1 - Figures**; and.
 - **Appendix 7.2 - Water Framework Directive (WFD) Assessment**.

7.2 Policy Context, Legislation, Guidance and Standards

Legislation

- 7.2.1 The overarching legislative framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Subject specific legislation of relevance to this assessment is:
- **Water Framework Directive:** The Water Framework Directive (WFD) (2000/60/EEC) establishes a framework for the management and protection of Europe’s water resources. It is implemented in Scotland through the Water Environment and Water Services (Scotland) Act 2003 and the Water Environment (Controlled Activities) (Scotland) Regulations 2011, more commonly known as the Controlled Activity Regulations (CAR). The overall objective of the WFD is to achieve good status in all inland, transitional (estuarine), coastal and ground waters by 2015, unless alternative objectives are set and there are appropriate reasons for time limited derogation. There is also a general “no deterioration” provision to prevent decline in status.
- The WFD divides rivers, lakes, lagoons, estuaries, coastal waters (out to one nautical mile from the baseline for territorial waters), man-made docks and canals into a series of discrete surface water bodies. For each surface water body, ecological as well as chemical status is assessed (separate considerations for groundwater water bodies). Ecological status is measured on a scale of high, good, moderate, poor or bad, while chemical status is

measured as good or fail (i.e. failing to achieve good). For a surface water body to be at overall good status, the water body must be achieving good ecological status and good chemical status. A WFD Assessment considering the potential effects of the proposed development on WFD water bodies is presented in **Appendix 7.2**.

- **Priority Substances Directive:** There have been two amendments to the WFD through the development of the Priority Substances Directive (2008/105/EC and 2013/39/EU). Compliance with chemical status objectives under the WFD is assessed in relation to environmental quality standards (EQS) for a specified list of 'priority' and 'priority hazardous' substances. These substances were first established by Directive 2008/105/EC which entered into force in 2009. It sets objectives, amongst other things, for the reduction of these substances through the cessation of discharges or emissions.

As required by the WFD and Directive 2008/105/EC, a proposal to revise the list of priority (hazardous) substances was submitted in 2012. Subsequently, an updated Priority Substances Directive (2013/39/EU) was published in 2013, identifying new priority substances, setting EQSs for those newly identified substances, revising the EQS for some existing substances in line with scientific progress and setting biota EQSs for some existing and newly identified priority substances.

- **Nitrates Directive:** The Nitrates Directive (91/676/EEC) aims to reduce water pollution from agricultural sources and to prevent such pollution occurring in the future (nitrogen is one of the nutrients that can affect plant growth). Under the Nitrates Directive, surface waters are identified if too much nitrogen has caused a change in plant growth which affects existing plants and animals and the use of the water body. Specifically, the Directive requires EU Member States to apply agricultural action programme measures throughout their whole territory or within discrete Nitrate Vulnerable Zones (NVZs). Action programme measures are required to promote best practice in the use and storage of fertiliser and manure;
- **Urban Waste Water Treatment Directive:** The Urban Waste Water Treatment Directive (UWWTD) (91/271/EEC) aims to protect the environment from the adverse effects of the collection, treatment and discharge of urban waste water. It sets treatment levels on the basis of sizes of sewage discharges and the sensitivity of waters receiving the discharges. It was transposed into legislation in Scotland by the Urban Waste Water Treatment (Scotland) Regulations 1994, amended by the Urban Waste Water Treatment (Scotland) Amendment Regulations 2003.

In general, the UWWTD requires that collected waste water is treated to at least secondary treatment standards for significant discharges. Secondary treatment is a biological treatment process where bacteria are used to break down the biodegradable matter (already much reduced by primary treatment) in waste water. Sensitive areas under the UWWTD are water bodies affected by eutrophication of elevated nitrate concentrations and act as an indication that action is required to prevent further pollution caused by nutrients.

- **Bathing Water Directive:** The revised Bathing Water Directive (rBWD) (2006/7/EC) was adopted in 2006, updating the microbiological and physico-chemical standards set by the original Bathing Water Directive (BWD) (76/160/EEC) and the process used to measure/monitor water quality at identified bathing waters. The rBWD focuses on fewer microbiological indicators, whilst setting higher standards, compared to those of the BWD. Bathing waters under the rBWD are classified as excellent, good, sufficient or poor according to the levels of certain types of bacteria (intestinal enterococci and *Escherichia coli*) in samples obtained during the bathing season (May to September). The BWD was repealed at the end of 2014 and monitoring of bathing water quality has been reported against rBWD indicators since 2015. The new classification system considers all samples obtained during the previous four years and, therefore, data has been collected for rBWD indicators since 2012;
- **Shellfish Waters Directive:** The Shellfish Waters Directive (2006/113/EC) was repealed in December 2013 and subsumed within the WFD. In Scotland, it has been replaced by the Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2013 which came into force on 22 December 2013, and subsequently updated in 2016. The Order identifies 85 coastal areas as shellfish water protected areas which are identified on

a series of maps. The Water Environment (Shellfish Water Protected Areas: Environmental Objectives etc.) (Scotland) Regulations 2013 make provisions in relation to the setting of environmental objectives and the programme of measures to be applied to these protected areas. The Scotland River Basin District (Quality of Shellfish Water Protected Areas) (Scotland) Directions 2015 direct SEPA to assess and classify the quality of each shellfish water protected area as either good, fair or insufficient (by reference to specified criteria and standards, as described in Article 3); and

- **Marine Strategy Framework Directive:** The Marine Strategy Framework Directive (MSFD) (2008/56/EC) came into force in 2008 and aims to achieve Good Environmental Status (GES) of the marine environment across Europe by 2020. Each EU Member State is required to develop and implement a marine strategy, reviewed on a six-yearly basis. This should comprise an initial assessment of the current environmental status of its marine waters, a determination of what GES means for those waters, targets and indicators designed to show whether GES is being achieved, a monitoring programme to measure progress towards GES and a programme of measures designed to achieve or maintain GES.

The MSFD was transposed into UK law by the Marine Strategy Regulations 2010 which came into force on 15 July 2010, and which created a clear legal framework for the implementation of the MSFD in the UK. There are 11 'Descriptors' of GES, including (amongst others) seafloor integrity, biological diversity and introduction of energy (e.g. noise). GES will be assessed at the level of the European Marine Regions, of which there are two covering UK waters: Greater North Sea and the Celtic Seas (the proposed development is located within the latter). However, given the anticipated scale of effects associated with the proposed development, it is considered that reference to the MSFD (and potential assessment) would not be proportionate.

7.2.2 As noted in **Chapter 6 – Ground Conditions**, the following legislation relating to contamination and construction activities is also of relevance to this EIA:

- Environmental Protection Act 1990 (Part IIA) (as amended);
- The Contaminated Land (Scotland) Regulations 2000 (as amended);
- The Environment Act 1995 (Section 57);
- EU Water Framework Directive 2000/60/EC ("the WFD");
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended); and,
- Water Environment and Water Services (Scotland) Act 2003.

Policy

7.2.3 The planning policy framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Planning policy considerations of specific relevance to this assessment are:

7.2.4 Planning policy considerations of specific relevance to this assessment are:

- **Adopted West Dunbartonshire Local Plan (2010)**, in particular policies:
 - GD1: Development Control; and,
 - GD 2(9): Carless, Old Kirkpatrick;
- **West Dunbartonshire LDP Proposed Plan 2015**, in particular:
 - 'Changing Places' Carless Redevelopment Strategy (Section 3.6); and policies:
 - DS7: Contaminated Land; and,
 - GN6 – The Water Environment.
- **West Dunbartonshire LDP2 Proposed Plan (2018)**, in particular proposed policies:
 - Carless Policy 1 – Business and Industrial Development

- Policy ENV9: Contaminated Land;
 - ENV5 - Water Environment; and,
 - ENV10 - Implementation of the SEA Environmental Report.
 - **Scottish Planning Policy (SPP) (2014)**, in particular the Principal Policy on Sustainability (paragraphs 24-35).
 - **Scottish Government Planning Circular 1/2015: Relationship between the statutory land use planning system and marine planning and licencing.**
- 7.2.5 In accordance with sections 15 and 58 of the Marine and Coastal Access Act (2009), the marine licence application for the extent of the proposed development located below MHWS must be determined in accordance with the appropriate marine policy documents, unless relevant considerations indicate otherwise. As detailed in **Chapter 5 – Legislative and Policy Context**, the relevant marine policy documents and constituent comprise:
- **UK Marine Policy Statement (2011);**
 - **Scotland’s National Marine Plan (2015)**, in particular policies:
 - GEN1 - General Planning Principle;
 - GEN5 - Climate Change;
 - GEN8 - Coastal Process and Flooding;
 - GEN12 - Water Quality and Resource;
 - GEN19 - Sound Evidence; and,
 - GEN21 - Cumulative Impacts.

Guidance and Relevant Technical Standards

- 7.2.6 The following guidance and technical standards have informed this assessment:
- SEPA (2015). Technical flood risk guidance for stakeholders;
 - van Rijn (1993; 2012) and Soulsby (1997) have been used to inform the sediment transport assessment, while the Wentworth (1922) grain size scale provided a means of classifying particle size; and,
 - ‘Action Levels’ reported by Marine Scotland (2017) provided context for sediment quality in the vicinity of the proposed development.

7.3 Methodology

Overview

Assessment Scope

- 7.3.1 This chapter presents an assessment of likely significant effects on marine geomorphology (including water and sediment quality) from the proposed development, focusing in particular on likely effects from the proposed marine works element of the wider proposed development. The assessment has been prepared in accordance with the TCPA EIA Regulations as EIA screening has confirmed that the MW EIA Regulations are not specifically engaged by the proposed development.
- 7.3.2 The principal aspects considered within this assessment are:
- The effects of proposed marine works on the flow regime of the River Clyde estuary;
 - The resulting effects of any changes in the flow regime on the associated local sediment transport processes (erosion and deposition) during operation; and
 - Changes in water and sediment quality during construction and operation of the proposed marine works.

- 7.3.3 This assessment has considered likely effects from the construction and operational phases of the proposed marine works. As a permanent industrial facility, no decommissioning phase is presently envisaged for the whole proposed development, but if decommissioning were to occur it is likely that the structures installed as part of the proposed marine works would remain in situ providing they are environmentally stable. Any effects on the marine environment from the retention of the structure in situ would therefore be similar to the likely operational phase effects considered below and a separate decommissioning phase assessment is not considered to be required.
- 7.3.4 In accordance with the Carless Marine Fabrication Complex EIA Scoping Report and subsequent EIA Scoping Opinion provided in **Appendix 4.1**, the following potential effects have been scoped out of detailed consideration within the assessment:
- Changes to the wave climate;
 - Changes in quality of bathing waters;
 - Changes in quality of shellfish water protected areas; and,
 - Changes to suspended sediment concentrations.
- 7.3.5 This assessment includes consideration of potential effects resulting from the introduction or release of contaminants to the marine environment as a result of the proposed marine works. Potential effects resulting from the introduction or release of contaminants to the marine environment from the wider proposed development have however been scoped out of this assessment as these are instead considered elsewhere in **Chapter 6 – Ground Conditions**.

Assessment Process

- 7.3.6 In undertaking the assessment presented in this ES Chapter, the following activities have been carried out:
- EIA Scoping (see below);
 - Collection and review of baseline data through a site specific marine ecology survey, which included collection of two intertidal sediment samples for particle size analysis (PSA) and supporting photographs, and desk-based review;
 - Desk-based assessments using industry standard formulae and calculation methods. To account for uncertainty these assessments have been underpinned by worst-case assumptions as defined in the relevant sections below; and,
 - EIA Assessment which includes:
 - Assessment of Likely Effects: Section 7.7 presents an assessment of the level of likely effects arising from the construction and operation of the proposed development upon the expected future baseline scenario (with consideration of embedded mitigation);
 - Further Mitigation and Enhancement: Where likely impacts have been assessed as having a moderate, major or severe significance then additional mitigation measures are identified;
 - Residual Effects: Section 7.9 presents an assessment of the impact significance from the effects that could arise from the proposed development with mitigation; and,
 - Cumulative and in-combination: An assessment of impacts from the proposed marine works combined with the likely significant effects of other committed development.

Consultation

- 7.3.7 This assessment has been informed by an EIA Scoping Report (PBA, 2017) and subsequent EIA Scoping Opinion issued by WDC (March 2018) in respect of the EIA for the proposed development. The EIA Scoping Opinion, which is provided in full in **Appendix 4.1**, included a list of standard requirements for consideration in this chapter.
- 7.3.8 In the specific context of this chapter, the following was noted by WDC:

- *“It is not clear whether the proposals consider the effect of the proposed infilling of the jetties on the potential release of contaminants from the underlying river sediment. Earlier investigations identified contamination to be present within the sediment, so it is considered that the EIA should address this issue and that appropriate measures should be put in place to control the release of contaminated sediment into the River Clyde.”*
- 7.3.9 While the proposed marine works and associated scale of disturbance to underlying sediments has been amended since the EIA Scoping Report (PBA, 2017) was submitted, it is acknowledged that such activities could result in the release of contaminated sediment into the River Clyde. Therefore, potential changes to water and sediment quality during construction and operation of the proposed marine works are considered within this chapter.
- 7.3.10 In addition, it was noted by WDC that *“the EIA Report should be supported by a Water Framework Directive compliance assessment”*, while Marine Scotland were *“content that water quality with regard to Marine Ecology has been scoped out on the basis that a wider Water Framework Directive compliance assessment is being carried out”*. A WFD Assessment considering the potential effects of the proposed development on WFD water bodies is presented in **Appendix 7.2 – WFD Assessment**.
- 7.3.11 Further to the submission of the EIA Scoping Report (PBA, 2017), the following subject specific consultation activities have also been undertaken:
- Consultation has been undertaken with Peel Ports (Clydebank) via telephone on 19th November 2018 to validate available information on the existing flow regime; and,
 - Consultation with Scottish Environment Protection Agency (SEPA) on water and sediment quality data for the River Clyde in the vicinity of the proposed development.

Study Area

- 7.3.12 The Study Area has been defined based upon the spatial extent of potential effects on the flow regime and associated changes in sediment transport, as well as the potential extent of any sediment dispersion from construction activities. This is considered to cover an area approximately 1 km upstream and downstream of the proposed marine works, as potential effects would be limited to well within this extent. However, it should be noted that water and sediment quality data obtained from SEPA includes values from water and sediment samples collected up to 8 km downstream of the site.

Information Sources

Desk Top Study

- 7.3.13 The following key data sources have been reviewed to identify the relevant baseline characteristics of the site and the surrounding environment:
- Hydrographic data (Allen, 1966; Peel Ports Group, 2017) and morphological evolution (Karunarathna, 2011) of the River Clyde;
 - SEPA’s Water Classification Hub for the latest available WFD water body classifications⁷;
 - SEPA’s Bathing Waters website⁸;
 - Maps of Shellfish Water Protected Areas, as defined under the Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2013⁹;
 - Map of Sensitive Areas, as designated under the UWWTD¹⁰; and
 - Maps of surface water NVZs, as designated under the Nitrates Directive¹¹.

⁷ <https://www.sepa.org.uk/data-visualisation/water-classification-hub> (Accessed January 2019).

⁸ <http://apps.sepa.org.uk/bathingwaters> (Accessed January 2019).

⁹ <https://www.gov.scot/publications/shellfish-water-protected-areas-maps> (Accessed January 2019).

¹⁰ <http://www.gov.scot/Topics/Environment/Water/15561/UWWTDSensitiveAreas> (Accessed January 2019).

¹¹ <https://www2.gov.scot/Topics/farmingrural/Agriculture/Environment/NVZintro> (Accessed January 2019).

Fieldwork

- 7.3.14 An Intertidal Phase 1 Habitat Survey was undertaken in October 2017 (see **Chapter 10 – Marine Ecology and Figure 7-1 in Appendix 7.1**). The survey included the collection of two intertidal sediment samples from which particle size analysis (PSA) has been used to inform the assessment, along with supporting photographs from the site.

Approach to Assessment

Consideration of Relevant Receptors

- 7.3.15 Based on the information sources outlined above, the current and likely future baseline characteristics of site and the surrounding area was characterised. This led to the identification of the following relevant sensitive receptors to consider within the assessment, as detailed within **Section 7.4 – Current Baseline Conditions**:

- Hydrodynamic regime;
- Sediment transport regime; and,
- Water quality.

The first stage of the assessment therefore identified potential environmental changes resulting from the proposed development and the features of interest (receptors) likely to be affected (which are together referred to as the impact pathway). Determining the Importance of Marine Geomorphological Features

- 7.3.16 In order to determine whether there are likely to be significant effects, it is necessary to identify whether a marine geomorphological feature is ‘important’. To achieve this, where possible the receptor has been valued on the basis of a combination of its designation under conservation legislation, and local or regional importance with respect to use of the estuary. The definition of importance of the receptor is identified in **Table 7.1** below.

Table 7.1 - Summary of Receptor Importance

Receptor Importance	Definition
High	Receptor internationally designated and/or of international ecological importance. Likely to be rare with minimal potential for substitution or unable to tolerate change. May also be of high or very high socio-economic importance.
Moderate	Receptor nationally designated and/or of national ecological importance and with some ability to tolerate change and recover in the medium term. Likely to be relatively rare. May also be of high socio-economic importance.
Low	Receptor not designated but of local to regional importance and able to tolerate change effects to a large extent, with relatively rapid rate of recovery; or not designated/of local importance but not tolerant to change.
Negligible	Receptor only of local importance with a high tolerance to change.

Impact Assessment Methodology

- 7.3.17 Assessment of potential effects on the local hydrodynamic and morphological regime due to the proposed marine works has been based on a conceptual understanding of the study area. This is based on available data sets without the use of numerical modelling.
- 7.3.18 The second stage involves understanding the nature of the environmental changes to provide a benchmark against which the changes and levels of exposure can be compared. The scale of the impacts via the impact pathways depends upon a range of factors, including the following:
- Magnitude (local/strategic):
 - Spatial extent (small/large scale);

- Duration (temporary/short/intermediate/long-term);
- Frequency (routine/intermittent/occasional/rare);
- Reversibility;
- Probability of occurrence;
- Confidence, or certainty, in the impact prediction;
- The margins by which set values are exceeded (e.g. water quality standards);
- The sensitivity of the receptor (resistance/adaptability/recoverability);
- The baseline conditions of the system; and
- Existing long-term trends and natural variability.

Establishment of Effect Significance

- 7.3.19 Determination of the level and significance of the predicted effects on marine geomorphology was undertaken through professional judgement, having regard to the likely positive (beneficial) or negative (adverse) nature; extent; magnitude; duration; timing; frequency; and reversibility of the impacts assessed. A summary of the assessment criteria is provided in **Table 7.2**.

Table 7.2 - Summary of significance levels

Effect Level and EIA Significance		Criteria	Geographical criteria
Significant	Severe	Only adverse effects are assigned this level of significance as they represent key factors in the decision-making process. These effects are generally, but not exclusively associated with sites and features of international, national or regional importance. A change at a regional or district scale site or feature may also enter this category.	Marine geomorphological impacts assessed as being significant at national or higher geographical scales and that have triggered a response in development control terms are considered to represent impacts that overall fit within this assessment, are of severe significance.
	Major	These effects are likely to be important considerations at a local or district scale but, if adverse, are potential concerns to the project and may become key factors in the decision-making process.	Marine geomorphological impacts assessed as being significant at the regional scales and that has triggered a response in development control terms are considered to represent impacts that overall within this assessment are of major significance.
	Moderate	These effects, if adverse, 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.	Marine geomorphological impacts assessed as being significant at the county scale, and that have triggered a response in development control terms, will be considered to represent impacts that overall within this assessment are of moderate significance.
Not significant	Minor	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 enhancing the subsequent design of the project and consideration of mitigation or compensation measures.	Marine geomorphological impacts assessed as being significant at the local scale, and that have triggered a response in development control terms, will be considered to represent impacts that overall within this assessment are of minor significance.
	Negligible	No effect or effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error.	Marine geomorphological impacts that have been assessed as not being significant at any geographic level

- 7.3.20 Effects assessed at Moderate or above level are considered as likely to be significant in the context of the TCPA EIA Regulations. For any such likely effects, appropriate mitigation was devised to reduce residual impacts, as far as possible, to environmentally acceptable levels. Within the assessment procedure, the use of further mitigation measures alters the risk of exposure and/or severity of impact, resulting in the need to re-assess the residual level and significance of likely effects.
- 7.3.21 Following the assessment of likely effects and their EIA significance, a confidence assessment was undertaken which recognises the degree of interpretation and expert judgement applied. This is presented in the summary table contained within the conclusions section. Confidence was assessed on a scale incorporating three values: low, medium and high.

Approach to Cumulative Impact Assessment

- 7.3.22 Industry standards for conducting cumulative and in-combination impact assessments include a guidance note published by the MMO (2014). This section considers that a cumulative/in-combination assessment needs to take account of the total effects of all pressures acting upon all relevant receptors in seeking to assess the overall cumulative/in-combination significance. Additionally, consideration is given to any other activities and plans or projects, including any impacts that do not directly overlap spatially, but may indirectly result in a cumulative/in-combination impact.

Assumptions and Limitations

- 7.3.23 No water and sediment quality data (other than PSA of two sediment samples) have been obtained at the site of the proposed marine works. It has therefore been assumed, based on historic data, previous use of the site and observations during the Intertidal Phase 1 Habitat Survey, that sediment quality is poor with significant levels of hydrocarbon contamination. This conservative assumption has directly informed the identification in **Section 7.7 – Further Mitigation** of a requirement for the Applicant to undertake an intrusive site investigation (SI) and any subsequent remediation necessary within the footprint of the proposed marine works. This marine SI and subsequent remediation will need to take place prior to the construction of the proposed marine works.

7.4 Current Baseline Conditions

The Site

- 7.4.1 **Figure 3.1 - Site Location Plan** identifies the whole site of the proposed development, including the proposed marine works, in relation to its geographical context. **Figure 3.2 – Proposed Marine Works** identifies the location of existing derelict jetties at the site within which the proposed marine works will be undertaken.
- 7.4.2 In accordance with an EIA Screening Opinion adopted by the Scottish Ministers (Marine Scotland) on 20th December 2017, the footprint of the proposed marine works will not exceed 2,400m² and will be located within the area of the existing jetties as shown in **Figure 3.2**. These existing jetties presently comprise five linked ‘jetty cells’ protruding approximately 30m from existing sheet piles at the foreshore south eastwards into the River Clyde. The jetties connect the with solid ‘dolphin’ structures which are fixed to the seabed. As shown on the submitted **Marine Licence Application Drawings**, the Applicant intends to utilise the third and fourth western most jetty cells for the proposed marine works.
- 7.4.3 The existing jetty structure at the site is a legacy of previous uses of the adjacent terrestrial, including as a Ministry of Defence strategic fuel depot in the first half of the 20th Century and then as an oil storage terminal. The Carless Oil Terminal was formally decommissioned in 1992 and some terrestrial demolition works were subsequently undertaken, although the full jetty structure remains in-situ.
- 7.4.4 The existing jetty structure presently has no direct vehicular access, with access only possible on foot from within the adjacent former Carless Oil Terminal.

The Surrounding Area

Physical Processes

Geomorphology

- 7.4.5 The Clyde Estuary is complex in its morphological shape, with the Firth of Clyde feeding several sea lochs (including Loch Striven, Loch Long and Loch Gare) before propagating eastwards towards Glasgow. The Clyde basin consists of a mixture of geological features, with the lower basin sediments mainly glacial with overlying carboniferous limestone and pockets of extrusive igneous rock and Devonian sandstone also present. Large elongated rock shore platforms exist in the upper sections of the estuary at Erskine and Clydebank (Karunarathna, 2011).
- 7.4.6 The Clyde Estuary has a much smaller tidal range in comparison to other west coast estuaries of Great Britain, resulting in a low-energy hydrodynamic regime and low turbulence. The estuary therefore provides ideal conditions for the deposition of sediments, particularly within upper sections of the Clyde (e.g. upstream of the Erskine Bridge). Siltation has caused problems for hundreds of years, with an average sediment input equivalent to 200,000 m³ of infilling each year (Allen, 1995).
- 7.4.7 Heavy modification of the estuary from human activity has occurred over the last 250 years (Mills et al. 2017). Downstream from Glasgow City Centre, the present banks of the river are formed by a variety of quay walls, wharves, revetments and slipways which date to previous and current industrial activity (Barr et al. 2004).
- 7.4.8 Maintenance dredging occurs to provide safe navigation to the city centre and the BAE Systems site in Govan, with very limited ad-hoc dredging further upstream for commercial and leisure vessels (Hansom, 2017). Depths are regularly maintained to a minimum of 7.5 m Chart Datum (CD) in the navigation channel. The average annual maintenance dredging commitment of the River Clyde in the 1990's was *circa* 272,000 m³ (Allen, 1995). The general rate of siltation remains somewhat weather dependant, being primarily controlled by rainfall in the tributary catchments (Karunarathna, 2011; Peel Ports (Clydebank), *pers. comm.* 2018). The local bathymetry to the proposed development is provided in Peel Ports Group (2017).
- 7.4.9 At present, the marine/terrestrial boundary is controlled by an existing sheet-pile wall, extending throughout the full length of the site. Much of this wall is in poor condition, with evidence of rust voids and localised failure (e.g. **Image 7.1**). Much of the intertidal foreshore throughout the site consists of large cobbles and boulders mixed with rubble, of which some is piled against the existing sheet-pile wall and partly vegetated. Two samples were collected from small patches of sediment exposed between boulders and cobbles during an Intertidal Phase 1 Habitat Survey in October 2017 (ABPmer, 2017). Based on these samples, the intertidal sediment habitat consisted of gravel and muddy sandy gravel (**Table 7.3**).

Image 7.1 – Example sections of sheet-pile wall at top of foreshore



Source: ABPmer (Photos taken during Intertidal Phase 1 Habitat Survey, October 2017)

Table 7.3 – Particle size analysis (PSA) for sediment samples collected adjacent to the proposed marine works

Sample	Sediment Fraction (%)			Organic Content (%)
	Gravel	Sand	Silt	
1	85.9	6.5	7.6	0.898
2	69.6	19.7	10.8	8.732

Source: ABPmer, 2017

7.4.10 Subtidal bed material within the upper sections of the River Clyde, including the site, is predominantly a mixture of silt and clays with varying sand contribution (Natural Environmental Research Council, 1974; Allen, 1995).

Hydrodynamics

7.4.11 The upper section of the River Clyde behaves as a partially mixed estuary. During periods of ebb flow, stratification in the form of a sharp salinity interface can be observed, occurring at a water depth of 3-5 m with differences of up to 5-10 parts per thousand (ppt) (Allen, 1966). Stratification then decreases on the subsequent flood tide as mixing occurs and will be modified by river discharges.

7.4.12 Flow conditions at the site are primarily influenced by tidal propagation up the Clyde Estuary, with flows orientated east/west (i.e. parallel to the orientation of the river channel). In general, the Clyde Estuary can be classed as mesotidal (2-4 m range). However, while the mesotidal range results in relatively small tidal currents in lower parts of the estuary entering the Firth of Clyde (less than 0.2 m/s; ABPmer, 2008), higher peak flows occur within upper sections of the estuary and are generally concentrated within the deeper dredged channel. Peak flow speeds generally reach a maximum of *circa* 1 m/s during spring tides and *circa* 0.5 m/s during neap tides (Peel Ports (Clydebank), *pers. comm.* 2018) in the local area.

7.4.13 Discharge rates of tributary rivers (predominantly the Black Cart Water and White Cart Water which enter the River Clyde approximately 4 km upstream (east) of the proposed development) also exert additional control on flow speeds, with increased values following a lag of *circa* 24 hours after periods of intense rainfall in the surrounding catchments (Karunaratna, 2011; Peel Ports (Clydebank), *pers. comm.* 2018). Tide level information from the United Kingdom Hydrographic Office (UKHO) is provided in **Table 7.4** for secondary ports of Bowling (*circa* 3 km downstream of the proposed development) and Clydebank (Rothesay Dock) (*circa* 4.5 km upstream of the proposed development).

Table 7.4 - Predicted tidal levels secondary ports upstream and downstream of the proposed development

Location	Unit	HAT	MHWS	MHWN	MLW	MLWN	MLWS	LAT	Spring Range (m)	Neap Range (m)

Bowling	mCD	4.6	4.0	3.3	-	1.3	0.4	-0.3	3.6	2.0
	mODN	2.6	2.0	1.3	-	-0.7	-1.6	-2.3		
Clydebank (Rothesay Dock)	mCD	5.1	4.5	3.7	2.71	1.6	0.6	-0.1	3.9	2.1
	mODN	2.9	2.3	1.5	0.51	-0.6	-1.6	-2.3		

HAT- Highest Astronomic Tide; MHWS- Mean High Water Springs; MHWN- Mean High Water Neaps; MLW- Mean Low Water; MLWN- Mean Low Water Neaps; MLWS- Mean Low Water Springs; LAT- Lowest Astronomic Tide.

Source: UKHO, 2018; Admiralty TotalTide (ATT)¹²

Waves

- 7.4.14 Wave penetration into the Clyde Estuary is severely restricted due to the orientation of the upper sections of the estuary mouth in relation to the predominant wave direction within the Firth of Clyde (HR Wallingford, 1996; Karunarathna, 2011). This results in a low-energy wave climate at the site that is highly dependent on local wind generation. Throughout the area of the proposed marine works, the maximum estimated fetch for wind-generated waves is *circa* 1 km.

Sediment Dynamics

- 7.4.15 The relatively low current speeds throughout the Clyde Estuary result in relatively low suspended loads. Within the dredged navigation channel, this is generally less than 50 mg/L (Allen, 1966). The majority of sediment movement is likely to occur during peak current flows; it is also likely to be confined mainly to the dredge navigation channel. Sediment transport due to wave activity is suggested to be minimal, only providing additional forcing of transport rates during adverse and/or wind-over-tide conditions.

Water and Sediment Quality

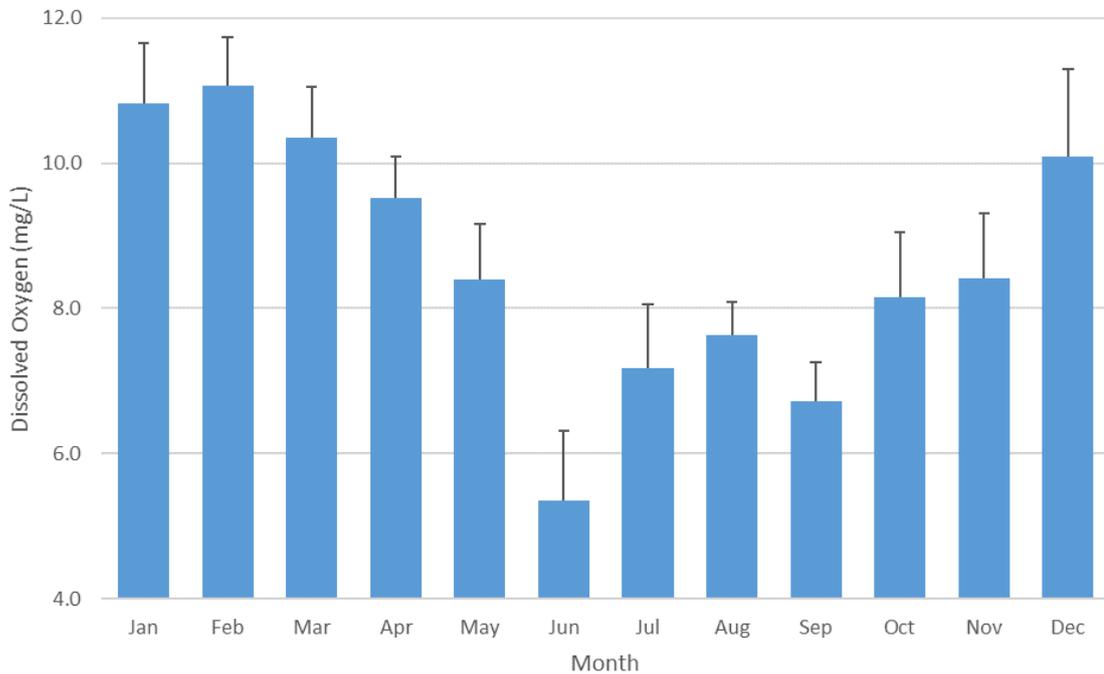
Water Quality

- 7.4.16 The Glasgow area has been significantly affected by its industrial past. Subsurface coal mining, shipbuilding, chemical and engineering industries have all left their mark in the catchment of the River Clyde (Scottish Consortium for Rural Research, 2012). While contaminant loadings to the Clyde Estuary are lower now compared to historical discharges, a legacy of localised contaminated sediments remains. These in turn have caused elevated concentrations of contaminants in mussels in the Clyde Estuary. Water quality in the Clyde Estuary is compromised by discharges of industrial effluent and treated sewage although effluent treatment has improved resulting in returning populations of residential and migratory fish (McIntyre et al. 2012).
- 7.4.17 The proposed marine works are located within the Clyde Estuary - Inner (inc Cart) transitional water body (ID: 200510), part of the Scotland River Basin District. This water body, designated as a heavily modified water body (HMWB), currently (2017) has an overall moderate status based on moderate ecological potential (chemical status not reported). Parameters currently failing to achieve (at least) good status include dissolved oxygen (moderate), chromium (fail) and morphology (poor)¹³.
- 7.4.18 Water quality monitoring data collected from five locations in the vicinity of the proposed development, namely the Clyde Estuary at Dalmuir, Erskine, Rothesay Dock, Leven Confluence and Milton (**Figure 7.1**), was obtained from SEPA (E&F Advice Enquiry Ref:171858, data received December 2018). Pooled dissolved oxygen concentration (**Image 7.2**) and water temperature (**Image 7.3**) values show clear temporal trends for these two parameters along this section of the Clyde. Dissolved oxygen concentrations are highest in the winter months (max = 12.78 mg/L, February 2016) and lowest in the summer (min = 3.94 mg/L, June 2014), and vice versa for water temperature (max = 17.23°C, June 2014; min = 2.83°C; February 2015).

¹² <https://www.admiralty.co.uk/digital-services/admiralty-digital-publications/admiralty-totaltide> (Accessed January 2019).

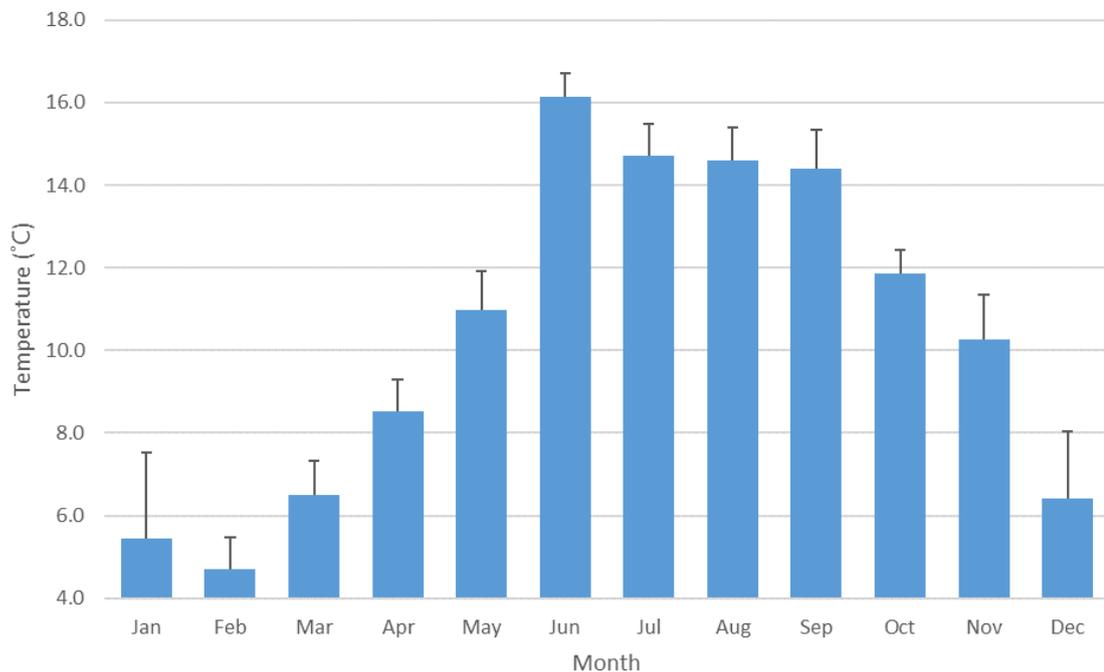
¹³ <https://www.sepa.org.uk/data-visualisation/water-classification-hub> (Accessed January 2019).

Image 7.2. Mean monthly dissolved oxygen concentration, with standard deviation bars, in water samples collected from monitoring locations near the proposed development between 2014 and 2017



Source: Data collected by SEPA

Image 7.3. Mean monthly temperature, with standard deviation bars, of water samples collected from monitoring locations near the proposed development between 2014 and 2017



Source: Data collected by SEPA

7.4.19 Dissolved metal concentrations in water samples collected by SEPA at monitoring site ‘Clyde Estuary at Rothesay Dock’ (located approximately 4.5 km upstream of the proposed marine works within the Clyde Estuary - Inner (inc Cart) transitional water body; **Figure 7.1**) between 2014 and 2017 are presented in **Table 7.5**. Exceedances in the respective annual average (AA; long term) EQS values are recorded for cadmium (2017), chromium (2014, 2015 and 2017), lead (all years) and zinc (2015, 2016 and 2017). There was also one exceedance of the maximum allowable concentration (MAC; short term) EQS for cadmium in November 2017 (2.82 µg/L).

Table 7.5 - Dissolved metal concentrations recorded at the monitoring location 'Clyde Estuary at Rothesay Dock' between 2014 and 2017

Metal	EQS (µg/L)	Sample Concentration (µg/L)			
		2014	2015	2016	2017
Cadmium	0.2 (AA); ≤0.45 – 0.6 (MAC)*	0.01 – 0.02 \bar{x} = 0.02 n = 4	0.01 – 0.1 \bar{x} = 0.06 n = 4	0.02 – 0.2 \bar{x} = 0.065 n = 4	0.02 – 2.82 \bar{x} = 0.72 n = 4
Chromium (VI)	0.6 (AA); 32 (95%tile)**	1.46 – 5.91 \bar{x} = 3.15 n = 4	1.56 – 3.78 \bar{x} = 2.37 n = 3	0.2 – 0.5 \bar{x} = 0.35 n = 2	0.55 – 3.7 \bar{x} = 1.702 n = 5
Copper	3.76 (AA)	0.9 – 2.54 \bar{x} = 1.59 n = 4	1.2 – 7.25 \bar{x} = 3.13 n = 4	0.86 – 3.08 \bar{x} = 1.5 n = 4	0.97 – 6.42 \bar{x} = 2.69 n = 4
Lead	1.3 (AA); 14 (MAC)	0.82 – 1.81 \bar{x} = 1.32 n = 4	1.38 – 10.7 \bar{x} = 3.89 n = 4	1.32 – 2.14 \bar{x} = 1.68 n = 4	0.62 – 9.62 \bar{x} = 3.02 n = 4
Nickel	8.6 (AA); 34 (MAC)	1.6 – 3.69 \bar{x} = 2.28 n = 4	1.61 – 3.51 \bar{x} = 2.21 n = 4	1.47 – 2.83 \bar{x} = 1.83 n = 4	1.2 – 2.18 \bar{x} = 1.73 n = 4
Zinc	7.9 (AA)	4.01 – 9.38 \bar{x} = 6.36 n = 4	7.04 – 22.8 \bar{x} = 13.07 n = 4	8.79 – 16.2 \bar{x} = 10.98 n = 4	5.03 – 103 \bar{x} = 30.53 n = 4

EQS – Environmental Quality Standard (based on transitional water values presented in the Scotland River Basin District (Standards) Directions 2014 and Amendment Directions 2015); AA – Annual Average; MAC – Maximum Allowable Concentration.

* Water hardness assumed to be Class 1 – Class 3 (<100 mg CaCO₃/L).

** 95%tile (95-percentile) is a standard that is failed if the measured value of the parameter to which the standard refers is greater than the standard for 5% or more of the time.

Source: Data collected by SEPA

- 7.4.21 There are no designated bathing waters situated in the vicinity of the proposed development. The closest bathing waters to the proposed development are Lunderston Bay, which is located approximately 20 miles to the west, and Luss Bay, which is located approximately 17 miles to the northwest. There are also no Shellfish Water Protected Areas situated in the vicinity of the proposed development. The nearest Shellfish Water Protected Areas are Loch Long, which is located approximately 28 miles to the northwest, and Loch Striven, which is located approximately 35 miles to the west. Given the anticipated scale of effects, no further considerations are made with regards to bathing waters and Shellfish Water Protected Areas.
- 7.4.22 The Clyde Estuary water body is not designated under the Nitrates Directive (91/676/EEC) and there are no surface water Nitrate Vulnerable Zones (NVZs), designated as being at risk from agricultural nitrate pollution, located near the Proposed Development. There are also no designations under the UWWTD (91/271/EEC) located in the vicinity of the proposed development.

Sediment Quality

- 7.4.23 Subsurface coal mining, shipbuilding, textile and paper as well as engineering industries have all had a significant environmental impact on sediments quality of the urban area of Glasgow (Hume, 1974; Edgar et al., 1999; 2003; cited in Vane et al. 2007). Although heavy industry on the banks of the River Clyde declined from 1950s to 1970s, and shipbuilding in the area ended in 1971, Glasgow remains a thriving city with much of the infrastructure necessary to maintain a modern mixed economy such as power stations, oil refineries, landfill sites and sewage works located in close proximity to the main channel and tributaries (Vane et al. 2007).

- 7.4.24 No sediment samples have been collected directly from the location of the proposed marine works. However, it was observed during Intertidal Phase 1 Habitat Survey in October 2017 that sediments were heavily contaminated with hydrocarbons (see **Image 7.4**).

Image 7.4: Photographs of sediment sample locations during Intertidal Phase 1 Habitat Survey in October 2017



Source: ABPmer

- 7.4.25 Historic sediment quality monitoring data (2007 and 2010) collected from three locations downstream of the proposed development, namely the Clyde Estuary at Erskine, Milton and Leven Confluence (**Figure 7.1**), was obtained from SEPA (E&F Advice Enquiry Ref:171858, data received December 2018) and presented in **Table 7.6**. In addition, Vane et al. (2007) reported sediment quality data on the River Clyde at Duntocher Burn, Erskine and Milton from 2003. Both datasets provide sediment concentrations for polycyclic aromatic hydrocarbons (PAHs; United States Environmental Protection Agency (USEPA) suite of 16) and polychlorinated biphenyl (PCBs; ICES 7 congeners). There are numerous instances where PAH concentrations have exceeded AL1 (there is currently no AL2 for PAHs). The sum of ICES 7 PCB congeners was typically below AL1 across all sites, with the exception of the sample collected at Duntocher Burn (approximately 1 km upstream of the proposed marine works) which was found to be above AL1 (but well below AL2; Vane et al. 2007).

Table 7.6 - Contaminant concentrations in sediment samples collected from monitoring locations near the proposed development in 2007 and 2010

Contaminant	Units	Revised Action Levels*		Sample Concentration								
				1	2	3	4		5		6	
		AL1	AL2	2003			2007	2010	2007	2010	2007	2010
Acenaphthene	µg/kg	100	-	208	26	6	-	10.9	-	72.2	-	<1.12
Acenaphthylene	µg/kg	100	-	-	-	-	-	2.19	-	36.1	-	<1.23
Anthracene	µg/kg	100	-	305	38	15	56	32.5	52	163	<3.8	2.07
Benzo(a)anthracene	µg/kg	100	-	1,079	182	61	94	91.6	73	871	26	1.39
Benzo(a)pyrene	µg/kg	100	-	1,041	168	47	110	87.4	48	733	<8.2	4.24
Benzo(b)fluoranthene	µg/kg	100	-	1,368	283	88	-	97.7	-	664	-	4.93
Benzo(g,h,i)perylene	µg/kg	100	-	436	147	69	100	99.6	45	731	<15	5.36
Benzo(k)fluoranthene	µg/kg	100	-	384	39	14	-	56.39	-	462.92	-	2.06
Chrysene	µg/kg	100	-	845	132	43	58	80.5	37	480	<7.7	<2.03
Dibenzo(a,h)anthracene	µg/kg	10	-	220	27	14	-	22.1	-	223	-	<0.91
Fluoranthene	µg/kg	100	-	2,050	253	79	190	212	92	855	<6.8	1.47
Fluorene	µg/kg	100	-	254	34	8	-	15.4	-	51.6	-	1.03
Indeno(1,2,3cd)pyrene	µg/kg	100	-	622	72	37	39	93.7	27	674	<7.8	4.16
Naphthalene	µg/kg	100	-	202	36	7	<11	14.1	14	109	<9.9	<1.51
Phenanthrene	µg/kg	100	-	801	167	48	<6.5	70.2	94	460	140	3.78
Pyrene	µg/kg	100	-	1,886	241	95	130	174	370	890	<8.2	6.04
PCB (Sum of ICES 7)	µg/kg	20	180	33.02	10.55	4.99	3.4	6.6	2.6	22	<1.1	<1.1

AL1 – Action Level 1; AL2 – Action Level 2. Data collected by Vane et al. (2007): 1 – Duntocher Burn; 2 – Erskine; 3 – Milton. Data collected by SEPA: 4 – Clyde Estuary at Erskine; 5 – Clyde Estuary at Milton; 6 - Clyde Estuary at Leven Confluence.
* Marine Scotland (2017).

7.5 Baseline Evolution and Expected Future Baseline

Current Baseline Evolution

- 7.5.1 The TCPA EIA Regulations require that the EIA Report must describe the likely evolution of the baseline scenario in the absence of the proposed development. In the absence of any development activities, current baseline conditions, including the natural variability in surrounding physical processes and extensive hydrocarbon contamination of sediments, would be likely to remain relatively unchanged.
- 7.5.2 For the purposes of this EIA, the likely evolution of the baseline is predicated upon the approval and implementation of proposed remediation works on the terrestrial part of the site before the construction of the proposed development. Prior remediation will be needed to:
- Reduce to an acceptable level the risk to human health and environmental receptors both on and off the site from hydrocarbon and other contamination in soil; and,
 - Reduce to an acceptable level the risk to the River Clyde from mobile contamination within soils and contaminants floating on and dissolved within the groundwater.
- 7.5.3 Remediation is therefore required both owing to the terrestrial site's current contaminated land and Special Site designations under Part IIA of the Environmental Protection Act 1990 and to make the site suitable for the future intended use (i.e. the construction and operation of the proposed development). As such, a 'no development' baseline evolution scenario is not considered to merit further consideration in this EIA.
- 7.5.4 With respect to the area of the proposed marine works, it is possible that water and sediment quality in this area could be improved through land-based remediation of the site (i.e. reduced risk of historic hydrocarbon contaminants migrating into the estuary).

Expected Future Baseline

Overview

- 7.5.5 The expected future baseline scenario comprises the implementation of the proposed remediation works subject to planning application DC18/245 to address known contamination within the current baseline scenario. A detailed description of the proposed remediation works is provided in **Appendix 6.3 – Remediation Strategy**, which was submitted to underpin planning application DC18/245 and is appended to this EIA Report to allow for a full description of the whole development proposed at the site to be provided in accordance with the EIA Regulations.
- 7.5.6 This section provides a high-level overview of the expected future baseline conditions for marine geomorphology (including water and sediment quality) receptors.

Future Baseline Conditions

- 7.5.7 Under the future baseline scenario, assuming shore-protection/flood risk management and dredging regimes remain broadly the same there are unlikely to be any short-term changes to estuary geomorphology or hydrodynamics. Small scale marine works are unlikely to affect the estuary geomorphology. If maintenance dredging were to cease, studies have predicted siltation of the navigation channel at the site (Hansom, 2017).
- 7.5.8 Changes in the long-term will be more pronounced through climate change. Using UKCP18's RCP 4.5 scenario (at 95th percentile), sea level rise in the Firth of Clyde is estimated to increase water levels by approximately 0.6 m by 2100 (Palmer et al. 2018). SEPA guidance indicates that by 2080 river flows could be exceeded by around 30% (over present day)¹⁴. This will result in the loss of intertidal habitat and an associated increase in subtidal extent through a process known as coastal squeeze.

¹⁴ <https://www.sepa.org.uk/media/162602/ss-nfr-p-002-technical-flood-risk-guidance-for-stakeholders.pdf> (Accessed January 2019).

- 7.5.9 The anticipated increase in river flow is likely to result in increased sediment input to the estuary. The larger tidal prism and river flows will increase flow speeds on both flood and ebb tides which could result in increased mobilisation of finer sediment. These changes are not themselves anticipated to be affected by the proposed marine works.
- 7.5.10 Climate change will result in changes to the hydrodynamics and sediment transport regime; however, these parameters are already subject to a high degree of natural variability. The associated ecological impacts resulting from such changes are considered separately in **Chapter 10 – Marine Ecology**.

Summary of Receptor Sensitivity / Importance and Consideration in this Assessment

- 7.5.11 **Table 7.7** below summarises the receptors that have been considered in this assessment. The importance and sensitivity of relevant receptors under the current and likely future baseline scenarios has been determined with reference to the criteria listed in **Table 7.1**.

Table 7.7 - Assessed Importance and Sensitivity of Marine Geomorphology Receptors

Receptor	Importance	Sensitivity	Future Sensitivity/Importance
Hydrodynamics (flow regime)	Low to moderate importance: The adjacent intertidal is designated of national importance (intertidal); however, the intertidal and subtidal is highly modified through bank protection works and maintenance dredging. The navigation channel is considered to be of local to regional importance but is tolerable to change to a large extent.	The flow regime is highly tolerant to change through natural variability of tidal, fluvial and meteorological processes and, therefore, considered to have a low sensitivity to changes.	The importance and sensitivity of each identified receptor is not expected to change between the current and future baseline scenarios.
Sediment transport regime	Low to moderate importance: The adjacent intertidal is designated of national importance (intertidal); however, the intertidal and subtidal is highly modified through bank protection works and maintenance dredging. The navigation channel is considered to be of local to regional importance but is tolerable to change to a large extent.	The sediment transport regime is highly tolerant to change through natural variability of tidal, fluvial and meteorological processes and, therefore, considered to have a low sensitivity to changes.	
Water quality	High importance: Species of conservation importance use the water course, including some fish species of commercial importance.	Water quality is considered to have a moderate sensitivity to change through reductions in dissolved oxygen concentration and introductions of contaminants, both directly in terms of changes to water quality conditions and indirectly through implications to other receptors (e.g. marine ecological receptors – fish, marine mammals, etc.).	

7.6 Embedded Mitigation

- 7.6.1 As detailed in **Chapter 3 – The Proposed Development**, a number of design features and embedded mitigation measures have been incorporated into the design and construction of the proposed development which will avoid, prevent or minimise significant adverse environmental effects and to enhance beneficial effects.
- 7.6.2 As above, the implementation of the proposed remediation works are considered to form an integral part of the likely future baseline scenario. The works will need to have been completed to the extent necessary to demonstrate that the specific land where construction activities are proposed (for the proposed development) has been made suitable for the future intended use, prior to the commencement of such activities. In consequence, whilst the proposed remediation works are not strictly a form of embedded mitigation in respect of the proposed development itself, they can effectively be considered as such for the purposes of assessing likely significant effects from the implementation of the proposed development, including on marine geomorphological receptors.
- 7.6.3 Embedded mitigation measures of relevance to this assessment are detailed below.

Construction Phase

- Implementation of and adherence to a Construction Environmental Management Plan (CEMP) including a Pollution Prevention Plan (PPP) and Controlled Activities Regulations (CAR) Licence. Of relevance to the protection of hydrological interests, this will include matters relating to dust and silt control, oils, fuels and materials storage, pollution prevention and control, and the protection of hydrological receptors. The CEMP will include standard measures and procedures to manage sources of potential pollution such that no pollution would be capable of reaching the water environment. This will be through suitable site management practises using containment systems and suitable treatment or settlement facilities; and,
- Use of a construction phase SuDS to ensure no detriment to water quality arises from surface water discharges during the construction phase of the proposed development. Further details regarding proposed SuDS are provided in **Chapter 8 – Hydrology and Flood Risk**.

Operational Phase

- The footprint of the marine works has been minimised as far as is possible. In particular, the alignment of the jetty has been designed to mirror as closely as possible that of the existing structure; and
 - The potential for accidental spillages (from land and vessels) will be Negligible during the operation phase by following established industry guidance and protocols (e.g. bunding of fuel stores).
 - Foul discharges to the River Clyde in accordance with WAT-RM-03;
 - Provision of adequate compensatory flood storage on suitable land within the wider Carless landholding (under the control of the Applicant), with the required volume and storage characteristics to be determined through the impact assessment presented in Chapter 8 – Hydrology and Flood Risk;
 - Surface water runoff control – Permanent SuDS to be managed in accordance with a PPP and CAR licence; and,
 - The surface water drainage scheme for the site will be designed using SuDS principles such that a level of treatment will be provided prior to discharge of surface waters to the River Clyde.
- 7.6.4 West Dunbartonshire Council have confirmed that the surface water discharge to the River Clyde does not require to be attenuated due to the magnitude of this waterbody at this location. If required, further mitigation and enhancement measures identified through the EIA process are

detailed in **Section 7.8** below before likely residual effects from the proposed development are then stated in **Section 7.9**.

7.7 Assessment of Likely Effects

- 7.7.1 This section presents an assessment of the likely effects of the construction and operation of the proposed marine works element of the proposed development on marine geomorphology receptors. In doing so, the assessment considers the following key impact pathways for likely direct and indirect effects:
- Changes in water quality due to the release of contaminants (including oil) during construction;
 - Potential changes to dissolved oxygen in the water column during construction;
 - The effects of the piled structure on hydrodynamics (flow speeds) during operation; and,
 - The resulting effects of any changes in the flow regime on local sediment transport processes (erosion and deposition) during operation.
- 7.7.2 As noted in **Section 7.3**, this assessment focuses on likely effects from the construction and operation of the proposed marine works only. Potential effects resulting from the introduction or release of contaminants to the marine environment from the wider proposed development are instead considered elsewhere in **Chapter 6 – Ground Conditions**.

Construction Phase

Potential changes to dissolved oxygen in the water column

- 7.7.3 The increase in chemical and biological oxygen demand associated with elevated suspended sediment concentrations in the water column can have the potential to reduce dissolved oxygen concentrations (LaSalle, 1990). This effect is primarily associated with organic rich material, such as peat or alluvium. However, the sediment type underlying the area of the proposed marine works is likely to be relatively coarse with low organic content (including consideration of the two intertidal samples collected in October 2017; see **Table 7.3**) and, therefore, the potential effects on dissolved oxygen are likely to be minimal. Dissolved oxygen is at moderate status for the Clyde Estuary - Inner (inc Cart) transitional water body (2017 classification), but it is considered unlikely that the short-term increases in suspended sediment concentration would significantly influence these levels.
- 7.7.4 While increases in SSC are anticipated as a result of the proposed marine works, these will be localised, short-term and within background variability. Sensitivity to changes in dissolved oxygen is considered to be high, particularly given the importance of water quality conditions to marine ecology receptors. However, the magnitude of effects is considered negligible, resulting in an overall significance of **Negligible to Minor**.

Changes in water quality due to the release of contaminants

- 7.7.5 In the absence of formal sediment EQS values, sediment contamination concentrations have been compared to Marine Scotland's Revised Action Levels (Marine Scotland, 2017), used to determine the suitability of material for disposal in the marine environment (it is important to note that sediment is not being disposed as part of the proposed marine works, but these thresholds provide context with regards to disturbance of contaminated sediment). As shown in **Table 7.6**, a number of sediment samples collected historically in the vicinity of the proposed marine works suggested elevated PAH concentrations (above AL1; there is no AL2 for PAHs). It is therefore assumed that sediment quality in the area of the proposed marine works will be poor, reflecting the high levels of hydrocarbon contamination observed during the Intertidal Phase 1 Habitat Survey in October 2017.
- 7.7.6 The proposed marine works have the potential to disturb and release contaminated sediments into the water column. However, the nature of the proposed construction works (site clearance, piling etc.) are only considered to cause relatively limited seabed sediment disturbance. In addition, oil and other contaminants that are released into the water column would be expected to be dispersed and diluted by the hydrodynamic conditions in the area. Nevertheless, the

overall level of oil-based sediment contamination is considered to be high and even a small amount of seabed sediment disturbance is likely to cause localised elevated oil contaminant levels in the water column and on the water's surface. The potential for unexploded ordnance to be encountered within the footprint of the proposed marine works during the construction phase also cannot be discounted at this stage. Further mitigation is therefore identified in **Section 7.8** below to address these likely environmental effects and risks.

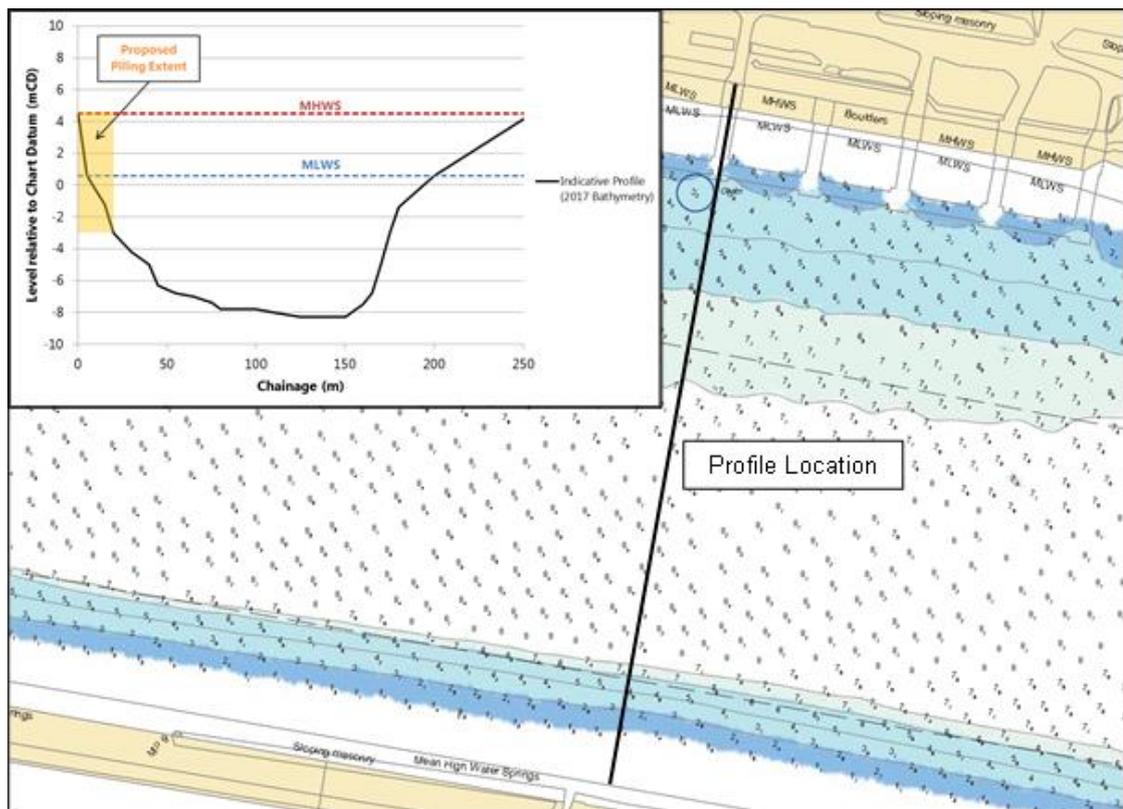
- 7.7.7 Based on these factors, the magnitude of change in water quality is considered to be medium, with a high probability of occurrence, leading to a medium exposure to change. With a moderate sensitivity of features to change, being an already contaminated environment, this leads to a moderate vulnerability. Therefore, given the importance is considered to be high, the impact is considered to be **Moderate**.

Operational Phase

Changes in hydrodynamics (flow speeds)

- 7.7.8 Potential effects of the proposed marine works on local hydrodynamics would occur through the installation of additional/new piles into the seabed, potentially altering flow speeds around the new structure. The existing quayside consists of six steel frame/concrete pile structures providing a partial blockage of both flood and ebb tidal flows to depths of approximately 3 mCD. The proposed insertion of 40 steel tubular piles, 30 of which will be 762 mm diameter and 10 of which will be 559 mm diameter, spread uniformly throughout the area of the existing quayside structures, will result in a direct footprint of *circa* 16 m² from the intertidal and subtidal to a depth of approximately 3 mCD. This area is within the existing footprint of the present quayside.
- 7.7.9 **Image 7.5** shows the proportion of total cross-sectional area (schematised from 2017 bathymetric surveys; Peel Ports Group, 2017) of the piling extent within the estuary channel. The additional obstruction to flow from the new piles within the original jetty footprint equates to less than 0.5% of the channel cross-sectional area at MHWS (Rothesay Dock).
- 7.7.10 The pile matrix will be orientated perpendicular to existing channel flows and provide a small increase in blockage, particularly on the flood tide (on the ebb tide the flow will already be partially blocked by the existing jetty structure). Flow will be diverted around each pile creating marginally greater disturbance than present under the jetty and the potential for small scale scour around each pile. The overall scale of the blockage will have only a very small to negligible effect close to the structure and no measurable effect on the main channel flows.
- 7.7.11 The maximum flow speed in this area is considered to be 1 m/s at peak spring tides. Using a worst-case scenario, the 0.5% loss in channel area would cause a negligible change (less than 0.01 m/s) in main channel flows.
- 7.7.12 Flow speeds will be marginally decreased overall from the baseline in the lee of the piling extent on both the flood and ebb tides, but will have a more turbulent character. However, the spatial extent of this reduction in flow speed will be small, extending no more than 20-30 m up and down the estuary.
- 7.7.13 The potential effects to flow speeds noted above represents a worst-case scenario, whereby for much of the tidal cycle any changes will be smaller in spatial scale and magnitude. As such, the significance of impacts to hydrodynamics is considered to be **Negligible**.

Image 7.5: Schematisation of the extent of proposed works in relation to the existing river channel cross-section



Changes in sediment transport regime

- 7.7.14 The rate of potential sediment transport is likely to be marginally higher than the existing baseline due to the enhanced flow turbulence within the pile matrix and initial scour around the piles. This is likely to initiate marginally higher suspended sediment concentrations comprised of the finer silt/clay material in the vicinity of the existing structure. Established sediment transport formulae (Soulsby, 1997; van Rijn, 1993; 2012) suggest that the baseline conditions (maximum flow speeds of 1 m/s) have the potential to mobilise material less than 1.4 mm. This means that material of coarse sand, gravels or larger are not mobilised even under peak spring tide flows and mobility is limited to the finer silts and muds.
- 7.7.15 When peak flow speeds increase to 1.01 m/s along the southern face of the proposed marine works, the resulting material which could be mobilised remains less than 1.4 mm. The increase in flow speed, therefore, would exert negligible difference on the sediment transport processes for the coarser gravel material, whilst finer silts/clays will remain mobile in line with the natural variability of the existing processes at the site.
- 7.7.16 The eastward extent of the Inner Clyde SSSI, designated for its intertidal habitat, is adjacent to the piling extent of the proposed marine works. The changes in hydrodynamics in the lee of the structure through the potential formation of back-eddies down-stream of the piling (up to *circa* 20-30 m) could marginally increase the potential for accretion of fine sediments in this region. This would relatively quickly create a new equilibrium level muddy foreshore, potentially a few millimetres higher than present.
- 7.7.17 The scale of effects would be limited in spatial extent and the intertidal is already highly modified in this location. As such, the magnitude of change is negligible and the significance of impacts to the sediment transport regime is considered to be **Negligible**.

7.8 Further Mitigation and Enhancement

Construction Phase

Changes in water quality due to the release of contaminants

- 7.8.1 The assessment provided in **Section 7.7** indicates that in the absence of any further mitigation, the construction phase of the proposed marine works is likely to result in a **Moderate Adverse** effect on water quality due to the disturbance and release of hydrocarbon contaminants from riverbed sediments. The potential for unexploded ordnance to be encountered within the footprint of the proposed marine works during the construction phase also cannot be discounted at this stage. As detailed below, further mitigation measures are therefore proposed to minimise the avoidance of likely significant adverse effects, comprising:
- A site investigation (SI) will be undertaken within the footprint of the proposed marine works (limited to 2,400m² in accordance with the Marine Works EIA Screening Opinion), for both geo-technical and geo-environmental purposes. Following this, any remediation works necessary to reduce levels of sediment contamination, limit contamination dispersal into the water column and to make the area suitable for future intended use (as a heavy lift quay) will be implemented and verified as the first stage of the proposed marine works (i.e. prior to construction), as detailed within the **submitted Heavy lift Quay Construction Sequence Document**. Conditions requiring the undertaking of this SI and any necessary subsequent remediation works are therefore expected to be attached to any planning permission and marine licence granted for the proposed development; and,
 - Specialist risk assessments will be undertaken prior to the construction of the proposed marine works to determine whether a properly trained and equipped unexploded ordnance (UXO) specialist is required to attend the site and supervise the works.

Operational Phase

- 7.8.2 As likely operational effects have all been assessed as **Negligible Adverse**, no further operational phase mitigation measures are required.

7.9 Residual Effects

- 7.9.1 Changes in water quality during construction were assessed as **Moderate Adverse**. However, with the adoption of the further mitigation measures outlined in **Section 7.8**, likely residual effects for this pathway would reduce to **Minor Adverse**. All other pathways have been assessed as **Negligible to Minor Adverse** and not requiring further mitigation.
- 7.9.2 Taking account of proposed mitigation and enhancement measures, the likely residual effects from the construction and operation of the proposed marine works are identified in **Table 7.9** below.

Table 7.8 – Summary of Likely Residual Effects

Development Phase	Potential Impact Pathway	Pre-Mitigation Effect Level	Mitigation / Monitoring	Residual Effect Level	Residual Effect Significance	Confidence
Construction	Changes in water quality due to the release of contaminants (including oil)	Moderate Adverse	Marine SI, remediation works and unexploded ordnance risk assessment	Minor Adverse	Not significant	Moderate: Some baseline data available and potential effects are generally well understood
	Potential changes to dissolved oxygen in the water column	Negligible to Minor Adverse	No mitigation or monitoring required	Negligible to Minor Adverse	Not significant	High: Baseline conditions and potential impacts on benthic receptors are generally well understood
Operation	The effects of the piling extent on hydrodynamics (flow speeds)	Minor Adverse	No mitigation or monitoring required	Minor Adverse	Not significant	High: Baseline conditions and potential impacts on benthic receptors are generally well understood
	The resulting effects of any changes in the flow regime on local sediment transport processes (erosion and deposition)	Minor Adverse	No mitigation or monitoring required	Minor Adverse	Not significant	High: Baseline conditions and potential impacts on benthic receptors are generally well understood

7.10 Monitoring

- 7.10.1 No monitoring is considered to be proportionate or required specifically in relation to the predicted residual (not significant) effects of the construction and operation of the proposed marine works element of the proposed development.
- 7.10.2 More widely, the Applicant has already committed to undertaking monitoring of boreholes at the periphery of the terrestrial site (and on the wider Carless landholding) through planning application DC18/245 for the proposed remediation works. Boreholes in these locations will continue to be monitored to confirm the absence of hydrocarbon free product migrating to the River Clyde. It is provisionally envisaged that monitoring will take place every 2 months for 2 years with the ongoing frequency and duration to be evaluated at that stage as required.
- 7.10.3 In the event that the hanging wall barrier forming part of the proposed remediation works needs to be installed, new monitoring and extraction boreholes are likely to be required on the northern land-side. Extraction boreholes will be necessary to remove free product trapped by the barrier. Wells and pumps will require operation and maintenance. It is provisionally envisaged that monitoring, extraction and maintenance will take place every 2 months for 2 years with the ongoing frequency and duration to be evaluated at that stage as required.

7.11 Cumulative Effects

Construction Phase

- 7.11.1 Relevant cumulative developments listed in **Section 2.4** were reviewed to identify potential interactions with the construction and/or operation of the proposed development which could result in likely significant environmental effects within the scope of this assessment. Of particular relevance to this assessment are the following marine projects which have the potential to impact of marine ecology receptors (assessed further in **Chapter 10 – Marine Ecology**):
- Clyde Waterfront Renfrew Riverside (CWRR) development: Planning consent was granted for the development in November 2018 with construction expected to start at the end of 2019. The waterfront regeneration project includes the construction of a bridge crossing the river. Marine works for the bridge element of the project include channel piling and dredging for a layby berthing structure (The Glasgow City Region City Deal, 2018).
 - Dumbarton Waterfront: Proposed housing developments including a seawall upgrade at the Sandpoint Marina site and works to stabilise the basin and harbour walls at Castle Street.
 - Esso Bowling and Scott's Yard: Redevelopment of the area to increase business and industry opportunities. This includes works under planning application XX (for voluntary remediation works) to reinforce the Clyde riverbank.
- 7.11.2 In combination with the relevant cumulative developments highlighted above, the construction phase of the proposed development has the potential to generate cumulative effects on water and sediment quality. Effects on other receptors have not been considered further given the nature and scale of the proposed marine works and the relevant cumulative developments.
- 7.11.3 Changes in water quality could occur as a result of construction activity (piling and dredging) for the CWRR river crossing and any potential marine works at the Dumbarton Waterfront, Esso Bowling and Scott's Yard sites. This would be due to the release of sediment bound contaminants and elevated suspended sediment concentrations during construction activities in or adjacent to the marine environment. However, by adhering to best practice and site-specific mitigation during construction, potential impacts from these cumulative developments are expected to be minimised. Furthermore, each relevant cumulative development will need to satisfy relevant legislative and policy requirements, including the requirement under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 as amended for developments discharging to the water environment to incorporate appropriate SuDS. Taking account of this embedded cumulative mitigation, likely short term cumulative effects on water quality as a result of the Carless proposed marine works in combination with other relevant cumulative developments have been assessed as **Minor Adverse** at worst.

Operation Phase

7.11.4 No operational phase cumulative impacts have been identified.

7.12 Summary

7.12.1 This chapter of the EIA Report provides an assessment of the likely significant effects from the proposed development on marine geomorphology, including consideration of water and sediment quality.

7.12.2 To facilitate the marine geomorphology impact assessment process, a standard analysis methodology has been applied. This methodology has been developed from a range of sources, including the Town and Country Planning (EIA) Regulations 2017, Marine Works (EIA) (Scotland) Regulations 2017, the new EIA Directive (2014/52/EU), statutory guidance, consultations and ABPmer's previous (extensive) EIA project experience.

Baseline Conditions

7.12.3 Heavy modification of the Clyde Estuary from human activity has occurred over the last 250 years. Downstream from Glasgow City Centre, the present banks of the river are formed by a variety of quay walls, wharves, revetments and slipways which date to previous and current industrial activity. Depths are regularly maintained to a minimum of 7.5 mCD in the navigation channel. The average annual maintenance dredging commitment of the River Clyde in the 1990's was *circa* 272,000 m³. The Clyde Estuary can be classed as mesotidal (2-4 m range). Peak flow speeds generally reach a maximum of *circa* 1 m/s during spring tides and *circa* 0.5 m/s during neap tides in the local area.

7.12.4 The Glasgow area has been significantly affected by its industrial past. Subsurface coal mining, shipbuilding, chemical and engineering industries have all left their mark in the catchment of the River Clyde. The proposed marine works are located within the Clyde Estuary - Inner (inc Cart) transitional water body, a heavily modified water body (HMWB) which is currently (2017) has an overall moderate status. Parameters currently failing to achieve (at least) good status include dissolved oxygen (moderate), chromium (fail) and morphology (poor). Sediment quality in the vicinity of the proposed marine works is considered to be poor, with significant hydrocarbon contamination present.

Assessment of Likely Effects

7.12.5 The key impact pathways on marine geomorphology receptors during construction relate to potential water quality changes as a result of the release of sediment contaminants. Water quality effects were assessed as Moderate given that overall levels of sediment contamination (particularly hydrocarbons) is considered to be high and even a small amount of seabed sediment disturbance is likely to cause a localised elevation in oil contamination. Potential reductions in dissolved oxygen concentration, due to the generation of any small suspended sediment plume during piling, were assessed as Negligible to Minor as these changes will be small-scale and highly localised.

7.12.6 The key impact pathways on marine geomorphology receptors during operation relate to hydrodynamics (flow rate) and the sediment transport regime. The effects are anticipated to be of limited spatial extent, with both pathways assessed as Minor.

Mitigation and Enhancement

7.12.7 To reduce potential water quality impacts to sensitive receptors, a marine site investigation and subsequent remediation works, together with an unexploded ordnance risk assessment, will be undertaken prior to the construction of the proposed marine works.

Residual Effects

7.12.8 Changes in water quality during construction were assessed as Moderate. However, with the mitigation measures outlined above, residual impacts for this pathway have been assessed as Minor. All other pathways were assessed as Negligible to Minor and not requiring mitigation.

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8 Hydrology and Flood Risk

8.1 Introduction

- 8.1.1 This chapter of the EIA Report provides an assessment of the likely significant effects from the proposed development on hydrology, flood risk and drainage. The assessment covers a range of topics including fluvial hydrology, surface water, water quality, drainage and water supply. The assessment is based on the characteristics of the site and surrounding area and the key parameters of the proposed development detailed in **Chapter 2 – Site and Surrounding Area** and **Chapter 3 – The Proposed Development** respectively.
- 8.1.2 This chapter has been prepared by PBA. In accordance with Regulation 5(5)(b) of the EIA Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this EIA Report chapter is provided in **Appendix 1.1**.
- 8.1.3 The aims of this chapter are to:
- Identify the relevant context in which the assessment of the likely significant effects on hydrology and flood risk has been undertaken;
 - Describe the methods used to undertake the assessment;
 - Outline the relevant baseline conditions currently existing at the site and surroundings;
 - Consider how the implementation of the proposed remediation works would affect current baseline conditions, resulting in a likely future baseline scenario;
 - Identify the likely direct and indirect effects of the proposed development on the water environment under the likely future baseline scenario;
 - Identify mitigation and enhancement measures where required to address likely effects;
 - Assess likely residual effects, and,
 - Assess likely cumulative effects on the water environment from the proposed development in combination with other relevant cumulative developments.
- 8.1.4 This chapter is supported by the following figures and technical reports provided in **Appendices 8.1 - 8.3**:
- **Appendix 8.1 – Figures**;
 - **Appendix 8.2 – Stage 3 Flood Risk Assessment Report** (including Hydrological and Hydraulic Modelling Report); and,
 - **Appendix 8.3 – Drainage and SuDS Strategy**.

8.2 Policy Context, Legislation, Guidance and Standards

Legislation

- 8.2.1 The overarching legislative framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Subject specific legislation of relevance to this assessment is:
- Water Environment and Water Services (Scotland) Act 2003 (WEWS Act);
 - Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR);
 - Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2013;
 - Water Environment (Miscellaneous) (Scotland) Regulations 2017
 - Flood Risk Management (Scotland) Act 2009;
 - Water Environment (Oil Storage) (Scotland) Regulations 2006;
 - Water Environment (Groundwater and Priority Substances) (Scotland) Regulations 2009;

- The Private Water Supplies (Scotland) Regulations 2006, and
 - Water Services etc. (Scotland) Act 2005.
- 8.2.2 All activities with potential to impact on the water environment require to be authorised under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR). The level of authorisation required is dependent on the anticipated environmental risk posed by the activity to be carried out. Liaison with SEPA operations team will be undertaken at an early stage to further confirm this. These activities could include construction drainage, dewatering, storage of liquids and disposal of surface water and treated wastewater.
- 8.2.3 Revised levels of authorisation, including amendments to the General Binding Rules (GBR), came into effect on January 1st, 2018. These include the need for CAR authorisation for drainage of construction sites over four hectares in size, as well as a change to the size of development that will require authorisation for the permanent surface water drainage. The below summarises the requirements of these regulations.
- 8.2.4 For the construction of Sustainable Drainage Systems (SuDS) associated with a site of this size, a complex CAR licence will be required, as detailed in the CAR Practical Guide (SEPA, 2018) which includes the submission of a Pollution Prevention Plan as outlined in SEPA's publication Supporting Guidance (WAT-SG-75) Sector Specific Guidance: Construction Sites.

Policy

- 8.2.5 The planning policy framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Planning policy considerations of specific relevance to this assessment are:
- 8.2.6 Planning policy considerations of specific relevance to this assessment are:
- **Adopted West Dunbartonshire Local Plan (2010)**, in particular policies:
 - F1 – Flood Prevention;
 - F2 – Waste Water, Sustainable Urban Drainage, Drainage Impact Assessment and Culverts; and,
 - F3 – Standards of Flood Protection.
 - **West Dunbartonshire LDP Proposed Plan 2015**, in particular proposed policies:
 - GN6 – The Water Environment; and,
 - DS6 – Flooding.
 - **West Dunbartonshire LDP2 Proposed Plan (2018)**, in particular proposed policies:
 - ENV5 - Water Environment;
 - ENV6 – Flooding; and,
 - ENV10 - Implementation of the SEA Environmental Report.
 - **Scottish Planning Policy (2014)** including relevant provisions outlined in **Chapter 5**, in particular:
 - Principal Policy on Sustainability (paragraphs 24-35);
 - Valuing the Natural Environment Subject Policy (Paragraphs 193 - 233); and,
 - Managing Flood Risk & Drainage Subject Policy (Paragraphs 254-268).
 - **SEPA's Development Management Guidance: Flood Risk (2017)**;
 - **Scottish Government Online Planning Advice regarding Flood Risk (2015)**;
 - **Scottish Government Planning Advice Note (PAN) 61 Planning and Sustainable Urban Drainage Systems (July 2001)**; and,
 - **Scottish Government PAN 79 Water and Drainage (September 2006)**.

8.2.7 In accordance with sections 15 and 58 of the Marine and Coastal Access Act (2009), the marine licence application for the extent of the proposed development located below MHWS must be determined in accordance with the appropriate marine policy documents, unless relevant considerations indicate otherwise. As detailed in Chapter 5 – Legislative and Policy Context, the relevant marine policy documents and constituent comprise:

- UK Marine Policy Statement (2011);
- Scotland's National Marine Plan (2015), in particular policies:
 - GEN1 - General Planning Principle;
 - GEN5- Climate Change;
 - GEN8- Coastal Process and Flooding;
 - GEN12- Water Quality and Resource;
 - GEN19- Sound Evidence;
 - GEN21- Cumulative Impacts; and
 - WILD FISH 1 – Diadromous Species.

8.2.8 Other policy considerations of relevance to this assessment are:

- The River Basin Management Plan (RBMP) for the Scotland River Basin District: 2015–2027 (Scottish Government, 2014).

Guidance and Relevant Technical Standards

8.2.9 The following guidance and technical standards have informed this assessment:

- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended): A Practical Guide (SEPA);
- Masters-Williams, H., Heap, A., Kitts, H., Greenshaw, L., Davis, S., Fisher, P., Owens, D. (2001). Control of water pollution from construction sites. Guidance for consultants and contractors (C532). London: CIRIA;
- SEPA (2006) Guidelines for Water Pollution Prevention from Civil Engineering Contracts;
- SEPA (Various). Guidance for Pollution Prevention including PPG 1, 3, and 6 and GPP2, 5 and 21;
- SEPA (2009). Engineering in the water environment good practice guide; Temporary construction methods;
- SEPA (2014). Land Use Planning System SEPA Guidance Note 31; Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems;
- SEPA (2015). Technical flood risk guidance for stakeholders;
- SEPA (2017). Flood Risk and Land Use Vulnerability Guidance;
- SEPA (2016). Supporting Guidance; General binding rules for surface water drainage systems (No. WAT-SG-12);
- SEPA (2016). Regulatory method; Sustainable Urban Drainage Systems (SuDS or SuD Systems) (No.WAT-RM-08);
- SEPA (2010). Good Practice Guide – River Crossings (No. WAT-SG-25);
- SNH (2013). Environmental Assessment Handbook;
- CIRIA C624. Development and Flood Risk – Guidance for the Construction Industry
- CIRIA C753. The SUDS Manual: Woods Ballard, B. (2015)., and
- SEPA (2016). Regulatory Method; Sewage Discharges to Surface Waters (No. WAT-RM-03).

8.3 Methodology

Overview

Assessment Scope

- 8.3.1 This EIA Report chapter presents an assessment of likely significant effects on the water environment from the proposed development. The assessment presented in this EIA Report chapter has been prepared in accordance with the EIA Regulations.
- 8.3.2 The principal aspects considered within this assessment are likely effects from the construction and operation of the proposed development on flood risk and surface water drainage. Of note, likely effects on water quality and ground water from potential contamination sources, as opposed to sedimentation from during construction activities, are assessed separately within **Chapters 9 – Ground Conditions**.
- 8.3.3 In accordance with the Carless Marine Fabrication Complex EIA Scoping Report and subsequent EIA Scoping Opinion provided in **Appendix 4.1**, the following effects have been scoped out of detailed consideration within the assessment:
- Potential effects on existing drainage infrastructure or water mains;
 - Detailed assessment of groundwater, pluvial and reservoir flood risks¹⁵; and,
 - Hydraulic modelling of the Auchentoshan Burn.
- 8.3.4 Potential effects on groundwater, marine ecology and marine geomorphology have been scoped out of this assessment, as they are addressed elsewhere in the assessments provided in **Chapters 6 – Ground Conditions, 7 – Marine Geomorphology and 10 – Marine Ecology**. An assessment of the implications of the proposed development for the objectives of the Water Framework Directive (WFD) and the Scotland District RBMP is provided separately within the submitted **WFD Assessment**.

Assessment Process

- 8.3.5 In undertaking the assessment presented in this EIA Report Chapter, the following activities have been carried out:
- EIA Screening and Scoping (see below);
 - Desk based review of available information, including previous studies, topographical survey, SEPA Flood Maps, Scottish Water asset plans, surface water drainage features;
 - A walkover survey of the site;
 - Evaluation of current baseline water environment conditions (**Section 8.4**);
 - Consideration of the effect of the implementation of the proposed remediation works upon current site conditions, resulting in a future baseline scenario (**Section 8.5**);
 - Development of a Flood Risk Assessment (FRA) including a Hydrological and Hydraulic Modelling Report, which is presented in **Appendix 8.2**;
 - Development of a SuDS and Drainage strategy for the proposed development, which is presented in **Appendix 8.3**, and
 - Identification and assessment of residual likely significant effects, taking into account proposed mitigation and enhancement measures and including consideration of likely cumulative effects (**Sections 8.6 – 8.11**).

¹⁵ Although the SEPA Reservoir Map indicates that an area approximately 450m south-east of the site is within a reservoir flooding extent (Greenside and Jaw Reservoir), it is noted that the map does not give any indication of the likelihood of breach occurring. Although the consequences of reservoir breach can be severe, it should be emphasised that the likelihood of reservoir flooding is very small, and all large reservoirs are inspected and supervised by Panel Engineers. On this basis, no significant effects from reservoir flooding are considered likely and no detailed assessment of such flood risks is proposed.

Consultation

- 8.3.6 This assessment has been informed by an EIA Scoping Report (PBA, October 2017) and subsequent EIA Scoping Opinion issued by WDC (March 2018) in respect of the EIA for the proposed development. The EIA Scoping Opinion, which is provided in full in **Appendix 4.1**, included a list of standard requirements for consideration in this chapter. However, the following should be noted:
- SEPA request:
 - Flood risk information is to be provided to demonstrate that the development would not have a detrimental impact on flood risk from all sources. Whilst flood risk effects from existing drainage, groundwater sources, pluvial sources and reservoirs can be scoped out of the EIA, flood risk from all sources must still be considered in any flood risk assessment to comply with SPP;
 - Further assessment of tidal flood risks to the site and adjacent land will be required;
 - Updated datasets and increased siltation levels in the Lower Clyde should be considered;
 - Information would need to be provided demonstrating that any land raising would have a neutral or better impact on flood risks out with the raised area, taking account of any proposed compensatory storage;
 - Sufficient information is provided to characterise potential risks to the water environment and identify pollution prevention measures to address these risks;
 - Provide sufficient details regarding proposed SuDS, including construction phase;
 - Provide sufficient details for wastewater provision and disposal;
 - A site survey should be provided including photographs and dimensional details of existing water features relative to the location of all proposed engineering activities in the water environment, supported by details of mitigation measures, and
 - Confirmation of any groundwater abstractions.
 - Scottish Water request:
 - All their assets are identified and considered within the assessment, and
 - Adoption of a list of precautionary methods when working in proximity to their assets including consultation with them on a site-specific Construction Method Statement.
- 8.3.7 The above requests for information have been addressed through this assessment and associated technical appendices.
- 8.3.8 Following the adoption of the EIA Scoping Opinion by WDC, additional consultation has been undertaken with:
- Scottish Canals regarding potential overtopping and breach risks of the Forth and Clyde Canal some 40m east of the development site, to confirm current position and risk.

Study Area

- 8.3.9 The Study Area adopted for the assessment of likely effects on the water environment is generally consistent with the site boundary, as shown in **Figure 2.1 – Site Location Plan**. However:
- The Hydrological and Hydraulic Modelling Study incorporated within **Appendix 8.2 -FRA** extends for National Grid Reference (NGR) NS494696 at Clydebank to NS273790 at Greenock, covering a reach of the River Clyde approximately 23km in length, and includes an inflow from the River Leven, a major tributary in this reach; and,
 - The Study Area for the drainage strategy extends to include Scottish Water sewer network infrastructure, as shown in **Appendix 8.3 – SuDS and Drainage Strategy**.

Information Sources

Desk Top Study

8.3.10 The assessment presented in this chapter has been informed by an FRA and SuDS and Drainage Strategy, presented as **Appendices 8.2** and **8.3** respectively. In turn, these technical studies have been based on the following sources of flood risk information:

- Ordnance Survey (OS) 1:10,000 & 1: 25,000 digital mapping;
- Topographical survey of the Proposed Development site;
- British Geological Survey (BGS) 1:50,000 digital map data;
- British Geological Survey (BGS) User Guide: Aquifer Productivity (Scotland) GIS datasets, Version 2;
- Digital soil maps published by the Scottish Government and James Hutton Institute;
- Aerial photography of the site;
- Catchment extents and characteristics from the Flood Estimation Handbook (FEH) website (CEH, 2017);
- The online SEPA River Basin Management Plan Interactive Map and Flood Map;
- The River Clyde Flood Management Study (2005);
- SEPA Annual Maximum (AMAX) data at the Blairston, Daldowie and Linnbrane gauges;
- HiFlows datasets
- SEPA 15-minute flow data at Blairston;
- Multibeam bathymetric survey undertaken by Aspect Land and Hydrographic Surveys Ltd in 2016, and,
- Scottish Water asset plans.

Fieldwork and Modelling

8.3.11 Site walkovers were undertaken 2016/17 to facilitate an understanding of the baseline water environment and geometric characteristics, general landform of the site and surrounds, to define the scope/ specifications of technical assessments/ surveys. A photographic record of watercourses taken at the time of this walkover is presented in **Figures 8.1 – 8.5**.

Approach to Assessment

Consideration of Relevant Receptors

8.3.12 Based on the information sources outlined above, current (2018) and likely future baseline characteristics of site and the surrounding area were confirmed. This led to the identification of relevant sensitive receptors to consider within the assessment, as detailed within **Section 8.4 – Current Baseline Conditions**.

8.3.13 Receptor sensitivity was defined based on the capacity of the receptor to accommodate change without fundamentally altering its character. The definitions provided in **Error! Reference source not found**. consider the quality of the receptor, its purpose and the potential for substitution or replacement.

Table 8.1 – Criteria for Assessing Receptor Sensitivity

Sensitivity	Criteria	Typical Example
High	Receptor has a high quality and rarity on a local scale	<ul style="list-style-type: none"> ▪ Receiving watercourse classified as Good Ecological status/potential under WFD Species protected under EU or UK wildlife legislation. ▪ SEPA Land Use Vulnerability Classification 'Most Vulnerable'.

Sensitivity	Criteria	Typical Example
Medium	Attribute has a medium quality and rarity on a local scale	<ul style="list-style-type: none"> Receiving watercourse classified as Moderate Ecological status/potential under WFD. SEPA Land Use Vulnerability Classification 'Highly Vulnerable'.
Low	Attribute has a low quality and rarity on a local scale	<ul style="list-style-type: none"> Receiving watercourse classified as Poor Ecological status/potential under WFD. SEPA Land Use Vulnerability Classification 'Less Vulnerable'.
Negligible	Attribute has a barely perceptible or no quality/rarity on a local scale	<ul style="list-style-type: none"> SEPA Land Use Vulnerability Classification 'Water Compatible'.

Impact Assessment Methodology

8.3.14 **Appendix 8.2 - FRA** provides an assessment of the different types of flooding to the site and considers whether the proposed development would increase flood risk elsewhere. This is supplemented by a Flood Risk Assessment letter provided by Scottish Canals in respect of the Forth and Clyde Canal. **Appendix 8.3 – SuDS and Drainage Strategy** examines existing drainage patterns at the site and considers how waste water and surface water will be managed during the construction and operational phases including the provision of SuDS.

8.3.15 Based on the evidence presented in Appendices 8.2 and 8.3, the likely magnitude of changes in hydrological conditions and flood risk to identified sensitive receptors as a result of the proposed development was determined based on the criteria described in **Table 8.2**. This considered likely effects both to identified receptors within the site and in the immediate vicinity. The description of the magnitude of change is based on professional judgement.

Table 8.2 – Criteria for Assessing Magnitude of change

Magnitude of Change	Criteria	Typical Examples of Changes
High	Large change to receptor in terms of...	<ul style="list-style-type: none"> Water quality to the receiving watercourse; Flood Risk Vulnerability Classification Surface water flood risk; Fluvial flood risk, and Foul drainage volume.
Medium	Moderate change to receptor in terms of...	
Low	Small change to receptor in terms of...	
Negligible	No change or barely perceptible change to receptor in terms of...	

Establishment of Effect Significance

8.3.16 The level of a likely effect was determined taking account of the sensitivity of the affected receptor and the predicted magnitude of change, using the matrix presented in **Table 8.3**. The level of an effect should also be quantified based on the likelihood of an effect occurring (using a scale of certain, likely, or unlikely), the duration of effect and the confidence on the accuracy of the assessment. Temporary effects are considered to occur in the construction phase, the permanent effects in the occupational phase (albeit that the effect may first occur during construction).

8.3.17 Identified receptors assessed as having High or Very High sensitivity to the types of change that may result from the proposed development (as per Table 8.1) were both afforded the highest level of importance in this matrix.

Table 8.3 – Level of Effect and EIA Significance Matrix

Sensitivity	Magnitude of change			
	High	Medium	Low	Negligible
High or Very High	Substantial	Moderate/Substantial	Moderate	Slight
Medium	Moderate/Substantial	Moderate	Slight / Moderate	Slight
Low	Moderate	Slight/Moderate	Slight	Negligible
Negligible	Slight	Slight/Negligible	Negligible	Negligible

8.3.18 Each likely effect from the proposed development was evaluated through the integration of all of the relevant factors, including any relevant proposed mitigation, before likely residual effects were assessed as either significant or not significant (effects at Moderate or above level are considered as likely to be significant in the context of the EIA Regulations).

Approach to Cumulative Impact Assessment

8.3.19 The relevant cumulative developments identified in **Section 2.4** have been considered in combination with the proposed development to identify any likely cumulative effects on flood risk or water quality. The approach to this cumulative assessment, presented in **Section 8.11**, has considered whether each identified cumulative development would be likely to impact upon the water environment, and if so whether this impact is likely to interact with any likely effects from the proposed development.

8.3.20 Owing to the physical separation of all relevant cumulative developments from the site and their lack of hydrological connectivity with drainage from the site, it is judged that there is no potential for significant cumulative hydrology or flood risk effects to arise in combination with the proposed development. In light of this, detailed assessment of cumulative effects has not been undertaken.

Assumptions and Limitations

8.3.21 No substantial information gaps have been identified during the preparation of baseline information or undertaking of the assessment, and it is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant environmental effects on hydrology and flood risk. The assessment is however based on the following assumptions:

- The assessment considers only the potential for likely significant environmental effects to occur and is based on the EIA Scoping Opinion adopted by WDC (Appendix 4.1);
- The assessment is based on a desk based study only. No specific monitoring, field measurements or site investigations have been undertaken as part of this assessment;
- Reliance has been placed on publicly available data obtained from the sources identified above;
- **Appendix 8.2 - FRA** is based on risk, whilst the EIA is based on the likely level and significance of environments effects. These effects have been determined with reference to threshold criteria and taking account of professional judgement;
- The proposed flood risk and surface water management strategies detailed within **Appendix 8.2 – FRA** and **8.3 - SuDS and Drainage Strategy** respectively, including

setting appropriate finished floor levels and compensatory storage are based on the guidance provided by SEPA and CIRIA development and flood risk guidance, and,

- The assessment considers flood risk and surface water drainage only. No assessment of potable water supply, including if there is sufficient volume to accommodate the proposed development, has been undertaken as part of this assessment.

8.4 Current Baseline Conditions

The Site

Topography

- 8.4.1 A topographical survey of the site was undertaken by Malcolm Hughes Surveyors during September 2017 and provides details of physical features at the site with level data to Ordnance Datum.
- 8.4.2 A review of the survey indicates that the existing ground levels within the site generally slope gently south-westerly towards the River Clyde. Existing ground levels within the corners of the development site are of the following magnitude:

North east	6.5m AOD
North west	5.0m AOD
South east	4.8m AOD
South west	4.2m AOD

Existing Flood Defences

- 8.4.3 From the site walkover there is no visible evidence to suggest that the site benefits from formal flood defences. The southern frontage of the site is however characterised by sections of concrete and sheet piled wall and embankments formed of aggregate.

Existing Drainage

- 8.4.4 Site walkover identified extant drainage features within the site, some of which may still convey flows from within the site. The possibility that the extant drainage also conveys flows from outside of the site cannot be ruled out. Where drainage systems remain intact they are likely to be dilapidated or poorly maintained and as such, blockages and localised flooding may occur.
- 8.4.5 Existing road drainage systems would be expected to serve the roads surrounding the site, no records of road drainage have been obtained.
- 8.4.6 A review of Scottish Water public sewer records indicates that there are no public sewers located within the site.
- 8.4.7 Scottish Water records indicate the presence of a combined rising main running through the site in a south-easterly direction, following the north-eastern boundary. The diameter and pipe material are unknown as they are not indicated on Scottish Water's asset plans.

Geology

- 8.4.8 British Geological Survey "Geology of Britain"¹⁶ was consulted to determine the soil types and classifications located within the development. This information can be advantageous to further understand the flood extents and better inform any possible mitigation options.
- 8.4.9 A detailed review of geological and ground conditions at the site and within the surrounding area is provided in **Section 6.4**. In summary:
- The proposed development area comprises of a Lawmuir Formation bedrock, which is a type of bedrock typically found in swamps, estuaries and deltas. These sedimentary rocks

¹⁶ British Geological Survey, available at <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>

are fluvial, palustrine and shallow-marine in origin. The superficial deposits consist of sediment;

- As documented in Appendix 6.1 – Site Investigation Interpretive Report, an extensive Site Investigation (SI) was undertaken by the Applicant in 2018 to inform the design and planning of the proposed remediation works. Of relevance to this assessment, the SI found that:

Made Ground

- Made Ground was encountered in all site investigation locations.
- The thickest Made Ground was recorded in BH106, extending to a depth of 11.5mbgl. BH106 was located within the infilled dock area.
- Made Ground greater than 5m thick was recorded in BH106, 111 and 201 as well as PB boreholes PB02, 04 and 10A, all of which were situated within the western or central areas.
- Most Made Ground was described as granular (i.e. in a matrix of sands or gravels) rather than cohesive (clayey). There was no clear distinction in distribution between granular and cohesive Made Ground deposits, in some cases, both granular and cohesive Made Ground deposits were encountered in the same exploratory hole.

Natural Superficial Deposits

Sands and gravels

- Sands and gravels were typically encountered within shallow superficial deposits, underlying Made Ground (where present) in bands interspersed with clays and silts. Sands were typically described as silty, clayey or gravelly and fine to coarse. Typically, bands of sands and gravels were encountered at depths of between approximately 1.5 – 4m through to 8-15m.
- Where boreholes were in areas of contamination, sands were sometimes described as having hydrocarbon odours associated with them.
- Sands and gravels tended to extend to greater depths towards the southeast, recorded in BH114 to 12.30mbgl and BH116 to 19.80mbgl. There was no evidence of contamination in deeper sands and gravels in the east of the site.

Silts

- Silts were typically encountered within shallow superficial deposits, underlying Made Ground (if present) between depths of approximately 4m to 10mbgl. Typically, silts were described as dark grey / black with fine sand and were present in bands of 1-2m (occasionally thicker). Where boreholes or trial pits were in areas of contamination, shallow silts were sometimes described as having hydrocarbon odour associated with them.
- Deeper bands of silt (approximately 25 – 30mbgl) were picked up in the deep roto-sonic boreholes (e.g. BH123, 124, 201), underlying thick boulder clay. The deep bands of silt were associated with sub-artesian water. There was no visual or olfactory evidence of contamination associated with deep silts.

Clays

- Natural clays were encountered across the site in bands within the shallow superficial deposits of sands, silts, gravels and cobbles at depths of less than 10mbgl. Typically, the shallow clays were described as soft to firm and generally silty, sandy, gravelly with variable cobble content. In some locations, shallow clays were noted to have hydrocarbon odour associated with them.
- The deeper roto-sonic boreholes typically encountered stiff to very stiff clay (slight sandy, slightly gravelly, low cobble content) from approximately 8 - 15mbgl through to approximately 25-30mbgl. The exception to this was borehole BH124 which advanced through sands, silts and gravels before encountering stiff clay at 19m through to 22mbgl.

- The deeper clays did not show any evidence of contamination.

Boulders

- The presence of boulders, generally of basalt, has been noted within natural superficial deposits across the site. In particular, within the 6 - 8m range (BH104, BH107, BH108B, BH109, BH110, BH121) where boulders were noted within silts, gravels and clays.
- Boulders were also noted at around 10m and 25m in BH121 and BH124 respectively.
- Cobbles and boulders could act as preferential pathways for the movement of water within natural deposits if present within an open matrix. However, the boulders at the site are predominately within a silt and clay matrix and do not therefore present a significant pathway for migration. Further, the logs from the boreholes listed here do not describe evidence of hydrocarbon contamination associated with boulders in the natural deposits.

Bedrock

- Bedrock was not encountered in any of the investigative locations and is therefore inferred to be at least 30mbgl.
- An historic borehole advanced for the construction of Erskine Bridge (located approximately 500m north west of the site) encountered a sequence of stiff boulder clays with band of sands and gravels from approximately 7m to approximately 42m where a “hard, dark grey, massive BASALT with occasional weathered jointing” was recorded.

Tidal Flooding

- 8.4.10 Significant areas of the southern half of the site are shown by the Scottish Environment Protection Agency (SEPA) indicative online Flood Map to be at ‘Medium likelihood’ of tidal flooding (defined as a 0.5% chance of happening in any given year) and the site frontage adjacent to the River Clyde is shown to be at ‘High likelihood’ of tidal flooding (defined as a 10% chance of happening in any given year). Within the Scottish Planning Policy (SPP) (2014), these areas fall under the designation of ‘Functional Floodplain’.
- 8.4.11 Some further small areas in the east and centre of the site are shown to be at ‘Low likelihood’ of tidal flooding (defined as having a 0.1% chance of happening in any given year), with the remainder of the site having less than 0.1% chance of tidal flooding happening in any given year.

Fluvial Flooding

- 8.4.12 A review of SEPA’s online Flood Risk Map indicates that the site is not shown to be at risk of fluvial flooding. Although the adjacent River Clyde has fluvial influences, the predominant flood risk through this reach is driven by the tidal influence discussed above.

Surface Water (Pluvial) Flooding

- 8.4.13 The SEPA indicative online Flood Map indicates that relatively small isolated areas in the north of the site are considered as being at a ‘medium likelihood’ and ‘low likelihood’ of surface water flooding. A ‘medium likelihood’ and ‘low likelihood’ of flooding are defined as a flood event that is likely to occur on average once in every 200 years, or a 0.5% chance of happening in any one year and once in every 200 years, or a 0.5% chance of happening in any one year including an allowance for climate change respectively.
- 8.4.14 The SEPA indicative online Flood Map indicates that the remainder of the site is not considered to be at significant risk from surface water flooding. It should be noted that the mapping is based on relatively coarse generalised methodology and should therefore be considered as indicative.

Groundwater Flooding

- 8.4.15 Groundwater flooding occurs when water rises up from the underlying geology or flows from springs and is usually classified as a contributing factor to flooding rather than the primary source.

- 8.4.16 The SEPA indicative online Flood Map shows indicative areas where there is a likelihood of groundwater flooding. The maps do not highlight the site and surrounding area as being at risk.
- 8.4.17 The site lies within SEPA Loch Lomond and Vale of Leven Potentially Vulnerable Area (PVA) 11/01 Loch Lomond Catchment. The PVA 11/01 Datasheet does not indicate the site is at risk from groundwater flooding.
- 8.4.18 Owing to the potential for migration of contaminants to migrate within the site and to the surrounding environment through groundwater flows, the Site Investigation (SI) undertaken to inform the design of the proposed remediation works (provided in **Appendix 6.1**) included a specific focus on understanding groundwater conditions at the site. As detailed fully **Appendix 6.1 - SI Interpretive Report**:
- All groundwater encountered in the SI was located within the permeable superficial deposits and overlying Made Ground, in the region of 1.5-5mbgl;
 - It has previously been established that the direction of groundwater flow is towards the River Clyde, albeit with some flow reversal during rising tide. Based on groundwater levels from the monitoring conducted by ERS in April 2018, the average hydraulic gradient is estimated to be approximately 0.01. This is similar to the average hydraulic gradient estimated by Parsons Brinkerhoff in 2014 of 0.011;
 - PBA have estimated groundwater discharge from the site to the River Clyde to be 470m³/d;
 - Given the proximity of the River Clyde to the site, shallow groundwater is regarded as being within a major discharge zone, i.e. shallow groundwater is expected to discharge to the River Clyde;
 - The River Clyde is tidal at the Carless site and it is understood that the groundwater levels across much of the site are influenced by tide cycles;
 - The presence of heterogenous ground conditions and physical barriers within the subsurface of the site are likely to have a significant influence on the effects of the tidal variations on groundwater within the Made Ground; and,
 - The influence of existing buried structures will however depend on how deep these barriers are. Given that there is a significant thickness of (i.e. 8m of even greater) permeable strata (Made Ground and Natural) below the site, subsurface structures are unlikely to act as a complete barrier to the movement of groundwater. Buried structures may affect shallow groundwater flow and migration of floating Non-Aqueous Phase Liquid (NAPL) but only where the buried structures intercept the water table which is generally 2m below ground level or more.
- 8.4.19 Owing to the nature of hydraulic connectivity between the groundwater aquifer and the River Clyde, it is assumed that any likelihood of coastal flooding that could occur will be exacerbated by groundwater flooding. As coastal flooding is considered to hold *medium likelihood* of flooding within the site, groundwater flooding is considered to carry the same likelihood.

The Surrounding Area

Topography

- 8.4.20 A topographical survey of the site was undertaken by Malcolm Hughes Surveyors during September 2017 and provides details of physical features at the site with level data to Ordnance Datum.
- 8.4.21 A review of the survey indicates that the existing ground levels within the surrounding area fall in a westerly direction towards the River Clyde from an elevation of approximately 6m AOD to 2.5-3.0m AOD.

Geology

- 8.4.22 A detailed review of geological and ground conditions within the surrounding area is provided in **Section 6.4**.

Hydrological Context

- 8.4.23 The River Clyde is a significant river in Scotland and outfalls to the Firth of Clyde downstream of Glasgow. It originates at Watermeetings, approximately 7.5km east of Wanlockhead, where the Daer Water and Portrail Water have their confluence, and drains an area of approximately 3,900km² to Greenock. The river is tidally influenced downstream of Dalmarnock, Glasgow.
- 8.4.24 The River Clyde forms the southern boundary of the site, which is tidally influenced along the reach adjacent to the site and is the principal watercourse in the area. The reach of the Clyde Estuary in proximity to the site is a Water Framework Directive (WFD) classified water body – ID: 200510 ‘Clyde Estuary – Inner (inc Cart)’. This is a ‘transitional water body’ in the Scotland River Basin District. It is 4.4km² in area and incorporates the reach of the River Clyde from Bowling to Merchant City.
- 8.4.25 The Forth and Clyde Canal is located approximately 40m directly north of the site. The reach of the Forth and Clyde Canal in proximity to the site is a WFD classified water body – ID: 10710 ‘Forth and Clyde Canal (Old Kilpatrick to Mount Blow)’.
- 8.4.26 There is a further watercourse/burn located approximately 450m south-east of the site which flows into the River Clyde. From review of OS mapping, Flood Estimation Handbook (FEH) catchment data, Centre for Ecology and Hydrology and Scottish Water public sewer records, it appears likely that this watercourse is the downstream end of the Auchentoshan Burn. This watercourse begins in the Kilpatrick Hills to the north, beyond the A82 Great Western Road, before flowing south towards a small reservoir associated with the Auchentoshan Distillery. South of the distillery the watercourse is not visible on available mapping until south of the Forth and Clyde Canal, within the site. However, Scottish Water sewer records suggest the watercourse may be culverted within a surface water public sewer between the railway line and the canal. This watercourse has a catchment area of some 1.97km². The Auchentoshan Burn is not a WFD designated water body.

Water Body Status

- 8.4.27 The Clyde Estuary – Inner (inc Cart) (ID: 200510) water body has been designated as a heavily modified water body on account of “*physical alterations that cannot be addressed without a significant impact on navigation and from an increased risk of subsidence or flooding*”¹⁷. The water body’s current overall status (2016) is classified as ‘Moderate’ ecological potential. This is driven by a number of failing or poor WFD elements which are summarised in **Table 8.4** below.

Table 8.4 - 2016 Failing Elements of the Clyde Estuary – Inner (inc Cart) Water Body

Component	2015 Status
Overall Status	Moderate Ecological Potential
Overall Ecology	Poor
Pre-HMWB status	Poor
Morphology	Poor
Hydromorphology	Poor
Specific pollutants	Fail
Chromium	Fail

- 8.4.28 The pressures responsible for the water quality failings are noted to include waste water (sewage) disposal.

- 8.4.29 The WFD objective for the water body is for the achievement of overall Good status by 2027.

¹⁷ <https://www.sepa.org.uk/data-visualisation/water-classification-hub/>

- 8.4.30 The Forth and Clyde Canal (Old Kilpatrick to Mount Blow) (ID: 10710) water body has been designated as an artificial water body “on account of *physical alterations that cannot be addressed without a significant impact on navigation*”¹. The water body’s current overall status (2016) is classified as ‘Good’ ecological potential.
- 8.4.31 The WFD objective for the water body is for the achievement of overall Good status by 2021, and it is therefore meeting its objectives. This is considered in more detail within the holistic WFD assessment provided by ABPmer.

Existing Drainage

- 8.4.32 Out with the site, a surface water sewer located approximately 450m to the south-east of the site which originates in the residential development north east of the Forth and Clyde Canal and routes in a south westerly direction where it discharges into the Auchentoshan Burn (located outside of the development site to the south-east).
- 8.4.33 Similarly, there is a Scottish Water combined sewer following a similar route to the surface water sewer, originating in the same residential area and routes in a south westerly direction to a combined sewer overflow (CSO) discharging to the Auchentoshan Burn immediately south of the dismantled railway. Thereafter the combined sewer routes south easterly along the north-east boundary of the bonded warehouse complex.
- 8.4.34 Scottish Water records indicate the presence of a further surface water sewer system to the north east of the site which also originates north of Forth and Clyde Canal and runs parallel with the aforementioned surface water sewer. Based on available information, at this stage it is not clear if this surface water sewer discharges to the Forth and Clyde Canal or to the head of the open section of the Auchentoshan Burn. It appears likely that this sewer system may convey the culverted Auchentoshan Burn from a point south of the railway line.

Scottish Water records indicate the presence of an abandoned water main running just inside the northern boundary of the site, before heading north across the Forth and Clyde Canal. A number of abandoned spurs are shown within the north of the site.

Tidal Flooding

- 8.4.35 In 2005 Halcrow Group Ltd and WA Fairhurst and Partners completed preparation of the River Clyde Flood Management Strategy (FMS) on behalf of Glasgow City Council. This study included the development of a 1-dimensional hydraulic model of the River Clyde, extending from Blairston (Bothwell) to Greenock (approx. 14km to the west of the site). It is understood that this model informs the current tidal flood risk mapping for the site as represented in the SEPA indicative online flood maps.
- 8.4.36 Until recently the FMS model was understood to provide the principal and ‘best available’ evidence base in respect of fluvial and tidal flood risk associated with the River Clyde. However, SEPA has noted, as described in the West Dunbartonshire Council Scoping Opinion dated 14 March 2018, the following which may influence the validity of the River Clyde FMS:
- Siltation issues in the Lower Clyde and updated bathymetry data, and
 - Updated national Coastal Flood Boundary level dataset (which informs the downstream tidal boundary conditions of the FMS model).

Updated Hydrological and Hydraulic Modelling

- 8.4.37 In light of the above uncertainties, the objective of the baseline hydraulic modelling was to provide updated details of the River Clyde levels in the vicinity of the site using updated hydrology, channel geometry using up to date bathymetry data, and model boundary conditions.
- 8.4.38 A 1 D modelling exercise was undertaken, covering a 23km reach of the River Clyde, with the upstream extent being approximately 3.5km upstream of the site boundary and the downstream extent located at Greenock.

- 8.4.39 A baseline 1 in 200-year event has been determined using the same joint probability scenarios as identified as worst case in the 2005 study:
- TIDE₂₀₀ and Q₂, and
 - TIDE_{MHWS} and Q₂₀₀
- 8.4.40 The United Kingdom Climate Projection 2009 (UKCP09) data and guidance has been used, in combination with consultation with SEPA, to determine the methods used for assessing the impact of climate change. To examine the fluvial peak flow sensitivity the climate change, 44% and 60% climate change allowances have been adopted, as determined by SEPA.
- 8.4.41 As the site size is modest in relation to the reach of the model, modelling results are limited to three cross sections within the overall site; the locations of the sections are shown in Error! Reference source not found..
- 8.4.42 Joint probability modelling results with maximum water stages are presented in **Table 8.5** with the completed hydraulic modelling report presented in **Appendix 8.2**.

Table 8.5 – Maximum Water Levels

Cross Sections	Stage (m AOD)					
	T200 1in2yr	T200+CC 1in2YR+44%CC	T200+CC 1in2yr+60%CC	TMHWS 1in200yr	TMHWS+CC 1in200+40%CC	TMHWS+CC 1in200+60%CC
SEC_84	4.054	4.669	4.666	2.317	2.977	2.973
SEC_85	4.053	4.667	4.665	2.322	2.984	2.982
SEC_86	4.052	4.667	4.665	2.318	2.982	2.979

- 8.4.43 Flood extents mapping for the T200 and I in 2-year mapping is presented in Error! Reference source not found..

Fluvial Flooding

River Clyde

- 8.4.44 Whilst the River Clyde has fluvial influences, the predominant flood risk through the reach in the vicinity of the site is driven by the tidal influence discussed above.

Auchentoshan Burn

- 8.4.45 The lower reach of the Auchentoshan Burn, a tributary of the River Clyde, is located approximately 450m to the south-east of the site.
- 8.4.46 The SEPA indicative online Flood Maps show the extent of tidal flooding associated with the Clyde Estuary backing up this watercourse, however, the mapping does not show flood outlines for fluvial or surface water flooding. As the catchment of the watercourse is relatively small (1.97km² based on FEH data), flood risk would not be expected to have been modelled by SEPA.
- 8.4.47 It is further noted that the presence of sluices, as indicated by OS mapping, at the downstream end of the watercourse may have influence on the flow conditions in the watercourse.

Surface Water (Pluvial) Flooding

- 8.4.48 The SEPA indicative online Flood Map indicates that relatively small isolated areas within the surrounding area are considered as being at a 'medium likelihood' and 'low likelihood' of surface water flooding. A 'medium likelihood' and 'low likelihood' of flooding are defined as a flood event that is likely to occur on average once in every 200 years, or a 0.5% chance of happening in

any one year and once in every 200 years, or a 0.5% chance of happening in any one year including an allowance for climate change respectively.

- 8.4.49 The SEPA indicative online Flood Map indicates that the remainder of the site is not considered to be at significant risk from surface water flooding.
- 8.4.50 It should be noted that the mapping is based on relatively coarse generalised methodology and should therefore be considered as indicative.

Groundwater Flooding

- 8.4.51 The SEPA indicative online Flood Map shows indicative areas where there is a likelihood of groundwater flooding. The maps do not highlight the surrounding area as being at risk.
- 8.4.52 The site lies within SEPA Loch Lomond and Vale of Leven Potentially Vulnerable Area (PVA) 11/01 Loch Lomond Catchment. The PVA 11/01 Datasheet does not indicate the site is at risk from groundwater flooding.
- 8.4.53 Groundwater flooding occurs when water rises up from the underlying geology or flows from springs and is usually classified as a contributing factor to flooding rather than the primary source.
- 8.4.54 Owing to the potential for migration of contaminants to migrate within the site and to the surrounding environment through groundwater flows, the Site Investigation (SI) undertaken to inform the design of the proposed remediation works included a specific focus on understanding groundwater conditions at the site. This is detailed fully within the submitted **SI Interpretive Report**. In short:
- All groundwater encountered in the SI was located within the permeable superficial deposits and overlying Made Ground, in the region of 1.5-5mbgl;
 - It has previously been established that the direction of groundwater flow is towards the River Clyde, albeit with some flow reversal during rising tide. Based on groundwater levels from the monitoring conducted by ERS in April 2018, the average hydraulic gradient is estimated to be approximately 0.01. This is similar to the average hydraulic gradient estimated by Parsons Brinkerhoff in 2014 of 0.011;
 - PBA have estimated groundwater discharge from the site to the River Clyde to be 470m³/d;
 - Given the proximity of the River Clyde to the site, shallow groundwater is regarded as being within a major discharge zone, i.e. shallow groundwater is expected to discharge to the River Clyde;
 - The River Clyde is tidal at the Carless site and it is understood that the groundwater levels across much of the site are influenced by tide cycles;
 - The presence of heterogenous ground conditions and physical barriers within the subsurface of the site are likely to have a significant influence on the effects of the tidal variations on groundwater within the Made Ground; and,
 - The influence of buried structures will however depend on how deep these barriers are. Given that there is a significant thickness (i.e. 8m of even greater) of permeable strata (Made Ground and Natural) below the site, subsurface structures are unlikely to act as a complete barrier to the movement of groundwater. Buried structures may affect shallow groundwater flow and migration of floating Non-Aqueous Phase Liquid (NAPL) but only where the buried structures intercept the water table which is generally 2m below ground level or more.
- 8.4.55 Owing to the nature of hydraulic connectivity between the groundwater aquifer and the River Clyde, it is assumed that any likelihood of coastal flooding that could occur will be exacerbated by groundwater flooding. As coastal flooding is considered to hold *medium likelihood* of flooding within the surrounding area, groundwater flooding is considered to carry the same likelihood.

Forth and Clyde Canal

- 8.4.56 The Forth and Clyde Canal is located approximately 40m directly north of the site.

8.4.57 PBA contacted Scottish Canals to gain a better understanding of the flood risk associated with the Forth & Clyde Canal. The response from Scottish Canals, provided in **Appendix 8.2**, noted the following key points:

- Ground levels at the site are below the normal operating water level of the canal;
- Scottish Canals has an archive record of breaches and overtopping incidents across Scotland, no record of any breaches or overtopping of the canal in the area of the proposed development, or within 500m of the site boundary was found;
- There is one earth embankment retaining the canal to the east of the development site, known as Farm Road West Embankment 49 – Scottish Canals Ref. FC-052-005-L. The embankment condition is considered “fair” and “fit for purpose”.
- Seepage from embankments, historically lined with natural materials such as puddle clay, can expect a certain degree of seepage. The nearest seepage to the development site is located 383m south-east of the development at Grid Ref. 247005, 671925 at a rate less than 0.1l/s. This level of seepage is expected to evaporate or be taken in by vegetation/grass on the face of the embankment.
- All leaks from canal retaining structures are monitored monthly by Scottish Canals and any change is entered onto a Leak Register. The nearest leak to the development site is to the north of Erskine Ferry Road – Grid Ref. 246583, 672509 and is considered a minor leak (0.1-<0.2l/s).

8.5 Baseline Evolution and Expected Future Baseline

Current Baseline Evolution

- 8.5.1 The TCPA EIA Regulations require that the EIA Report must describe the likely evolution of the baseline scenario in the absence of the proposed development. In the absence of any development activities current baseline conditions, including extensive hydrocarbon contamination of soils and groundwater, would be likely to remain relatively unchanged, except for natural growth of existing vegetation within the site.
- 8.5.2 For the purposes of this EIA, the likely evolution of the baseline is predicated upon the approval and implementation of proposed remediation works before the commencement of the proposed development (the construction of the proposed development). Prior remediation will be needed to:
- Reduce to an acceptable level the risk to human health and environmental receptors both on and off the site from hydrocarbon and other contamination in soil;
 - Reduce to an acceptable level the risk to the River Clyde from mobile contamination within soils and contaminants floating on and dissolved within the groundwater; and therefore,
- 8.5.3 Remediation is therefore required both to remove the site’s current contaminated land and Special Site designations under Part IIA of the Environmental Protection Act 1990 and to make the site suitable for the future intended use (i.e. the construction and operation of the proposed development). As such, a ‘no development’ baseline evolution scenario is not considered to merit further consideration in this EIA.
- 8.5.4 Whilst not forming part of the proposed development assessed in this EIA, an overview of the proposed remediation works is provided for completeness in **Chapter 6 – Ground Conditions**. In addition to intrusive works within the site, the proposed remediation works include a commitment by the Applicant to undertake further SI and subsequent remediation works on land to the east within the wider Carless landholding. This will be out with the site of the proposed development considered in this EIA. Planning application DC18/245 for the proposed remediation works was submitted to West Dunbartonshire Council as the relevant local planning authority on 1st November 2018 and validated on 14th November 2018.

Expected Future Baseline

Expected Changes in Conditions within site

- 8.5.5 The nature of the proposed remediation works will involve the removal of surface hardstanding to facilitate the excavation of materials below, both to allow extraction of pollutants for treatment, and to allow formation of surface water management SuDS features. Excavated materials will be stored on site in temporary stockpiles. Following the completion of the proposed remediation works, site levels and surface water management features will be restored to their pre-remediation grade. However, existing surface hardstanding associated with historic site uses (and which will have been removed through the proposed remediation works) will not be replaced.
- 8.5.6 The Stage 3 FRA Report submitted in support of planning application DC18/245 concluded that, taking account of all mitigation proposed, only one cross section (SEC_86) within the 1D model was found to be impacted by flooding for modelled scenarios, which included the 1 in 200-year extreme tide level. Water levels during this storm event were found to be at 4.05mAOD for baseline and 4.66mAOD for both climate change allowances.

Expected Changes in Conditions outwith site

- 8.5.7 There are no expected changes in conditions out with the site.

Predicted Future Baseline Conditions

- 8.5.8 These are expected to replicate current baseline conditions, as upon the completion of the proposed remediation works, site levels will be restored to the existing grade. New hardstanding areas will be constructed within the site to service the proposed development. On this basis the Stage 3 FRA Report submitted in support of planning application DC18/245 concluded that, no permanent change in flood risk at the site is therefore likely as a result of the proposed remediation or construction works. The consultation response received from SEPA (February 2019) in respect of planning application DC18/245 supported this conclusion.

Predicted Future Receptor Sensitivities and Vulnerabilities

- 8.5.9 No change to current baseline receptor sensitivities and vulnerabilities is expected as a result of the implementation of the proposed remediation works.

Summary of Receptor Sensitivity / Importance and Consideration in this Assessment

- 8.5.10 Drawing upon **Sections 18.4**, and **18.5**, **Table 8.6** below provides a summary of the sensitivity under the future baseline scenario of identified receptors which are likely to experience hydrological and flood risk effects from the proposed development. **Table 8.6** confirms which receptors have been carried forward to the impact assessments presented in **Sections 8.7 – 8.9** below.

Table 8.6 – Future Baseline Receptor Sensitivity

Receptor	Sensitivity/ Importance	Rationale
River Clyde	Medium	The water body's current overall status (2016) is classified as 'Moderate' ecological potential.
Existing Scottish Water Rising Main	Low	Combined sewer rising main adjacent to north east boundary

Site users and construction workers	High	Health and Safety
Potable water supply	High	Potable water quality

8.6 Embedded Mitigation

8.6.1 As detailed in **Chapter 3 – The Proposed Development**, a number of design features and embedded mitigation measures have been incorporated into the design and construction of the proposed development to avoid, prevent or minimise significant adverse environmental effects and to enhance beneficial effects. Embedded mitigation measures of relevance to this assessment are:

Construction Phase

- Implementation of and adherence to a Construction Environmental Management Plan (CEMP) including a Pollution Prevention Plan (PPP) and Controlled Activities Regulations (CAR) Licence. Of relevance to the protection of hydrological interests, this will include matters relating to dust and silt control, oils, fuels and materials storage, pollution prevention and control, and the protection of hydrological receptors. The CEMP will include standard measures and procedures to manage sources of potential pollution such that no pollution would be capable of reaching the water environment. This will be through suitable site management practises using containment systems and suitable treatment or settlement facilities; and,
- Use of construction phase SuDS to ensure no detriment to water quality arises from surface water discharges during the construction phase of the proposed development.
- Surface water drainage measures for the construction phase will be in line with SuDS principles and guidance (CIRIA 2001)¹⁸, incorporating appropriate treatment prior to discharge to the water environment and in accordance with the required CAR authorisation. These measures may include the use of temporary bunding, swales and settlement ponds to allow for isolation and on-site treatment of any sediment laden or contaminated runoff prior to discharge to the River Clyde
- The implementation of SuDS measures together with detailed surface water drainage proposals and methodology for the construction phase will be detailed within a Pollution Prevention Plan (PPP) as set out in SEPA’s Supporting Guidance (WAT-SG-75)¹⁹ which will be included within the CEMP. The SuDS measures will be installed prior to the main construction activities, including any earthworks. Suitable measures will be in place at all times for treatment of runoff from construction areas to prevent the release of sediment and pollutants to the water environment.
- Any runoff from earthworks and stockpiles will be routed through the appropriate construction SuDS measures prior to discharge to the water environment.
- Excavations will be left open for the minimum period required to avoid ingress of water, minimise erosion and the need for de-watering which will comply with CAR General Binding Rule 11. Drainage or pumping from excavations will be minimised through design. Temporary cut-off drains will be installed, if required to prevent surface water runoff entering excavations.
- Any water pumped out of excavations will be treated by passing through a SuDS feature prior to discharge to the water environment.
- Access tracks used during construction will incorporate appropriate drainage measures including ditches, camber to shed water to the road channel, frequent cross drains and grips/ offlets to prevent the tracks acting as a preferential drainage route and to protect the

¹⁸ CIRIA C532, 2001, Control of water pollution from construction sites – guidance for consultants and contractors

¹⁹ SEPA, 2018, WAT-SG-75, Sector Specific Guidance: Construction Sites

water environment. Any trackside drainage will be routed to the construction SuDS measures prior to discharge to the water environment.

- Surface water management measures employed during the construction phase should be regularly inspected, particularly after periods of heavy rainfall, and maintained to ensure they are working effectively and that there are no blockages or unexpected discharges.
- Clean runoff from vegetated areas or offsite will be kept clean and diverted around the construction works to avoid mixing with sediment laden water.
- The mitigation measures to minimise the risk of contaminant release will be in accordance with The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) include provision for oil storage, now covered by new General Binding Rules (GBRs) 26, 27, and 28, which state:
 - GBR 26 – The storage of oil in a portable container is limited to a capacity of less than 200 litres. The container must be of sufficient strength and structural integrity so as to ensure that it is unlikely to burst or leak in its ordinary use;
 - GBR 27 – The storage of oil on premises used for residential purposes (Not applicable to this proposed development), and
 - GBR 28 – The storage of oil on premises other than:
 - Where the premises is a vehicle or vessel
 - Where the storage is an activity specified in GBR 26 or 27; or
 - Otherwise authorised under CAR
 - In a container which is wholly underground (unless situated wholly within a building underground), and
 - The oil must be stored in a container which is of sufficient strength and structural integrity so as to ensure that it is unlikely to burst or leak in its ordinary use.
- Suitable welfare facilities will be provided to accommodate site staff and operatives during the construction phase with off-site tankering facilities, until such time that the permanent package treatment plant is installed and operational.

Operational Phase

- No buildings within the functional floodplain and finished floor levels of buildings to be below the $T_{200+CC} Q_{2+CC}$, peak flood level with a 600mm freeboard allowance;
- The proposed BioDisc package waste water treatment plant is designed to accept crude domestic sewage and produce an effluent quality of Biological Oxygen Demand (BOD) 20mg/l, Suspended Solids (SS) 30mg/l and Ammonia 20mg/l, suitable for discharge to the River Clyde. Foul discharges from the proposed development, including the gatehouse will discharge to this treatment plant.
- Foul discharges to the River Clyde in accordance with WAT-RM-03;
- Provision of adequate compensatory flood storage on suitable land within the wider Carless landholding (under the control of the Applicant), with the required volume and storage characteristics to be determined through this impact assessment;
- Surface water runoff control – Permanent SuDS designed in accordance with CIRIA C753 The SuDS Manual compliant with GBR's;
- The surface water drainage scheme for the site will be designed using SuDS principles such that a level of treatment will be provided prior to discharge of surface waters to the River Clyde; and
- West Dunbartonshire Council have confirmed that the surface water discharge to the River Clyde does not require to be attenuated due to the magnitude of this waterbody at this location.

8.6.2 If required, further mitigation and enhancement measures identified through the EIA process are detailed in **Section 8.8** below before likely residual effects from the proposed development are then stated in **Section 8.9**.

8.7 Assessment of Likely Effects

8.7.1 Potential effects on the water environment that could arise during the construction and operational phases are summarised in **Table 8.7** below and are discussed further below in relation to each phase of the proposed development.

Overview

8.7.2 The construction phase is the most critical in terms of potential impacts on the water environment, with key activities including:

- Earthworks, including alteration of site ground levels;
- Excavation for foundations and site infrastructure;
- Piling for foundations;
- Stockpiling of excavated materials;
- Creation of impermeable surfaces;
- Construction of new drainage networks, and
- Use and storage of materials and oils.

8.7.3 During the operational phase, the two most important potential impacts are the potential change in surface water quality, arising from site activities and increased impermeable surfaces, and the generation of treated foul effluent from the proposed package wastewater treatment plant.

Table 8.7 – Summary of Potential Hydrology and Flood Risk Effects

Receptor	Potential Effect
River Clyde	Tidal flood risk
	Surface flow alterations and increased runoff
	Increased pollution from sediment
	Pollution from contaminated groundwater
	Pollution from chemicals
Scottish Water Rising Main	Pollution from chemicals
	Pollution from contaminated groundwater
Site users and construction workers	Tidal flood risk
	Pollution from chemicals
	Pollution from contaminated groundwater

Receptor	Potential Effect
Potable water supply	Pollution from chemicals
	Pollution from contaminated groundwater

Construction Phase

Tidal Flood Risk

- 8.7.4 Following the implementation of the proposed remediation works, the first stage in the construction of the proposed development will be the creation of a site development platform. This will involve elevating site levels to provide a proposed finished floor level of 5.27m AOD. Part of the development site hardstanding is located within the floodplain, meaning there is an inherent temporary risk of flooding to site workers and plant when the site levels are being raised. Permanent effects on the loss of floodplain from the proposed development, and the need to appropriate mitigation to be provided, are considered in relation to the operational phase and in **Section 8.8 – Further Mitigation** below.
- 8.7.5 Flood risk effects during the construction phase would be temporary in nature and generate a low magnitude of change of flooding from the River Clyde (medium sensitivity receptor), resulting in a **slight/ moderate** level of effect.
- 8.7.6 Flood risk effects during the construction phase would generate a low magnitude of change of site users and construction workers (high sensitivity receptor), resulting in a **moderate** level of effect.

Surface Water Flow Alterations and Pluvial Flood Risk

- 8.7.7 During construction, existing drainage patterns and flow paths are likely to be altered by loss of vegetation, loss of impermeable hardstanding areas, the introduction of new impermeable surfaces, changes in site ground levels, vehicle movements, presence of stockpiles of fill materials and excavations. Impermeable surfaces arising from the compaction of soils and construction of roads and hardstandings would reduce any infiltration potential and lead to an increase in surface water runoff. In the absence of mitigation, the potential environmental impact of this increase in flow rates could lead to river bank erosion and sediment transport to the River Clyde.
- 8.7.8 Potential surface water flow alterations are assessed as generating a low magnitude of change of water quality in the River Clyde (medium sensitivity receptor), resulting in a **slight/ moderate** level of effect.

Pollution from Sediment

- 8.7.9 There is the potential for increased release of sediment into the River Clyde arising from sediment-laden runoff from areas of soil stripping, hardstanding removal, earthworks and stockpiles of earthwork materials.
- 8.7.10 Increased sediment loading to watercourses can degrade water quality and change substrate characteristics, which may affect the quality of the aquatic habitat. Increased sedimentation of watercourses can also have a detrimental effect on flow conveyance within the channel, affecting flood risk.
- 8.7.11 Potential increased pollution from sediments would generate a low magnitude of change of the River Clyde (medium sensitivity receptor), resulting in **slight/ moderate** level of effect.

Pollution from Chemicals

- 8.7.12 During construction, there is a risk of accidental pollution incidences adversely affecting the River Clyde, Scottish Water's rising main, site users and construction workers and potable water supplies, from the following sources:
- Spillage or leakage of oils and fuels:

- Stored on site;
 - From construction plant or site vehicles, and
 - From refuelling plant.
 - Spillage or leakage from on-site toilet facilities;
 - Cement or concrete polluting surface water, and
 - Spillage or leakage from use or storage of other chemicals and hazardous substances.
- 8.7.13 Oil and fuel spillages to the water environment would be detrimental to water quality and could affect flora and fauna. Oils and fuels are classified as hazardous substances under The Water Environment (Groundwater and Priority Substances) (Scotland) Regulations 2009 and their ingress to groundwater must be prevented. Groundwater vulnerability to pollutants may increase in areas where drift deposits are excavated, for example for foundations, drainage trenches or where site levels have been lowered.
- 8.7.14 Hydrocarbon contaminated soil and groundwater could pollute water supplies if the water supply pipework has limited resistance to hydrocarbons.
- 8.7.15 Cement, concrete and grouts used in construction are highly alkaline, fresh concrete has a pH of around 12.5, and can cause serious pollution to the water environment. Water wildlife, such as invertebrates and fish, are very sensitive to changes in pH levels. Fresh cement bound materials can also cause skin irritation if contact is made.
- 8.7.16 Other chemicals and hazardous substances used and store on site (e.g. cleaning products and solvents) could cause pollution if they enter the water environment and cause respiratory and skin irritation if directly exposed.
- 8.7.17 The potential impact of contaminant discharge on the identified receptors is likely to be short term in nature. Potential contaminant discharges would generate a low magnitude of change of the River Clyde (medium sensitivity receptor), resulting in **slight/ moderate** level of effect.
- 8.7.18 Potential contaminant discharges would generate a low magnitude of change of the Scottish Water rising main (low sensitivity receptor), resulting in a **slight** level of effect.
- 8.7.19 Potential contaminant discharges would generate a low magnitude of change of site users and construction workers (high sensitivity receptor) and potable water supply (high sensitivity receptor), resulting in a **moderate** level of effect.
- 8.7.20 Assessment of construction phase pollution from contaminated groundwater is considered in detail in Chapter 6.

Operational Phase

Tidal Flood risk

- 8.7.21 The proposed development finished floor level is set at a level 600mm (freeboard) above the TIDE₂₀₀+CC and Q₂+CC design flood level. Elevation of the site and adjacent accesses and hardstandings will generate a negligible magnitude of change of flooding from the River Clyde on site users (high sensitivity receptor), resulting in a **slight** level of effect.

Surface Water Flow Alterations and Pluvial Flood Risk

- 8.7.22 Once the proposed development is completed and operational, surface water runoff volumes and flow rates would be increased as a result of an increase in impermeable area across the site, through the introduction of access roads, hardstandings and fabrication building roof. Whilst there would be an increase in volume and flow rate, this is considered negligible compared to the extent of the River Clyde at the point of discharge and will generate a negligible magnitude of change of flooding downstream from the River Clyde (medium sensitivity receptor), resulting in a slight level of effect.

Pollution from Sediment

- 8.7.23 Pollution from sediment may be reduced compared to baseline conditions due to the site SuDS capturing the sediment content in surface water runoff from the development. Potential

increased pollution from sediments will generate a negligible magnitude of change of the River Clyde (medium sensitivity receptor), resulting in **slight** level of effect.

Pollution from Contaminated Groundwater

- 8.7.24 The completion of the remediation strategy, whose aim is to deliver long term environmental betterment through reducing risks to human health and environmental receptors from contaminated soils and groundwater, together with the introduction of impermeable surfaces will generate a low magnitude of change of pollution from contaminated groundwater to the River Clyde (medium sensitivity receptor), resulting in a **slight/ moderate** level of effect.
- 8.7.25 The design and choice of materials for potable water supply will need to take cognisance of residual contamination generating a negligible magnitude of change of pollution from contaminated groundwater to site users (high sensitivity receptor) or the potable water supply (high sensitivity receptor), resulting in a **slight level** of effect.

Pollution from Chemicals

- 8.7.26 During the operational phase of the proposed development, oils and fuels within surface runoff from roads and hardstandings would be the main potential source of contaminant discharges. The SuDS scheme for the proposed development will allow for treatment of runoff in accordance with published standards and guidance. Increased contaminant discharges are therefore assessed as generating a negligible magnitude of change of the River Clyde (medium sensitivity receptor), resulting in **slight** level of effect.
- 8.7.27 Increased contaminant discharges are assessed as generating and negligible magnitude of change of site users (high sensitivity receptor) and potable water supply (high sensitivity receptor), resulting in **slight** level of effect.

8.8 Further Mitigation and Enhancement

Construction Phase

- 8.8.1 The assessment provided in **Section 8.7** indicates that in the absence of any further mitigation, the construction phase of the proposed development is likely to result in moderate effects on surface water quality and the functioning of the sewer system. As detailed below, further mitigation measures are therefore proposed to minimise the avoidance of likely significant adverse effects:

Tidal Flood Risk Mitigation

- 8.8.2 Elevation of the proposed site above the TIDE₂₀₀ + CC and Q₂ + CC design flood level, with provision of a 600mm freeboard to the proposed finished floor level has resulted in loss of flood plain and displaced flood storage, mitigated by the provision of compensatory storage.

Pollution Prevention

- 8.8.3 The risk of fuel/ oil contamination will be minimised by good site working practice, and in accordance with GPP⁵²⁰, but should a higher risk of fuel/ oil contamination be identified then consideration will be given to provision of an oil separator.
- 8.8.4 Should visual or olfactory examination of any unusual solids or liquids encountered during construction works identify areas of contamination, specific management procedures will allow for the short-term storage of the suspected material in stockpiles or storage tanks while verification testing for potential contamination is carried out.

Earthworks

- 8.8.5 Areas stripped of hardstandings, earth and vegetation will be kept to a minimum at any one time. Soil loss and erosion will be minimised through careful storage, reinstatement and landscaping. Stockpiles will be placed in areas of minimal risk of slippage or erosion from drainage and will not be located within 20m of the River Clyde.

²⁰ SEPA, 2018, Guidance for Pollution Prevention; Works and Maintenance in or near water, Version 1.2

- 8.8.6 It may be necessary to utilise proprietary and/or mechanical silt traps where runoff contains significant amounts of silt which may overwhelm conventional SuDS features. These typically comprise preformed chambers or tanks, installed on-line to the proposed runoff drainage system to capture and settle silt. Gross silt removal may include the use of lamella clarifiers (inclined plates) or chemical dosing systems which provide a controlled quantity of flocculants to ensure slow settling solids can be removed.

Construction Access Tracks

- 8.8.7 Further mitigation measures will include:
- Spill kits;
 - Drip trays for any refuelling activities, and
 - Regular inspection and maintenance of vehicles, tanks and bunds will be undertaken.
- 8.8.8 Welfare facilities will include closed-system toilets, with disposal of foul drainage by tanker to a suitable off-site facility.
- 8.8.9 Concrete and mortar preparation on site will be sited on an impermeable designated area at least 10m away from a watercourse or surface water drain, to reduce the risk of runoff entering a watercourse. Equipment will be washed out in a designated area, specifically designed to contain wet concrete and wash water. Wash water will be disposed of to a suitable authorised off-site facility.
- 8.8.10 All chemicals and hazardous substances will be stored safely, in a bunded area where appropriate, away from watercourses and surface water drainage in accordance with current best practice.

Operational Phase

Tidal Flood Risk Mitigation

- 8.8.11 To mitigate the loss of flood storage, compensatory storage will be provided on suitable land within the wider Carless landholding (within the control of the Applicant). This compensatory storage will be designed to mimic the function of the flood plain displaced by the proposed development, by providing the same volume and be at the same level relative to flood level as the lost storage i.e. 'level for level' compensation. The compensatory storage, comprising 5,160m³ will be constructed prior to commencing earthworks to elevate site levels. A layout of the proposed compensatory storage area is presented in **Figures 8.8 and 8.9**.
- 8.8.12 The proposed area for compensatory storage, in the southern margins of the wider Carless landholding lies in an area designated for blue/ green infrastructure. Construction and pollution control of the compensatory storage will require to meet similar obligations as the proposed development, including, if necessary, the use of impermeable liners to prevent groundwater contamination.

Surface Water Management

- 8.8.13 The proposed surface water drainage infrastructure including SuDS features will require regular maintenance during its operational life. This maintenance will include regular removal of litter and debris, grass cutting and vegetation management, and inspection of manholes. The responsibility for the maintenance of the drainage network will lie with the Applicant. Details of specific maintenance requirements and frequency are set out **Appendix 8.3 - Drainage Strategy**.

Package Waste Water Treatment Plant

- 8.8.14 During the operational life of the BioDisc plant, the following must not be discharged into the foul drainage system:
- Motor oil, grease, anti-freeze, brake fluid etc.;
 - Cooking oil and fat;
 - Weed-killers, insecticides, fungicides and other gardening chemicals, and
 - Paint, thinners, white spirit, turpentine, creosote etc.

8.8.15 BioDisc units are designed and engineered for the minimum possible maintenance requirements, however, it is important that routine preventive electro/ mechanical maintenance and de-sludging is carried out at the appropriate intervals by suitable qualified persons.

8.9 Residual Effects

8.9.1 Taking account of proposed mitigation and enhancement measures, the likely residual effects from the construction and operation of the proposed development are identified in **Table 8.8** below.

Table 8.8 – Summary of Likely Residual Effects

Potential Effect	Duration	Impacted Receptor(s)	Receptor Sensitivity/ Importance	Residual Magnitude of Change	Residual Level	Effect	Residual EIA Significance	Rationale
Construction Phase								
Tidal flood risk	Short	Site users and construction workers	High	Low	Moderate		Not significant	Increased site levels and provision of compensatory storage
Surface water flow alterations and pluvial flood risk	Short – medium	River Clyde	Medium	Low	Slight/ Moderate		Not significant	Pollution prevention plan implementation together with SuDS and appropriate site management
Pollution from sediment	Short – medium	River Clyde	Medium	Negligible	Slight		Not significant	Pollution prevention plan implementation together with SuDS and appropriate site management
Pollution from chemicals	Short	River Clyde	Medium	Negligible	Slight		Not significant	Appropriate site management and storage facilities
	Short	Scottish Water rising main	Low	Negligible	Negligible		Not significant	Appropriate site management and storage facilities
	Short	Site users and construction workers	High	Negligible	Slight		Not significant	Appropriate site management, storage facilities and use of PPE
	Short	Potable water supply	High	Negligible	Slight		Not significant	Use Water supply materials with appropriate

Potential Effect	Duration	Impacted Receptor(s)	Receptor Sensitivity/ Importance	Residual Magnitude of Change	Residual Level	Effect	Residual EIA Significance	Rationale
								chemical resistance, with barrier protection, if required
Operational Phase								
Tidal flood risk	Long	Site users	High	Negligible	Slight		Not significant	Increased site levels and provision of compensatory storage
Surface water flow alterations and pluvial flood risk	Short - medium	River Clyde	Medium	Negligible	Slight		Not significant	Provision of drainage and SuDS for surface water management
Pollution from sediment	Long	River Clyde	Medium	Negligible	Slight		Not significant	Provision of drainage and SuDS for surface water management
Pollution from contaminated groundwater	Long	River Clyde	Medium	Low	Slight/ Moderate		Not significant	Remediation works have been undertaken
	Long	Site users	High	Negligible	Slight		Not significant	Introduction of impermeable surfaces breaks pollutant linkage
	Long	Potable water supply	High	Negligible	Slight		Not significant	Water supply materials with appropriate chemical resistance, with barrier protection, if required
Pollution from chemicals	Short	River Clyde	Medium	Negligible	Slight		Not significant	Appropriate site management and storage facilities
	Short	Site users	High	Negligible	Slight		Not significant	Appropriate site management and storage facilities and use of PPE

Potential Effect	Duration	Impacted Receptor(s)	Receptor Sensitivity/Importance	Residual Magnitude of Change	Residual Level	Effect	Residual EIA Significance	Rationale
	Short	Potable water supply	High	Negligible	Slight		Not significant	Water supply materials with appropriate chemical resistance, with barrier protection, if required

8.10 Monitoring

8.10.1 In the absence of any likely residual significant hydrology or flood risk effects, no monitoring of likely residual effects is considered to be proportionate or required.

8.11 Cumulative Effects

8.11.1 As stated in **Section 14.3**, it is judged that there is no potential for significant cumulative hydrology and flood risk effects to arise in combination with the proposed development.

8.12 Summary

8.12.1 This chapter of the EIA Report has assessed the likely significant effects from the proposed development on the water environment which includes fluvial and tidal hydrology, including flood risk, surface water, drainage and water supplies. The assessment has been informed by a Flood Risk Assessment and Drainage and SuDS Strategy for the proposed development.

Methodology

8.12.2 The principal aspects considered within this assessment are:

- Flood risk and the impact on the development, including baseline hydraulic modelling;
- Foul and surface water management;
- Pollution prevention, and
- The impact of engineering activities on the water Environment.

Baseline Conditions

8.12.3 The River Clyde forms the southern boundary of the site, which is tidally influenced along the reach adjacent to the site and is the principal watercourse in the area. The water body's current overall status (2016) is classified as 'Moderate' ecological potential.

8.12.4 The Forth and Clyde Canal is located approximately 40m directly north of the site. The water body's current overall status (2016) is classified as 'Moderate' ecological potential.

8.12.5 There are no Scottish Water sewers located within the phase 1 development boundary.

8.12.6 Sands and gravels were typically encountered within shallow superficial deposits, underlying Made Ground (where present) in bands interspersed with clays and silts. Sands were typically described as silty, clayey or gravelly and fine to coarse. Typically, bands of sands and gravels were encountered at depths of between approximately 1.5 – 4m through to 8-15m.

8.12.7 Silts were typically encountered within shallow superficial deposits, underlying Made Ground (if present) between depths of approximately 4m to 10mbgl.

8.12.8 Natural clays were encountered across the site in bands within the shallow superficial deposits of sands, silts, gravels and cobbles at depths of less than 10mbgl

- 8.12.9 A 1 D hydraulic modelling exercise was undertaken, covering a 23km reach of the River Clyde, with the upstream extent being approximately 3.5km upstream of the site boundary and the downstream extent located at Greenock.
- 8.12.10 A baseline 1 in 200-year event has been determined using the same joint probability scenarios as identified as worst case in the 2005 study:
- TIDE₂₀₀ and Q₂, and
 - TIDE_{MHWS} and Q₂₀₀
- 8.12.11 A review of SEPA's online Flood Risk Map indicates that the site is not shown to be at risk of fluvial flooding.
- 8.12.12 The SEPA indicative online Flood Map indicates that relatively small isolated areas to the north of the site are considered as being at a 'medium likelihood' and 'low likelihood' of surface water flooding.
- 8.12.13 Owing to the nature of hydraulic connectivity between the groundwater aquifer and the River Clyde, it is assumed that any likelihood of coastal flooding that could occur will be exacerbated by groundwater flooding. As coastal flooding is considered to hold *medium likelihood* of flooding within the site, groundwater flooding is considered to carry the same likelihood.
- 8.12.14 The nature of the remediation works will involve excavation of materials, to allow extraction of pollutants for treatment, and excavation to allow formation of surface water management SuDS features. Excavated materials will be stored on site in temporary stockpiles. Following completion of the remediation works, site levels and surface water management features will be restored to their pre-remediation grade.
- 8.12.15 Future baseline conditions are expected to replicate the current baseline conditions, as the completed remediation strategy will restore levels to the existing grade.

Proposed Mitigation/ Enhancement

- 8.12.16 A collection of embedded and further mitigation measures has been proposed to avoid, prevent and minimise the likely significant effects on the water environment, including:
- All proposed development will be located out with the functional floodplain as identified in the Flood Risk Assessment through land raising, with the finished floor level being 600mm above (freeboard allowance) the 1 in 200 year + climate change event;
 - Compensatory storage will be provided to mitigate the loss of floodplain through land raising;
 - Use of construction phase SuDS;
 - Permanent surface water drainage and SuDS to ensure sufficient treatment of surface waters prior to discharge from the development;
 - Developing and adhering to a Construction Environmental Management Plan (CEMP) including a Pollution Prevention Plan (PPP) and Controlled Activities Regulations (CAR) Licence, which will include monitoring of the site activities to ensure compliance;
 - A buffer strip for construction activities within a 5m margin adjacent to watercourses, and
 - Adherence to national relevant guidance, legislation and good practice in construction methods.

Residual Effects

- 8.12.17 Taking account of further mitigation and enhancement measures, all likely residual construction phase effects on flood risk and water quality reduce to Moderate or lower levels and would therefore be considered Not significant in the context of EIA Regulations. Operational phase residual effects would also be Not significant as any risks to water quality, flooding, site users and potable water supply will be managed by the proposed on-site surface water drainage system including appropriate SuDS features, impermeable hardstandings and barrier protection to services.

8.13 References

Scottish Government (2009). Flood Risk Management (Scotland) act.

Halcrow Fairhurst (2005). River Clyde Flood Management Strategy -Broad Scale Modelling Report.

BGS (n.d.-a). Geology of Britain viewer. Retrieved from <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>.

SEPA (2018). The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended): A Practical Guide (No. Version 8.2).

SEPA (2006) Guidelines for Water Pollution Prevention from Civil Engineering Contracts.

SEPA (2015). Technical flood risk guidance for stakeholders.

SEPA (2017). Flood Risk and Land Use Vulnerability Guidance.

Bayliss A (1999). Flood Estimation Handbook (FEH), Volume 5: Catchment Descriptors, Institute of Hydrology, Wallingford.

SNH (2013). Environmental Assessment Handbook.

9 Terrestrial Ecology

9.1 Introduction

- 9.1.1 This chapter of the EIA Report provides an assessment of the likely significant effects from the proposed development on ecological features. The assessment is based on the characteristics of the site and surrounding area and the key parameters of the proposed development detailed in **Chapter 2 – Site and Surrounding Area** and **Chapter 3 – The Proposed Development** respectively.
- 9.1.2 This chapter has been prepared by Peter Brett Associates. In accordance with Regulation 5(5)(b) of the EIA Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.1**.
- 9.1.3 The aims of this chapter are to:
- Identify the relevant context in which the ecological assessment has been undertaken;
 - Describe the methods used to undertake the assessment;
 - Outline the relevant baseline conditions currently existing within the site and in the surrounding area;
 - Consider how the implementation of the proposed remediation works would affect current baseline conditions, resulting in a likely future baseline scenario;
 - Identify the likely direct and indirect effects of the proposed development on important ecological features under the future baseline scenario;
 - Identify mitigation and enhancement measures where required to address likely effects;
 - Assess likely residual effects; and,
 - Assess likely cumulative effects on ecological features from the proposed development in combination with other relevant cumulative developments.
- 9.1.4 This chapter is supported by the following figures and technical reports provided in:
- **Appendix 9.1 – Figures;**
 - **Confidential Appendix 9.2 – Proposed Remediation Works: Ecological Assessment Report (EAR)**²¹;
 - **Appendix 9.3 – Lighting Design Briefing Note;** and,
 - **Appendix 9.4 – Statutory Designation Citations.**

9.2 Policy Context, Legislation, Guidance and Standards

Legislation

- 9.2.1 The overarching legislative framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Subject specific legislation of relevance to this assessment is:
- Conservation of Habitats and Species Regulations 2010;

²¹ The EAR was originally prepared to support planning application DC18/245 for the proposed remediation works. The document is submitted as **Appendix 9.2** of this EIA Report as it provides detailed current baseline information applicable to the site and the wider Carless landholding, as well as considering the likely ecological effects of the implementation of the proposed remediation works, which for the purposes of this EIA will result in the likely future baseline scenario. Owing to the inclusion of baseline reporting regarding European Protected Species and other statutorily protected species, **Appendix 9.2** is provided on confidential basis to WDC and Marine Scotland only.

- Conservation (Natural Habitats &c.) Regulations 1994 (as amended);
- National Parks and Access to the Countryside Act 1949 (as amended);
- Wildlife and Countryside Act 1981 (as amended);
- Nature Conservation (Scotland) Act 2004 (as amended);
- Wildlife and Natural Environment (Scotland) Act 2011;
- The Natural Environmental and Rural Communities (NERC) Act 2006;
- The Protection of Badgers Act 1992 (as amended); and
- Wild Mammals Protection Act 1996 (as amended).

Policy

9.2.2 The planning policy framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Planning policy considerations of specific relevance to this assessment are:

- **Adopted West Dunbartonshire Local Plan (2010)**, in particular:
 - Policy GN 1: Green Network;
 - Policy GD 1: Development Control;
 - Policy E 1: Biodiversity Duty;
 - Policy E 2A: International Nature Conservation Sites (Natura 2000);
 - Policy E 2B: National Nature Conservation Site (Sites of Special Scientific Interest);
 - Policy E 3A: Local Nature Conservation Sites;
 - Policy E5: Development Affecting Trees; and
 - Policy E 9: Landscape Character.
- West Dunbartonshire Local Development Plan Proposed Plan (2015)
 - GN2 – Green Infrastructure; and,
 - GN3 - The Habitat Network and Geodiversity.
- **Our Green Network LDP Supplementary Guidance (2015)**
- **The West Dunbartonshire Local Development Plan 2 Proposed Plan (2018)**
 - Carless Policy 4 – Green Network and Green Infrastructure; and,
 - ENV1 Nature Conservation.
- **Scottish Planning Policy (2014)**, in particular the following relevant provisions:
 - Principal Policy on Sustainability (paragraphs 24-35); and,
 - Principal Policy on Valuing the Natural Environment (paragraphs 193 - 233), in particular provisions regarding:
 - Protection of designated sites (paragraph 196); and,
 - Maximising the Benefits of Green Infrastructure (paragraphs 219 - 233).

9.2.3 In accordance with sections 15 and 58 of the Marine and Coastal Access Act (2009), the marine licence application for the proposed marine works (i.e. the extent of the proposed development located below MHS) must be determined in accordance with the 'appropriate marine policy documents', unless relevant considerations indicate otherwise. Taking account of the terrestrial focus of this assessment (as opposed to **Chapter 10 – Marine Ecology**), appropriate marine policy documents which are of relevance to this assessment comprise:

- **UK Marine Policy Statement (2011)**;
- **Scotland's National Marine Plan (2015)**, in particular policies:

- GEN1 - General Planning Principle;
- GEN 9 - Natural Heritage;
- GEN19 - Sound Evidence; and,
- GEN21 - Cumulative Impacts.

9.2.4 Other policy considerations of relevance to this assessment are:

- West Dunbartonshire Council Biodiversity Duty Report 2015;
- Scottish Biodiversity list; and,
- UK Post-2010 Biodiversity Framework (Published July 2012).

Guidance and Relevant Technical Standards

9.2.5 The following guidance and technical standards have informed this assessment:

- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester;
- British Standards Institute. (2013) BS 42020:2013 Biodiversity. Code of practice for planning and development. British Standards Institute, London;
- Bat Conservation Trust and Institute of Lighting Professionals (2018) Bats and Lighting in the UK (Guidance Note 08/18);
- The Institution of Lighting Professionals (2011) Guidance Notes for the Reduction of Obtrusive Light GN01:2011; and,
- Scottish Executive (2007) Guidance Note: Controlling light pollution and reducing lighting energy consumption. Scottish Executive.

9.2.6 This assessment has been prepared in accordance with both the TCPA EIA Regulations and the Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine ('the CIEEM Guidelines'). The assessment therefore adopts an Ecological Impact Assessment (EclA) approach, and the CIEEM Guidelines state that "*EclA is a process of identifying, quantifying and evaluating the potential effects of development-related or other proposed actions on habitats, species and ecosystems*". An EclA compliant assessment therefore requires an assessment of likely significant effects on 'important' ecological features, and as such, does not require consideration of potential effects on every species or habitat that may be present within the site.

9.3 Methodology

Overview

Assessment Scope

9.3.1 This EIA Report chapter presents an assessment of likely significant effects on ecological features from the proposed development. The assessment has been prepared in accordance with the EIA Regulations.

9.3.2 The principal aspects considered within this assessment are:

- Habitat loss, disturbance or fragmentation;
- Habitat disturbance or damage, including from:
 - Physical damage to retained habitats during site clearance and construction processes;
 - Dust deposition on retained habitats during site clearance and/or construction;
 - Changes in lighting levels due to lighting required to ensure the safety and security of construction and operational site activities;

- Changes in surface water quality resulting from potential pollution incidents and surface run-off;
 - Mortality / injury of individual animals during habitat clearance, site operations and habitat management activities; and,
 - Species disturbance from increased visual, noise and vibration disturbance.
- 9.3.3 In accordance with the Carless Marine Fabrication Complex EIA Scoping Report and subsequent EIA Scoping Opinion provided in **Appendix 4.1**, the following potential effects have been scoped out of detailed consideration within the assessment:
- Assessment of potential or likely effects on effects on ecological features not judged to be 'important', with receptor importance determined through an analysis of current and likely future baseline conditions.
 - Potential effects on marine ecological interests have been scoped out of this assessment, as they are addressed elsewhere in the assessment provided in **Chapter 10 – Marine Ecology**. An assessment of the implications of the proposed development for the objectives of the Water Framework Directive (WFD) and the Scotland District RBMP, including with regard to the achievement of ecological objectives, is provided separately within **Appendix 7.2 - WFD Assessment**.

Assessment Process

- 9.3.4 The following assessment stages have been undertaken:
- EIA Scoping and consultation (see below);
 - Analysis of current and expected future baseline environmental conditions at the site and surrounding area, in particular to identify existing important ecological features which represent potential receptors;
 - Development of likely future baseline scenario to define predicted ecological conditions and relevant receptors following the implementation of the proposed remediation works;
 - Development of proposed avoidance and embedded mitigation measures of relevance to this assessment;
 - Assessment of likely effects on the identified important ecological features from the construction and operation of the proposed development under the likely future baseline scenario;
 - Development of further mitigation measures (including avoidance, mitigation, compensation and enhancement) as required to address predicted ecological effects; and,
 - Assessment of residual likely significant effects, taking into account all proposed mitigation and enhancement measures and including consideration of likely cumulative effects.

Consultation

- 9.3.5 This assessment has been informed by an EIA Scoping Report (PBA, October 2017) and subsequent EIA Scoping Opinion issued by WDC (March 2018) in respect of the EIA for the proposed development. The EIA Scoping Opinion, which is provided in full in **Appendix 4.1**, included a list of standard requirements for consideration in this assessment. WDC and Scottish Natural Heritage (SNH) confirmed through the EIA Scoping Opinion that they were content with the propose scope of assessment and assessment methodology, both of which remain unchanged and have been implemented in full.
- 9.3.6 Further to the submission of the EIA Scoping Report, the following subject specific consultation activities have also been undertaken:
- Consultation with SNH to discuss and agree the required scope and parameters of ecological baseline surveys – Autumn 2017; and,

- Engagement with SNH to discuss and agree the required scope of and methodology for undertaking this assessment – ongoing since Autumn 2017. This took the form of telephone and email discussions and a meeting held on 27th September 2018.

9.3.7 Through these discussions, SNH:

- Confirmed that as the Inner Clyde Site of Special Scientific Interest (SSSI) is designated for wider species and habitats beyond breeding redshank, assessments of effects on both the SPA and SSSI are required;
- Confirmed the need to assess likely ecological impacts, including direct and indirect impacts upon designated sites and protected or notable habitats and species. The reversibility of predicted impacts should also be considered;
- Provided guidance regarding the undertaking of ecological surveys in terms of alignment with relevant guidance, appropriate timing, ecologist's experience and climatic conditions;
- Advised that ecological surveys should cover the site and a suitable buffer area and that survey methods and results should be documented in the EIA Report;
- Advised that the assessment of disturbance effects should consider construction and operational phase activities within the marine and terrestrial environments upon both terrestrial and marine receptors; and,
- Advised that landscape planting should comprise native, locally appropriate species and existing trees should be protected during construction.

Study Area

9.3.8 The Study Area adopted for this assessment comprises the likely Zone of Influence²² of the proposed development, as measured from the site boundary, for important ecological features as identified in **Section 9.4 – Current Baseline**. This Study Area was therefore defined in relation to the geographical areas considered within baseline ecological surveys for relevant habitat and species, as reported in the technical reports included within **Appendix 9.2 - EAR**.

Information Sources

Desk Study

9.3.9 A desk study was undertaken, which included a review of statutory and non-statutory sites within 2 km of the site and the wider Carless landholding. Statutory site information was secured from Scottish Natural Heritage (SNH). In addition, information relating to the location and extent of West Dunbartonshire's non-statutory nature sites (Local Nature Conservation Sites - LNCSs) was extracted from the Local Development Plan. The locations of Sites of Importance for Nature Conservation (SINCs) in Renfrewshire were also plotted for completeness. However, these did not warrant further consideration within this assessment as they are not functionally or physically linked to the site. Pre-existing biological data records were sourced from the Glasgow Museums Biological Records Centre.

Fieldwork

9.3.10 **Table 9.1** below provides a summary of the ecological fieldwork undertaken to inform this assessment. All fieldwork was carried out in accordance with relevant technical and professional guidelines applicable at the time of undertaking the work.

²² The 'Zone of Influence' is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities.

Table 9.1: Summary of Ecological Surveys Undertaken (including Scope and Methods Adopted)

Ecological Feature	Survey Scope and Outline Methods
Habitats	<p>Standard JNCC approach to Phase 1 Habitat Survey (JNCC, 2010) by which all habitats present within the site and wider Carless landholding were classified and mapped according to standard categories. Target notes were used to describe areas of both typical and unique botanical character. The standard Phase 1 Habitat Survey was extended to include a search for evidence of or potential for the presence of protected species or species of nature conservation interest within and close to the site. The Phase 1 Habitat Survey was undertaken for the majority of the Study Area on 23rd August 2017, with additional areas covered on 28th November 2017 as a result of changes to the survey boundary.</p>
Overwintering birds (Intertidal)	<p>A Study Area was defined for the intertidal overwintering bird survey to capture information on bird distribution within the intertidal section of the Clyde and its open channel adjacent to the site as well as upstream and downstream. The Study Area spanned the Clyde from the shoreline along the boundary of the site (north-east shoreline) across to the opposite (south-west) shoreline. The downstream (north-western) extent of the Study Area was defined as a distance 300m north/north-west of the north-western corner of the site. This was approximately in line with the disused Erskine Ferry crossing south of Erskine Bridge. The upstream (south-eastern) extent of the Study Area was defined as 300m south/south-east of the boundary of the wider Carless landholding to the south-east. This effectively placed the upstream limit of the Study Area at approximately 580m from the south-easternmost point of the site itself, but again 300m from the edge of the wider Carless landholding.</p> <p>Count point locations were selected to provide defined areas for bird counts according to the survey viewshed offered by each point and included all areas of the Inner Clyde SPA within 300m of the site as well as the main channel of the River Clyde which is not designated. Three count points (CPs) were used throughout the survey. These were selected taking visual coverage and accessibility into account. Surveys were undertaken each month from September 2017 through to March 2018 inclusive. Dates were selected so that during each month, each CP's viewshed was watched "through the tide", i.e. the whole of the c. 12 hr tidal cycle occurring in daylight hours. Sea and shore birds were logged over a 30 minute count period within the count point location's defined viewshed, whether on exposed mud or open water, and plotted on field maps of the Study Area. The species counted included all waders, wildfowl and gulls, as well as other species associated with wetland/coastal habitats such as heron, cormorant and grebes.</p>
Otter <i>Lutra lutra</i>	<p>An otter survey was completed on 24th October 2017. This comprised searches for field signs, including spraints, confirmed shelters, feeding remains, slides, prints and tracks. The survey included all land within, and up to 250 m beyond, the wider Carless landholding boundary where access allowed.</p>
Water vole <i>Arvicola amphibious</i>	<p>A water vole survey was completed on 24th October 2017 within the wider Carless landholding and up to 50m beyond the boundary in suitable habitats, where access allowed. The survey comprised searches of ditch margins for water vole signs,</p>

Ecological Feature	Survey Scope and Outline Methods
	<p>including feeding stations, latrines, footprints, burrows and runs, as well as actual sightings of voles. The focused on stretches of watercourses and ponds previously identified as offering habitat suitable for water vole.</p>
Bats (Roosts)	<p>A Preliminary Roost Appraisal (PRA) and Ground Level Tree Assessment (GLTA) was carried out on 28th September 2017 within the wider Carless landholding (encompassing the site) for any remaining structures and associated concrete tunnels within the site and trees. The PRA was undertaken in accordance with current best practice survey guidance produced by the BCT (Collins, 2016). Existing structures were carefully inspected externally for features which might typically provide access for roosting and/or hibernating bats. Trees were inspected from ground level, using binoculars if necessary, for features considered to be suitable for bats, including cracked or flaking bark, split limbs or trunks, ivy cladding, knot holes, woodpecker holes and bird/bat boxes. Consideration was also made of the habitat context of a tree – its connectivity with and/or proximity to suitable bat commuting or foraging habitat, and accessibility for a flying bat.</p>
Bats (foraging and commuting)	<p>The Study Area used for bat surveys included all the land within the wider Carless landholding (encompassing the site). A manual bat survey transect route was walked on four occasions between October 2017 and July 2018. The route was devised to ensure good coverage of the Study Area, and its component habitats. The route initially (in October 2017) had ten points where timed recording stops were made. This was subsequently reduced to 8 points for the 2018 surveys due to parts of the Study Area becoming inaccessible due to site investigation works. Four of these points (points 1, 2, 9 and 10) fall within the site boundary.</p> <p>Each transect started at sunset and was typically completed within 2 hrs. The route was walked slowly between point count locations, and surveyors were stationary at each stopping point for 5 mins. Bat passes at each stopping point and en route between points were recorded, along with species, type of activity, flight height and direction of flight, where these parameters could be determined. Experienced surveyors carried out the manual transects, using Pettersson D-230 frequency division detectors in tandem with a continually recording static SM2+ detector, carried in a backpack with its microphone mounted externally</p> <p>Remote detector surveys were carried out four times; once during each of October 2017 and May, June and July 2018. SM2+ detectors were used, and in accordance with the standard protocol for remote detector surveys (Collins, 2016), were placed out within the Study Area for at least five consecutive nights each month. Remote detector locations were selected to provide good coverage and to incorporate the different habitat features present, such as woodland edges and boundary features. Seven detector locations were monitored in October 2017. This was reduced to five locations in each of May, June and July 2018 due to vegetation (that had previously been used to conceal static detectors) having been removed as part of site investigation works (which also rendered parts of the Study Area inaccessible). Two static locations (statics 5 and 6) fell within the site itself in October 2017. This was reduced to one slightly revised location (static 6 only) for the May to July 2018 monitoring periods for the reasons given above.</p>

Ecological Feature	Survey Scope and Outline Methods
Breeding Birds	<p>A survey method based on the Common Bird Census (CBC) technique was used to count and map breeding birds within the wider Carless landholding (defined as the Study Area). This area was covered by one transect route which was walked at a slow speed with a stop to listen and visually scan for birds at roughly 50 m intervals. The transect route ensured all parts of the Study Area were covered to at least 100 m and where possible to within 50 m.</p> <p>Survey visits were carried out throughout spring and summer 2018 to maximise the recording of breeding bird behaviour across a range of species. Visits were completed on 9th April, 1st and 31st May, 15th June and 9th July. Visits were carried out in the morning, starting between 07:00 and 08:00 with each survey usually taking 2-3 hrs to complete. All birds encountered were recorded on a field map using BTO activity codes. This included recording behaviours which were considered to indicate breeding such as:</p> <ul style="list-style-type: none"> ▪ a singing male on territory; ▪ birds carrying nesting material or food to chicks; ▪ alarm calling or other displays indicating the presence of young. <p>All species active within the Study Area were recorded with the exception of birds whose activity was clearly not associated with it; for example, high flying gulls passing overhead.</p> <p>Data were subsequently digitised in GIS and their evaluation was based on analysis of species number, distribution and their allocated conservation status (e.g. according to Eaton <i>et al.</i>, 2015).</p>
Overwintering birds (terrestrial)	<p>A Study Area was defined for the terrestrial wintering bird survey including all land within the wider Carless landholding (encompassing the site).</p> <p>A single transect route was established within the Study Area, which was walked twice a month, between October 2017 and March 2018 inclusive, at a slow speed. Transects were timed to cover all hours of daylight and were carried out in sufficient daylight to take into account the later timing of sunrise in the winter months. All birds seen and heard were marked on pre-prepared base maps, using a reduced version of the Common Bird Census (CBC) notation, focussing on species, number of birds and direction of movement. Data were subsequently digitised in GIS and their evaluation was based on analysis of species number, distribution and their allocated conservation status (e.g. according to Eaton <i>et al.</i>, 2015).</p>
Great crested newt	<p>A great crested newt (GCN) Habitat Suitability Index (HSI) appraisal was undertaken on 23rd August 2017 for nine ponds within proximity of the site (up to 500m) using the standard HSI methodology (Oldham <i>et al</i> 2000). This included two ponds (Pond 1 and Pond 2) located within or on the edge of the site itself, plus a further seven ponds (Ponds 3 to 9) located in the remainder of the wider Carless landholding to the south-east.</p>

Ecological Feature	Survey Scope and Outline Methods
	<p>eDNA (“environmental DNA”) sampling was undertaken of eight accessible ponds (no safe access to Pond 1 was available). The waterbodies at the site were sampled on 16th April 2018 using eDNA survey kits provided by ADAS Ltd. Survey work was timed to coincide with the GCN breeding period and took place during favourable weather conditions. It was not possible to survey Pond 1 as no safe access to the water’s edge could be found. This was not a limitation to the overall results as Pond 1 was concrete walled and was not suitable for GCN due to the height of the walls. Samples were returned to ADAS for their Fast Track analysis service.</p>
Reptiles	<p>100 artificial reptile refugia cut from roofing felt (measuring approximately 0.5 x 0.5 m) were placed in groups within areas of suitable reptile habitat within the wider Carless landholding on 13th September 2017. Fifty of these refugia were positioned in the site itself.</p> <p>Following a bedding-in period of just under one week, the refugia were checked on four separate days between 19th and 28th September 2017. Checks were made for reptiles either basking on top of or lying underneath the felts. Refuge checks were only carried out in periods of suitable weather for reptile activity, in the absence of high winds and rain, and when air temperatures were between 9°C and 18°C. Additionally, refuge checks were delayed until it was clear that the felts had been warmed by the first sunshine of the day</p>
Badger	<p>A survey for badger field signs was undertaken on 24th October 2017 within the wider Carless landholding and up to 50 m from its boundary. Evidence of badger activity was searched for, including: setts, latrines and dung pits, badger hair, footprints, trails and evidence of foraging.</p> <p>The survey focussed on habitats potentially suitable for sett excavation, including woodlands, woodland margins, embankments and other drier parts of the area surveyed. All identified badger signs, confirmed or potential, were noted and their locations recorded using a hand-held GPS.</p>

Other Information

9.3.11 This assessment considers likely direct and indirect ecological effects from the proposed development and therefore draws upon other relevant assessments of likely direct physical environmental effects which could result in indirect effects on ecological interests (e.g. habitat effects resulting from changes in ground conditions and disturbance effects on ornithological species resulting from noise and visual impacts). This assessment should therefore be read in conjunction with the following technical assessment chapters, which have informed the determination of the level and significance of related ecological effects:

- **Chapter 6 – Ground Conditions;**
- **Chapter 8 – Hydrology and Flood Risk;**
- **Chapter 12 – Air Quality;**
- **Chapter 13 – Noise and Vibration;** and,
- **Chapter 14 – Landscape and Visual Impact Assessment;**

Approach to Assessment

Consideration of Relevant Receptors

9.3.12 Based on the information sources outlined above, the current and likely future baseline characteristics of the site and the surrounding area was characterised. This led to the identification of relevant sensitive receptors to consider within the assessment, as detailed within **Section 9.4 – Baseline Conditions**. Any likely changes in the sensitivity of identified important ecological features resulting from the implementation of the proposed remediation works were then identified and taken account of in the impact assessment.

Evaluation and Impact Assessment Methodology

9.3.13 In accordance with the CIEEM Guidelines (2018), this impact assessment examines effects on important ecological features with reference to the extent, magnitude, duration, timing, frequency, and reversibility of the impacts. For each ecological feature within the Study Area (as defined above), the baseline is identified and evaluated. For each important ecological feature, relevant impacts are characterised; effects defined and their significance assessed; mitigation, compensation and enhancement measures identified and residual effects reported. This exercise is performed for the construction and operational phases of the project separately.

Terminology

9.3.14 The terms ‘impact’ and ‘effect’ are often used synonymously, and this can lead to confusion. For the purposes of this EclA they are defined as follows, in accordance with CIEEM guidance (2018):

- **Impacts:** Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow.
- **Effects:** Outcome to an ecological feature from an impact. For example, the effects on a dormouse population from a loss of a hedgerow.

Establishment of Effect Significance

9.3.15 The importance of ecological features potentially affected by the proposed development was evaluated using Chartered Institute of Ecology and Environmental Management (CIEEM) Ecological Impact Assessment guidance (CIEEM, 2018). This process recognises that that determining ecological importance is a complex process, which is a matter of professional judgement guided by the importance and relevance of a number of factors. These include designation and legislative protection as well as biodiversity value, potential value (e.g. where appropriate management would improve the value of degraded habitats) and secondary/supporting value (e.g. where habitats may function as a buffer or resource associated with an adjacent designated area).

9.3.16 Factors such as extent, magnitude, duration, timing, frequency, and reversibility provide a means of characterising the impacts of the proposed development and thereby support an assessment of the significance of the effects on the important ecological features determined

as relevant in this assessment. CIEEM guidance (CIEEM 2018) states that a ‘significant effect is an effect that either supports or undermines biodiversity conservation objectives for important ecological features or biodiversity in general’.

9.3.17 This guidance recommends that the evaluation of ecological features associated with a site is made with reference to a geographical framework, i.e. a feature may be of importance within the following context:

- International or European;
- National (Scotland);
- Council or Regional (West Dunbartonshire);
- Local (Dumbarton); and
- Site (the site).

9.3.18 The lowest geographic threshold at which a feature may be considered important (and as such, susceptible to a significant effect that would form a material consideration during planning) is ‘Local’ (i.e. Dumbarton). As such, only features of importance at the ‘Local’ threshold or greater are subject to impact assessment. However, where protected species (of less than Local importance) are nonetheless present, measures to ensure compliance with relevant wildlife legislation have also been included. This ensures that the impact assessment remains focused on the most important potential ecological effects associated with the project.

9.3.19 An effect on an important ecological feature may be considered to be significant at a variety of geographic scales from international to ‘Less than Local’ (i.e. within the context of the site or its immediate environs only). The effect may be significant at the same geographic scale at which the feature is determined to be important, or at a lesser geographical scale, depending on the characterisation of the impact. This methodology supports an evidence based approach and supersedes and replaces the matrix based assessment methodologies.

Approach to Residual Effects

9.3.20 The CIEEM Guidelines state that: “a sequential process should be adopted to avoid, mitigate and compensate ecological impacts”. These measures should be described within the EclA and should be sufficient to allow the competent authority and relevant stakeholders to see clearly how the impacts will be addressed (CIEEM, 2018). The guidance advises that ‘enhancement measures should be designed to deliver biodiversity objectives that are specified in relevant policy documents. They should be incorporated into scheme design and assessed within the EclA’.

9.3.21 Residual impacts are those that remain after the implementation of ‘avoidance, mitigation, compensation and enhancement’ measures. These are then assessed to determine the significance of their effects on important ecological features.

9.3.22 Residual significance (taking account of proposed mitigation and enhancement measures) have been expressed using the generic EIA significance criteria for the EIA Report. For ease of reference, **Table 9.2** *Error! Reference source not found.* below provides a means of relating the two approaches and has been used to enable an EclA compliant assessment to be integrated into the EIA Report in a consistent manner without compromising the CIEEM best practice approach.

Table 9.1: EclA and EIA Significance Criteria Conversion

EIA Significance		Generic Environmental Criteria	CIEEM geographical criteria
Significant	Substantial	Effects observed on an international, national or regional scale (i.e. greater than local impact) which represent key factors in the decision-making process. The effects are also very likely to have influenced the design and/or operational characteristics of the proposed development	Ecological impacts assessed as being significant at national or higher geographical scales and that have triggered a response in development control terms are considered to represent impacts that overall fit

EIA Significance		Generic Environmental Criteria	CIEEM geographical criteria
			within this assessment, are of substantial significance.
	Major	Effects observed on a regional, local or district scale which are likely to be important and may become key considerations in decision making. The effects are also likely to have influenced the design and/or operational characteristics of the proposed development.	Ecological impacts assessed as being significant at the regional scales and that has triggered a response in development control terms are considered to represent impacts that overall within this assessment are of major significance.
	Moderate	Effects observed on a local scale which, whilst important locally, are not likely to represent key factors in the decision-making process. The effects are also likely to have influenced the design and/or operational characteristics of the proposed development.	Ecological impacts assessed as being significant at the county scale, and that have triggered a response in development control terms, will be considered to represent impacts that overall within this assessment are of moderate significance.
Not significant	Minor	Effects observed on a local scale which may be raised as local issues but are unlikely to be key factors in the decision-making process. The effects may still have influenced the design and/or operational characteristics of the proposed development.	Ecological impacts assessed as being significant at the local scale, and that have triggered a response in development control terms, will be considered to represent impacts that overall within this assessment are of minor significance.
	Negligible	Effects observed on a local scale which are beneath the level of perception and therefore would not be important factors in the decision-making process. Owing to their minimal level, the effects would not have influenced the design characteristics of the proposed development and should not be considered by the decision-maker.	Ecological impacts that have been assessed as not being significant at any geographic scale, including the 'Local' level.

9.3.23 In accordance with the TCPA EIA Regulations, negligible and minor effects are considered to be 'not significant', whereas moderate, major and substantial effects are considered to be 'significant'.

Approach to Cumulative Impact Assessment

9.3.24 From reviewing the relevant cumulative developments listed in **Section 2.4**, it considered that there is no potential for significant cumulative effects to occur on terrestrial ecology. This is due to the physical separation of the site from the relevant cumulative developments. A cumulative impacts assessment is therefore not required and has been scoped out of this assessment.

Assumptions and Limitations

9.3.25 All limitations associated within the individual ecological baseline surveys carried out in support of this assessment are detailed within the respective technical reports included in **Appendix 9.2**. Key assumptions and limitations are:

- The surveys undertaken to inform this assessment were undertaken in accordance with the best practice methods current at the time of commissioning. Site circumstances, scientific knowledge or methodological requirements can change over the course of a project, and these external factors may impact on the scope of subsequent work requirements.

- All survey work and reporting was undertaken by experienced and qualified ecologists, in accordance with the Code of Professional Conduct of CIEEM.
- All ecological surveys have an expected validity period owing to the tendency of the natural environment to change over time. This validity period varies from receptor to receptor and is also dependant on the degree of change in a site's management and overall landscape ecology. Where the potential for change is considered to be relevant to the site, this is highlighted in the appropriate section.
- The report does not purport to provide detailed or specialist legal advice. Where legislation is referenced, the reader should consult the original legal text, and/or the advice of a qualified environmental lawyer.

9.4 Current Baseline Conditions

9.4.1 This section provides an overview of current ecological conditions within both the site and the surrounding area (including the wider Carless landholding situated immediately to the east of the site).

Designated Sites

9.4.2 A number of statutorily and locally designated sites are located within 2km of the site. The nearest statutory designated area is the Inner Clyde Special Protection Area (SPA), Ramsar site and Site of Special Scientific Interest (SSSI), a section of which is located directly adjacent to the west/south-west edge of the site. Although these are three separate designations, all are collectively called the Inner Clyde and are contiguous in area which covers approximately 1,825Ha of the estuary.

9.4.3 The SPA is designated for its internationally important overwintering population of redshank *Tringa totanus*. The Inner Clyde SSSI, contiguous with the SPA, includes additional bird species on its citation as being reasons for its notification. These species are non-breeding (i.e. overwintering) cormorant *Phalacrocorax carbo*, eider *Somateria mollissima*, goldeneye *Bucephala clangula*, oystercatcher *Haematopus ostralegus*, red-breasted merganser *Mergus serrator* and red-throated diver *Gavia stellata* in addition to the overwintering redshank (as per the SPA). The SSSI is also notified for its saltmarsh habitat, with good examples of transitions from saltmarsh to brackish swamps and grassland periodically inundated with sea water. The Ramsar citation also reflects the habitats supporting the bird interest including: tidal mudflats and shoreline of semi-natural coastal vegetation including saltmarsh. The qualifying species identified are the wintering redshank population, as for the SPA (see **Appendix 9.4** for full citation information of the Inner Clyde SPA, SSSI and Ramsar from SNH and JNCC).

9.4.4 One Local Nature Reserve (LNR), The Saltings LNR, is situated approximately 310 m north-west of the site at its closest point. It comprises regenerated woodland and meadow and is notable for its wetland habitats and bird assemblage. In terms of non-statutory designations, there are five Local Nature Conservation Sites within 2 km of the site. The nearest LNCS is the Disused Railway Line & Erskine Ferry Road LNCS, which is situated adjacent to the northern/north-eastern boundary of the site.

Terrestrial Habitats

9.4.5 The site is dominated by bare ground considered to be of negligible nature conservation value. No habitats listed in Annex 1 of the EU Habitats Directive were recorded within the site. This area is therefore considered to be of **negligible** (<site) value, and will not be considered any further within this assessment.

9.4.6 Terrestrial habitat surveys within the wider Carless landholding revealed a mosaic of early successional woodland, scrub and more open vegetation communities typical of recolonising brownfield sites. Habitats were dominated by relatively early successional woodland, and the swamp habitats which had colonised the holding tanks in the land in the south-east (i.e. outside the site itself). No habitats listed in Annex 1 of the EU Habitats Directive were recorded within the wider Carless landholding.

- 9.4.7 The woodlands dominating the wider Carless landholding were self-seeded communities which had developed on previously disturbed ground. Although the woodlands were floristically variable between stands, they tended to be species-poor. Greater levels of species diversity were noted within the woodlands along the route of the disused railway line. The habitats with greater interest, such as the marshy grasslands and swamps, were also relatively species-poor. Overall, the terrestrial habitat mosaic across the wider Carless landholding is considered to be of **Local** (Dumbarton) to **site** value. Terrestrial habitats within the wider Carless landholding, will therefore not be considered further within this assessment.
- 9.4.8 A summary of overall habitat types recorded within the wider Carless landholding (including the site) and a justification for their specific evaluation is provided in **Table 9.3** below. It should be noted that the majority of these habitats (with the exception of areas of bare ground) will not be directly affected by the proposed development.

Table 9.3: Habitat Types identified within the Wider Carless Land Holding including the site (including their Value)

Habitat Type	Value	Justification
Bare ground	<Site	Largely unvegetated habitat of recent origin with negligible intrinsic ecological value.
Buildings/structures	<Site	Widespread and commonplace habitat with limited intrinsic ecological value.
Continuous bracken	<Site	Widespread and commonplace habitat with limited intrinsic ecological value which may threaten other more valuable habitats if unchecked.
Dense scrub	Site	Widespread and commonplace habitat, but contributes to the value of the overall ecological mosaic
Ephemeral/short-perennial	Site	Open mosaic habitats on previously development land is listed on the Scottish Biodiversity List and was previously listed on the pre-2010 UK BAP as a priority habitat. However, this is a relatively small area of this habitat type but is important for its diversity and position in the wider ecological mosaic.
Hard-standing	Site	Widespread and commonplace habitat, but at Carless having some value due to the scattered presence of species of ecological interest.
Intertidal	Site	Small area of a widespread habitat, which contributes to the value of the overall ecological mosaic.
Marshy grassland	Site	Some of the marshy grassland types recorded within the wider Carless landholding had relatively high species diversity. These will be important locally for their size and relative rarity within the Dumbarton area, and their position in the overall ecological mosaic.
Neutral grassland (of recent origin)	Site	Widespread and commonplace habitat, but contributes to the value of the overall ecological mosaic
Semi-improved neutral grassland	Site	Widespread and commonplace habitat, but contributes to the value of the overall ecological mosaic
Semi-natural broadleaved woodland	Local	Assessed in relation to the Disused Railway LNCS. Broadleaved woodlands are listed on the Scottish Biodiversity List and are habitats for which conservation action is needed in Scotland. They were also previously listed on the pre-2010 UK BAP as a priority habitat. However, those in the wider Carless landholding are predominantly early successional types of woodland which decreases their potential value. Nevertheless, they

Habitat Type	Value	Justification
		remain locally important due to their abundance within the wider Carless landholding and their position in the overall ecological mosaic. They are also included on the Dunbartonshire LBAP.
Standing water	Local	Small areas of habitat important within the wider Carless landholding for their relative rarity within the locality, and their position in the overall ecological mosaic. Ponds are also listed on the Scottish Biodiversity List as habitats where conservation action is needed, and also on the Dunbartonshire LBAP.
Swamp	Local	Relatively large areas of habitat, important within the wider Carless landholding for their relative rarity within the wider locality, and their position in the overall ecological mosaic.
Tall non-ruderal vegetation	Site	Widespread and commonplace habitat, but contributes to the value of the overall ecological mosaic
Tall ruderal vegetation	Site	Widespread and commonplace habitat, but contributes to the value of the overall ecological mosaic
Tall ruderal/scattered scrub	Site	Widespread and commonplace habitat, but contributes to the value of the overall ecological mosaic
Unimproved neutral grassland	Local	Relatively large extents of a widespread and commonplace habitat, some areas of which contained species which are less common within the local area. This habitat also contributes to the value of the overall ecological mosaic.
Unimproved neutral grassland/scattered scrub	Local	Relatively large extents of a widespread and commonplace habitat, some areas of which contained species which are less common within the local area. This habitat also contributes to the value of the overall ecological mosaic.
Watercourses	Site	Widespread and commonplace habitat, but contributes to the value of the overall ecological mosaic

Overwintering Birds (Intertidal)

- 9.4.9 As detailed in relevant technical reports within **Appendix 9.2**, a total of 31 overwintering bird species associated with the Inner Clyde, its mudflats and immediate habitat were recorded over the survey period within the Study Area as a whole, with the largest number of individuals over the entire survey period being of black-headed gulls *Chroicocephalus ridibundus* (3754), followed by teal *Anas crecca* (3019) and mallard *Anas platyrhynchos* (1177).
- 9.4.10 The survey data indicated that the key area for intertidal birds during the survey period was the flats around the area known as Bottombow Island located on the opposite (north-west) shore of the Inner Clyde to the site. This area is approximately 220m from the site boundary at its closest point. Other areas regularly used included the shoreline adjacent to and south-east of Bottombow Island on the opposite shoreline running parallel with the site boundary (approximately 175m from the site boundary). Parts of the shoreline along the site boundary were also used, although the area north-west of the site adjacent to existing industrial units (Logitech) were more used. Birds also used the shoreline adjacent to the site side of the Clyde further to the south-east (i.e. adjacent to the remaining part of the wider Carless landholding). With regards to the conservation status of the birds counted, 66.7% of all species recorded within the Study Area were either red or amber list birds of conservation concern (BoCC; see Eaton et al., 2015).
- 9.4.11 The key area for redshank (the qualifying species within the Inner Clyde SPA) was also the area of intertidal mud at Bottombow Island on the shoreline opposite the site (approximately 220m from the site). Redshank were also recorded in reasonable numbers on the shore opposite Bottombow Island, immediately north of the site (i.e. the shoreline adjacent to the existing Logitech industrial units).
- 9.4.12 Aside from redshank interests, key survey observations relating to species included within Inner Clyde SSSI citation (provided in full in **Appendix 9.4**) were:
- Cormorant tended to be recorded in the water, scattered throughout the Study Area. There was no significant effect of tidal state on the numbers of cormorant recorded.
 - Goldeneye were generally recorded in low numbers in the water, with no significant relationship with tidal state.
 - After redshank, oystercatcher was the most frequently recorded SSSI bird species. Its numbers peaked in February 2018, and its habitat usage mirrored that of the redshank, with concentrations around Bottombow Island and the shoreline to the north of the site. It had a clear relationship with the tidal cycle, with numbers peaking just before low tide. However, small numbers of this species did persist in the count area at high tide.
 - Like goldeneye, red-breasted mergansers were recorded sporadically throughout the whole tidal cycle and in low numbers. These birds were predominantly on the water.
 - A single red-throated diver was recorded in January 2018.
- 9.4.13 The survey data indicates a moderate level of activity for redshank and other species associated with the Inner Clyde SPA/ Ramsar & SSSI, such as oystercatcher, within the Study Area. Activity was particularly associated with the Bottombow Island area and on the opposite shore, north of the site. The Bottombow Island area is sheltered as well as supporting intertidal mudflats, and this combination of features is relatively rare within the SPA as a whole. The shoreline just north of the site is an area of mudflat at low tide; unusual along the local stretch of shoreline that is predominantly rocky or with man-made structures. The habitat characteristics of these are likely to increase their importance for redshank and other birds in the context of surrounding habitats of lower potential value.
- 9.4.14 In evaluating the importance of the section of the Inner Clyde adjacent to and within proximity of the wider Carless landholding site (i.e. the Study Area), it is noted that the Study Area contained 0.17 % of the land within the SPA boundary, but over the survey period supported more than 0.17 % of the SPA redshank population (in all surveyed months). This is not surprising given that redshank will move around the total SPA habitat resource selecting the optimal areas for foraging and roosting at different tidal states and different times of day. Not all areas will be used equally, but many areas will see similar peak numbers as the birds move

around them. Other detailed studies of parts of the SPA have recorded redshank numbers representing a proportion of the entire SPA population of around 6-10 times more than the proportion of the SPA area sampled. With this in mind, the part of the SPA included in the survey undertaken to inform this assessment can be seen as being of lower value than the SPA as a whole and/or other parts of the SPA that may be more regularly used or used by greater numbers of redshank. Nonetheless, it is likely to have an important role for low tide feeding for redshank within the overall SPA population. Based on the peak count of 30 redshank from March 2018, this is equivalent of up to 1.43% of the overall Inner Clyde population that may be present in proximity to the wider Carless landholding as any one time.

- 9.4.15 However, in determining whether any effects on these species will be ecologically significant it is recognised that only sporadic/low levels of use of the areas in proximity to the site were recorded by some species (goldeneye, red-breasted merganser and red-throated diver) with no use by eider recorded. While more regular use by redshank, cormorant and oystercatcher were recorded, this will only represent a small proportion of the overall SSSI populations. Table 9.4 provides a breakdown of the proportion of the Inner Clyde peak wintering population that may be present at the site. These have been calculated using field survey data and data presented in the SNH Inner Clyde Information Sheet (2008).

Table 9.4: Over Wintering (Intertidal) Bird Peak Count Data

Species	Peak Count Recorded	SPA/ Ramsar Cited Winter Peak Mean	Proportion of Peak Winter SPA Population	Proportion of SSSI Peak Winter Population
Redshank	30	2,107	1.43%	N/A
Cormorant	32	405	N/A	7.90%
Eider	0	1,060	N/A	0%
Goldeneye	4	317	N/A	1.26%
Oystercatcher	49	3,292	N/A	1.49%
Red-breasted merganser	23	Not Available	N/A	N/A
Red-throated diver	1	Not Available	N/A	N/A

- 9.4.16 Over wintering birds (redshank) associated with the SPA/Ramsar, the SPA/Ramsar are of **international** value. Therefore will be further assessed in relation to the proposed development.
- 9.4.17 Similarly, the special interest features of the SSSI (populations of cormorant, eider, goldeneye, oystercatcher, red-breasted merganser and red-throated diver) are of **national** value. Therefore will be further assessed in relation to the proposed development.

Other Protected and Notable Species

Otters

- 9.4.18 There was little evidence of otter activity recorded during the survey, with no sprainting activity found anywhere within the wider Carless landholding.
- 9.4.19 One resting site was identified to the south-west of the site, underneath a fallen tree which had created a number of dry sheltered areas. An old spraint was found within one of these sheltered areas, and a second old spraint was found on a rock next to the fallen tree. Anal jelly (an otter secretion) was also found outside the entrance of the resting site. Otter footprints were also found in mud under a footbridge over a small tributary of the Clyde on the opposite bank (south-west) to the site within the wider Study Area. No signs of otter were recorded along the canal to the north-east of the wider Carless landholding.

9.4.20 The field signs of otter recorded in conjunction with an appraisal of the habitats present indicate that this species uses the tidal areas of the Clyde adjacent to the site for foraging and commuting, with an above ground rest site confirmed to the south-west of the site. Amphibians species such as smooth and palmate newts (a potential prey item for otter) were regularly recorded within the wider Carless landholding during other survey work. It is therefore possible that otters occasionally use the wider Carless landholding and its shoreline. However, based on the level of activity indicated by field signs recorded, in the wider Carless landholding and its surroundings are of **Local** (Dumbarton) value to otters. They will therefore be considered further in the detailed assessment.

Water Voles

9.4.21 No evidence of water voles was recorded within the wider Carless landholding during the survey. This species is therefore deemed likely to be absent and therefore will not be considered any further in this assessment.

Bats (Roosts)

9.4.22 No structures or trees within the wider Carless landholding were found to offer conditions or have features capable of supporting roosting bats. The site is therefore considered to be of negligible value to roosting bats and will not be considered any further in this assessment.

Bats (Foraging and Commuting)

9.4.23 A single species of bat was recorded using the site during all the walked transect surveys combined: the soprano pipistrelle *Pipistrellus pygmaeus*. No bat activity was recorded at all during the October 2017 survey, with only low levels of activity recorded during the May to July 2018 surveys. In total, three passes of soprano pipistrelles were recorded within the site (with a further nine passes recorded in the wider Study Area to the south-east).

9.4.24 The static detectors positioned within the site recorded a total of three species of bat: common pipistrelle *P. pipistrellus*, soprano pipistrelle and a *Myotis* species thought most likely to be Daubenton's bat *Myotis daubentonii* given this species geographical distribution and the type of habitats present, or possibly (although less likely given its scarcer status in Scotland) Natterer's bat *Myotis natterei*. Activity levels within the site were typically low, with very few bats recorded in October 2017 (10 soprano pipistrelle passes from Static 6 and no activity at all at Static 5) recognising this was a late season survey. Data from the May to July 2018 monitoring is likely to be more 'normal' as these periods fall within the core activity period for bat species. Only one static (Static 6) was present within the site itself during these periods. Activity recorded in May 2018 was still low, with a total of six common pipistrelle passes, 29 soprano passes and two *Myotis* passes. Activity in June was higher (although still unexceptional) with 30 common pipistrelle passes and 529 soprano pipistrelle passes. The activity in July was reduced from this, with four common pipistrelle passes and 123 soprano pipistrelle passes recorded.

9.4.25 The bats recorded as using the wider Carless landholding were predominantly common and soprano pipistrelle species, with only very limited *Myotis* activity (two passes). These are the most common and widespread species occurring in the UK, including in central Scotland. Given the presence of a bat assemblage dominated by common and widespread species of least conservation concern and generally low levels of activity, the site is of no more than **site** (Dumbarton) value to foraging and commuting bats. This species will not be further considered within the impact assessment but will be considered in relation to legislative compliance.

Breeding Birds

9.4.26 A total of fourteen species of bird were recorded as confirmed or potential breeding species within the site in 2018. A further two species were recorded using the wider Carless landholding, but with no evidence of breeding (with a lack of suitable nest sites noted). The species recorded using the site (breeding and non-breeding) together with their conservation status and estimated number of territories within or overlapping the site boundary are summarised in **Table 9.5** below. Conservation status is taken from Birds of Conservation Concern 4 (Eaton *et al*, 2015).

Table 9.5: Breeding Bird Species Recorded on Site

Species	BoCC Status	Present/Recorded				Bred?	No. Territories	Comments
		Apr	May	Jun	Jul			
Blackbird	Green	✓	✓	✓	✓	Yes	1	Behaviour indicated breeding
Blackcap	Green	✓	✓	-	✓	Yes	1	Singing birds in suitable habitat
Blue tit	Green	✓	✓	✓	✓	Yes	1	Families seen
Bullfinch	Amber	✓	✓	✓	-	Probably	1	Pairs present in suitable habitat
Carrion crow	Green	✓	✓	✓	✓	Yes	2	Nest and juvenile birds seen
Dunnock	Amber	✓	✓	✓	✓	Yes	2	Must have bred, many suitable territories
Feral pigeon	N/A	-	✓	✓	✓	Probably	2	Suitable sites in piers
Goldfinch	Green	✓	✓	✓	✓	Yes	1	Singing birds, families seen
Great spotted woodpecker	Green	-	-	-	✓	No	0	No suitable trees on site
Jackdaw	Green	✓	✓	✓	✓	No	0	No suitable nest sites
Magpie	Green	✓	✓	✓	✓	Yes	1	Fledged young seen
Moorhen	Green	✓	✓	✓	✓	Yes	1	One territory on south-east edge of site
Robin	Green	✓	✓	✓	✓	Yes	4	Nest found
Willow warbler	Amber	✓	✓	✓	✓	Yes	6	Behaviour indicated breeding
Woodpigeon	Green	✓	✓	✓	✓	Yes	1	Old nests found
Wren	Green	✓	✓	✓	✓	Yes	6	Must have bred, many territories

9.4.27 Overall the assemblage of birds using the site in the breeding season is characterised by common and widespread species with broad habitat requirements. Species with more specialised habitat requirements (e.g. woodpeckers) were recorded as present within the site, but with no evidence of breeding due to a lack of suitable nest sites. In addition, many species were present in low numbers (1 or 2 pairs/territories) with only robin (4 territories), willow warbler (6 territories) and wren (6 territories) being more numerous. However, robins and wrens often occur in high densities and are typically amongst the commonest bird species encountered across the UK where mixed habitats (such as those present within the wider Carless landholding) occur. The mixture of young secondary woodland and scrub within the site also provides good conditions for willow warbler.

9.4.28 The assemblage of birds on the site is dominated by 'green' listed species; i.e. those that do not qualify under any specific conservation status criteria so are of least concern. Three 'amber' listed species were recorded as breeding on site; bullfinch, dunnock and willow warbler. Amber list species are those that are considered to be of medium conservation concern (i.e. they have suffered a moderate national decline in recent years). The presence of these species is therefore of increased conservation value; however, all three species are still common and

widespread across the UK. Only a single territory of bullfinch and two of dunnock were recorded. Willow warbler was more numerous, with six territories estimated. It is noted that the decline on this species has been more pronounced in southern England, with a slight increase reported in Scotland by the British Trust for Ornithology (BTO) since 1995 (www.bto.org and Morrison *et al*, 2010).

- 9.4.29 Given the dominance of common species of bird with the assemblage recorded and the generally low numbers of territories of each species recorded, the site is of **site** (Dumbarton) value to breeding birds. This species will not be further considered within the impact assessment but will be considered in relation to legislative compliance.

Overwintering Birds in Terrestrial Habitats On Site – Non SPA/SSSI Species

- 9.4.30 The site did not support concentrations of wintering birds of high conservation value such as those listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Thrush species included on the Birds of Conservation Concern 4 (Eaton *et al*, 2015) red list (i.e. those of high conservation concern), namely fieldfare *Turdus pilaris*, song thrush *Turdus philomelos* and redwing *Turdus iliacus*, were frequently recorded but this is not deemed to be exceptional as all are widely distributed across the UK countryside in winter. In addition, these thrush species are red-listed due to their decline in breeding status with the populations of each being augmented by migrants during the winter months. The relatively large number of red-listed birds on the wider Carless landholding was therefore a result of a few large flocks of redwings and fieldfares.
- 9.4.31 There were few sightings of birds using the jetties. A single black-headed gull *Chroicocephalus ridibundus* was seen perching on the north end of the jetties and there were also sightings here of a pied wagtail *Motacilla alba* and a group of magpies *Pica pica*. Observations from both the on-site over-wintering bird and other winter surveys completed on and around the site indicated that the jetties were of little value to any birds other than feral pigeons *Columba livia domestica*. Observations from other intertidal bird surveys indicated that the jetties were sometimes used by kingfishers *Alcedo atthis* for perching and hunting but otherwise they were rarely used by any aquatic or marine species.
- 9.4.32 Overall, a total of thirty-six species of bird were recorded using the wider Carless landholding during the overwintering terrestrial bird survey (see **Appendix 9.2**). However, it should be noted that this includes species that were only or primarily recorded using habitats outside the site boundary. Under criteria developed by Fuller (Fuller, 1980), the total of thirty-six species recorded within the wider Carless landholding ranks it as being of **Local** (Dumbarton) importance for wintering birds (54-25 species). As indicated above, the site itself likely ranks lower than this, but due to the mobile nature of wintering bird flocks and the proximity of records located off-site (i.e. within land nearby to the south-east) the value of Local is deemed appropriate to be taken forward into the impact assessment on a precautionary basis (i.e. as some or all these species may use the site on occasion).

Great Crested Newts

- 9.4.33 All nine ponds within the wider Carless landholding were assessed for habitat suitability produced an HSI score of < 0.5, indicating poor suitability for great crested newts. However, these low scores were primarily derived from the locational weighting applied to the index, in that all waterbodies in the Central Belt of Scotland are automatically classified as having marginal suitability. Plant species suitable for egg-laying occurred around the fringes of many of the waterbodies. Pond 2 contained tadpoles, confirming that breeding amphibians were present, and juveniles of both smooth and palmate newts were regularly recorded under artificial refuges during the reptile surveys undertaken on the wider Carless landholding site.
- 9.4.34 All eight of the sampled waterbodies returned negative results for great crested newt following analysis of the eDNA samples. This confirms this species is absent from the wider Carless landholding (encompassing the site). It will therefore not be considered further within this assessment.

Reptiles

- 9.4.35 No reptiles were recorded on or underneath any refugia within the wider Carless landholding during the survey, nor were reptiles seen elsewhere during other ecological surveys completed.

This species group is therefore considered absent from the site and will not be considered any further in this assessment.

- 9.4.36 Non-target (i.e. non-reptile) species noted as utilising the refugia included regular records of smooth newt *Lissotriton vulgaris* and palmate newt *Lissotriton helveticus* underneath refugia located through the wider Carless landholding site as well as occasional records of common toad and field vole.

Badgers

- 9.4.37 The majority of the wider Carless landholding was found to be unsuitable for sett creation as it comprised large areas of hard standing overgrown with scrub.
- 9.4.38 A potential two-hole disused sett was found along the embankment of the disused railway corridor within the wider Carless landholding (approximately 115m from the site boundary). Large but old and vegetated spoil heaps were located adjacent to the entrances and the holes were full of leaf litter suggesting they had not been used in some time. One hole had partially collapsed and although the other hole was still large enough for badger, it showed no signs of recent use. No obvious mammal paths were recorded nearby leading to this sett nor were there any latrines or signs of foraging in the vicinity.
- 9.4.39 The survey results suggest that the wider Carless landholding is unlikely to be regularly used by badger for foraging. Whilst a disused sett was recorded along the disused railway line, no active setts were found within the site itself or the remainder of the wider Carless landholding. However, given the historical evidence of badgers locally (the disused sett) and the presence of some (albeit very limited and largely peripheral) potential foraging habitat within the site. This species will not be further considered within the impact assessment, but will be considered in relation to legislative compliance.

Baseline and Evaluation Summary

Table 9.2: Summary of Current Baseline Evaluation

Ecological Feature	Importance (Geographic Frame of Reference)
Inner Clyde Special Protection Area (SPA), Ramsar (wintering redshank population)	International
Inner Clyde SSSI (non SPA/Ramsar features) (wintering birds and saltmarsh habitats)	National
The Saltings LNR	Local
Non-statutory designated areas for nature conservation in the wider area	Regional or below.
Terrestrial Habitats	Site
Overwintering birds (Intertidal)	National-International
Otter	Local
Bats (roosting)	N/A (likely absent)
Bats (foraging and commuting)	Site (considered in relation to legislative compliance)
Breeding Birds	Site (considered in relation to legislative compliance)
Overwintering birds in Terrestrial Habitats On Site - Non-SPA/ SSSI Species	Local
Great crested newt	N/A (likely absent)

Ecological Feature	Importance (Geographic Frame of Reference)
Water Vole	N/A - likely absent (considered in relation to legislative compliance)
Reptiles	N/A (likely absent)
Badger	N/A - likely absent (considered in relation to legislative compliance)

9.5 Baseline Evolution and Expected Future Baseline

Current Baseline Evolution

- 9.5.1 The TCPA EIA Regulations require that the EIA Report must describe the likely evolution of the baseline scenario in the absence of the proposed development. In the absence of any development activities, current baseline conditions, including the natural variability in surrounding physical processes and extensive hydrocarbon contamination of sediments, would be likely to remain relatively unchanged.
- 9.5.2 For the purposes of this EIA, the likely evolution of the baseline is predicated upon the approval and implementation of proposed remediation works on the terrestrial part of the site before the construction of the proposed development. Prior remediation will be needed to:
- Reduce to an acceptable level the risk to human health and environmental receptors both on and off the site from hydrocarbon and other contamination in soil; and,
 - Reduce to an acceptable level the risk to the River Clyde from mobile contamination within soils and contaminants floating on and dissolved within the groundwater.
- 9.5.3 Remediation is therefore required both owing to the terrestrial site's current contaminated land and Special Site designations under Part IIA of the Environmental Protection Act 1990 and to make the site suitable for the future intended use (i.e. the construction and operation of the proposed development). As such, a 'no development' baseline evolution scenario is not considered to merit further consideration in this EIA.

Expected Future Baseline

Overview

- 9.5.4 The expected future baseline scenario comprises the implementation of the proposed remediation works subject to planning application DC18/245 to address known contamination within the current baseline scenario. A detailed description of the proposed remediation works is provided in **Appendix 6.3 – Remediation Strategy**, which was submitted to underpin planning application DC18/245 and is appended to this EIA Report to allow for a full description of the whole development proposed at the site to be provided in accordance with the EIA Regulations. A summary of the physical extent and characteristics of the proposed remediation works which will result in the creation of a future baseline scenario is provided in **Section 6.5 – Ground Conditions Expected Future Baseline**.

Expected Changes in Conditions within the Site

- 9.5.5 With respect to existing terrestrial ecological features and sensitivities within the site boundary, in overall terms, the effect of implementing the proposed remediation works will be:
- Early successional woodland and scrub will be replaced with bare ground at original levels. The overall ecological value within the site is likely to be of negligible value;
 - Removal of on-site habitats as a result of remediation works are likely to reduce the suitability of the site for breeding and overwintering birds. In consequence, the value of the site to breeding and overwintering terrestrial bird species is expected to be reduced to **Site value or less**;
 - Bat roosting opportunities are likely to remain absent from the site;
 - Foraging and commuting bat activity on the site could be reduced due to habitat loss. In consequence, the site is likely to be of **Site value or less**; and,
 - Water voles, great crested newt, reptiles and badgers are expected to remain to be absent from the site.

Expected Changes in Conditions outwith the Site

- 9.5.6 With respect to existing ecological features and sensitivities within the Study Area (i.e. outwith the site boundary), in overall terms, the effect of implementing the proposed remediation works will be:

- There is likely to be a positive improvement in the ecological value of the SPA/SSSI adjacent to the site and the intertidal condition's in the Inner Clyde SPA/ SSSI may also be improved as a result of the proposed remediation works;
- Non-statutory designated sites would be largely unaffected;
- Overwintering intertidal bird populations are assumed to continue to use the intertidal habitats;
- Otters would continue to use the River Clyde and the wider Carless landholding;
- Bats foraging and commuting off-site are likely to be largely unaffected; and,
- Water voles, great crested newt, reptiles and badgers are still expected to be absent in the wider Carless landholding.

Predicted Future Baseline Conditions

- 9.5.7 Following remediation works, conditions within the site will have changed with some areas of existing habitats recorded (see **Section 9.4**) having been effectively replaced with areas of bare ground. This will result in direct physical changes to the baseline conditions of habitats within the site, with the overall ecological value (already no more than local value) likely being reduced due to habitat loss and change. As a result, the remaining habitats within the site (including newly created bare ground) are expected to be of **Site** value or less.
- 9.5.8 Both breeding and overwintering terrestrial birds using the site (but not within the SPA are also expected to be affected by remediation works due to the loss and change in habitats that will occur. This is because the site will support less suitable nesting (breeding) and overwintering foraging habitat. As a result, the value of the site to breeding and overwintering terrestrial bird species is expected to be reduced to **Site** value or below.
- 9.5.9 Ecological features that will be unaffected (or largely unaffected) by the proposed remediation works; i.e. those for which there is no predicted change in future baseline from current conditions, include the following:
- All designated sites – these are all outside the site boundary;
 - Overwintering intertidal bird populations – these are associated with habitats outside the site boundary and proposed remediation area, so use of these areas in the future should be assumed to continue;
 - Otter – the proposed remediation works will not remove any features found to be used by this species in the wider Carless landholding, so ongoing otter activity can be expected to occur at similar levels to that established by the current baseline;
 - Bats (roosting) – these features will still be absent post-remediation works;
 - Bats (foraging or commuting) – whilst the remediation works will result in changes to the site conditions (habitats present) which could result in a reduction of bat foraging or commuting activity, it is possible that bat species could still use the airspace over and surrounding the site in a similar way. Therefore the value of the site for foraging and commuting bats is expected to be **Site** value or below given the low levels of activity already recorded;
 - Great crested newt – this species is still expected to be absent;
 - Water voles – this species is expected to be absent (noting it is proposed to be taken forward in the assessment with respect to legal compliance only);
 - Reptiles – this species group is still expected to be absent; and
 - Badgers – this species is expected to be absent (noting it is proposed to be taken forward in the assessment with respect to legal compliance only).
- 9.5.10 The evaluation of ecological receptors in the predicted future baseline, together with an indication of which will therefore be carried forward into the assessment, is summarised in **Table 9.7**.

Table 9.7: Expected Future Baseline Evaluation

Ecological Feature	Importance (Geographic Frame of Reference)	Further Consideration in Ecological Impact Assessment
Inner Clyde Special Protection Area (SPA), Ramsar (wintering redshank population)	International	Yes
Inner Clyde SSSI (non SPA/Ramsar features) (wintering birds and saltmarsh habitats)	National	Yes
The Saltings LNR	Local	Yes
Other non-statutory designated areas for nature conservation	Region or below.	No
Habitats	Site or below	No
Overwintering birds (Intertidal)	National-International	Yes (in the context of impacts on over-wintering birds associated with the SPA and SSSI)
Otter	Local	Yes
Bats (roosting)	N/A (likely absent)	No
Bats (foraging and commuting)	Site	Yes (in respect of legal compliance only)
Breeding Birds	Site or below	Yes (in respect of legal compliance only)
Overwintering birds non-SPA/SSSI (Site)	Local	Yes
Great crested newt	N/A (likely absent)	No
Water Vole	N/A (likely absent)	Yes (in respect of legal compliance only)
Reptiles	N/A (likely absent)	No
Badger	N/A (likely absent)	Yes (in respect of legal compliance only)

Summary of Receptor Sensitivity / Importance and Consideration in this Assessment

9.5.11 Drawing upon the current and future baseline information presented in Sections 9.4 and 9.5 above, **Table 9.8** below provides reasoned justification for identified receptors which have been scoped out of further consideration. **Table 9.9** then confirms the identified receptors which have been forward for further assessment.

Table 9.8: Terrestrial Ecology - Summary of Receptors Scoped Out

	Justification for Excluding from Further Consideration	
Ecological Feature	Current Baseline	Future Baseline
Other non-statutory designated areas for nature conservation in the wider area	These sites are not functionally or physically connected to the site. Therefore, no significant impacts anticipated.	These sites are not functionally or physically connected to the site. Therefore, no significant impacts anticipated.
Terrestrial Habitats	Habitats are dominated by early successional habitats. These are deemed to be of Site-Local Importance, therefore potential impacts not deemed to be significant.	The proposed development will be dominated by bare ground. This habitat is predicted to be of importance only at a site level (or less), therefore potential impacts will not be deemed to be significant.
Bats (roosting)	Lack of potential roosting features within the site, therefore roosting bats are likely to be absent from the site.	The proposed development is unlikely to increase the suitability of the site for roosting bats. It is likely that roosting bats will remain to be absent from the site.
Breeding Birds	Only common bird species were identified and these were generally in low numbers of territories for each species. The site is of local value to breeding birds, therefore potential impacts are not be deemed to be significant. The site itself is deemed to be of local value to overwintering birds	The proposed development is unlikely to increase the suitability of the site for breeding birds. It is likely that breeding birds species will remain to be present as very low levels at the site. Breeding birds were deemed to be of site Importance or below, therefore potential impacts will not be deemed to be significant.
Great crested newt	eDNA analysis confirmed negative results for great crested newts and HSI scores of ponds confirmed that they were sub-optimal for the species. Therefore, is likely to be absent from the site, potential impacts will not be deemed to be significant.	Habitats on the site will not be improved for great crested newts as a result of the proposed development. Therefore they are likely to remain absent from the site, potential impacts will not be deemed to be significant.
Reptiles	No field signs of reptile species identified during surveys. Likely to be absent from the site. Potential impacts on reptiles are not be deemed to be significant.	Habitats on the site will not be improved for reptiles as a result of the proposed development. Reptiles are likely to remain absent from the site.

Table 9.9: Terrestrial Ecology – Summary of Receptors Identified for Further Assessment

Ecological Feature	Current Baseline		Future Baseline	
	Importance (Geographic Frame of Reference)	Further Consideration in Ecological Impact Assessment	Importance (Geographic Frame of Reference)	Further Consideration in Ecological Impact Assessment
Inner Clyde Special Protection Area (SPA), Ramsar (wintering redshank population)	International	Yes	International	Yes
Inner Clyde SSSI (non SPA/Ramsar features) (wintering birds and saltmarsh habitats)	National	Yes	National	Yes
Disused Railway Line & Erskine Ferry Road LNCS	Local	Yes	Local	Yes
The Saltings LNR	Local	Yes	Local	Yes
Overwintering birds in Terrestrial Habitats On Site - Non-SPA/SSSI Species	Local	Yes	Local	Yes
Otter	Local	Yes	Local	Yes
Bats (foraging and commuting)	Site	Yes (in respect of legal compliance only)	Site value or less	Yes (in respect of legal compliance only)
Breeding Birds	Site	Yes (in respect of legal compliance only)	Site	Yes (in respect of legal compliance only)
Water Vole	N/A (likely absent)	Yes (in respect of legal compliance only)	N/A (likely absent)	Yes (in respect of legal compliance only)
Badger	N/A (likely absent)	Yes (in respect of legal compliance only)	N/A (likely absent)	Yes (in respect of legal compliance only)

9.6 Embedded Mitigation

9.6.1 As noted in **Chapter 3 – The Proposed Development** and detailed in **Chapter 19 – Schedule of Mitigation**, a number of design features and embedded mitigation measures have been incorporated into the design and construction of the proposed development to avoid, prevent or minimise significant adverse environmental effects and to enhance beneficial effects. Embedded mitigation measures of relevance to this assessment are:

Construction

Avoidance

- 9.6.2 **Timing of Works:** Ecological surveys have determined that the site supports ecological features which are sensitive to disturbance during the spring and summer months (March-August inclusive), such as breeding birds. Given these identified ecological sensitivities, the best time for intrusive works which is likely to have least significant effects on sensitive ecological features is likely to be the autumn and/or early spring. The construction programme will take cognisance of this. However, for multiple reasons including to protect sensitive marine ecological interests (as detailed in **Chapter 10 - Marine Ecology**), it will not be possible to limit construction works to just this period.
- 9.6.3 **Minimising Land-take:** The footprint of the marine works has been minimised as far as is possible. In particular, the alignment of the new jetty has been designed to mirror as closely as possible that of the existing structure, while ensuring that works will not encroach in to the Inner Clyde SPA/ SSSI area.
- 9.6.4 **Provision of Temporary Visual Screening:** A physical barrier along the southern boundary of the working area (e.g. mesh or fabric screen on Heras fencing, wooden hoarding or similar) will provide a visual screen against visual and noise disturbance from the construction works to the SPA, where these take place the site during the winter months (September-March inclusive).
- 9.6.5 **Vegetation Clearance:** Advanced clearance of above-ground vegetation within the areas affected by the construction works in the winter months using hand tools will help to limit the potential for subsequent delays during the spring/summer months due to the presence of breeding birds. However, an ecologist should be involved in the discussion of the clearance approach to ensure a balance is achieved between required working areas and retention of existing vegetation (which may also provide existing screening to the SPA and SSSI). The arisings should be removed from the site or stockpiled away from working areas and not within the SPA or SSSI.
- 9.6.6 **Ecological Clerk of Works (ECoW) and Environmental Monitoring:** The ECoW will be appointed for the duration of construction works to undertake regular monitoring of site operations compliance with nature conservation legislation and policy, relevant planning conditions with regards to the ecological sensitivities and monitor the effectiveness of avoidance and mitigation measures. and monitor the effectiveness of avoidance and mitigation measures as outlined in the Construction Ecological Management Plan (CEMP).
- 9.6.7 The ECoW will also schedule and co-ordinate/ undertake relevant pre-construction surveys (including nesting bird checks as needed) and update surveys. These will be carried out to monitor activity of protected/ notable species in and around the site in advance of commencement of the construction works, and at other stages of the development. The aim of these surveys will be to enable legal compliance to be monitored with respect to protected species and bird species associated with the Inner Clyde SPA/Ramsar/SSSI (i.e. badger, otter, water vole, overwintering birds etc). These surveys may also be required to provide up to date data to support EPSL application(s), particularly in relation to potential disturbance of otters as a result of the construction of the new jetty.
- 9.6.8 **Sensitive Lighting Strategy:** Whilst the primary feature of ecological interest associated with the site is the Inner Clyde SPA/Ramsar/SSSI, its habitats and birds they support, the habitats are used by other light sensitive species such as bats and otters. The Disused Railway Line & Erskine Ferry Road LNCS immediately to the north of the site is also likely to support light sensitive species such as bats. A Lighting Strategy has been developed for the site and is outlined in **Appendix 93 – Lighting Design Briefing Note**. The following outlines the required

mitigation to reduce the potential for impacts to sensitive ecological receptors by lighting during the construction and operation of the site.

- 9.6.9 There is evidence that whilst artificial illumination can have a positive effect on the nocturnal foraging of waders, it may draw them to degraded areas, and potentially raises their exposure to predators (Santos et al., 2010). As such, the lighting design has been produced to minimize the impact on these ecological receptors by, where possible, ensuring that minimal lighting over 1 Lux falls within the sensitive receptors. The 1 Lux level is selected as this Lux level is considered equivalent to twilight or maximum levels during a clear full moon (BCT/ILP, 2018).
- 9.6.10 All of the luminaires proposed within this design emit a warm white light, which have a significantly lower impact on light sensitive species compared to a neutral or cool white (ILP – Bats and Artificial Lighting in the UK, 08/18).
- 9.6.11 Guidance on obtrusive light in relation to bats as issued by the Bat Conservation Trust is listed below:
- Bat Conservation Trust and Institute of Lighting Professionals (2018) Bats and Lighting in the UK (Guidance Note 08/18).
 - The Institution of Lighting Professionals (2011) Guidance Notes for the Reduction of Obtrusive Light GN01:2011
 - Scottish Executive (2007) Guidance Note: Controlling light pollution and reducing lighting energy consumption. Scottish Executive.
- 9.6.12 In the event that lighting is used during the construction phase of the proposed development, 'bright light' (i.e. above 1 lux) will not spill directly on to the Inner Clyde SPA/ SSSI or the Disused Railway LNCS. Bright lighting should also be avoided during the winter months (September – March) overnight or around dusk/ dawn. In addition, lighting will be focussed on those areas requiring illumination only. E.g. through use of cowls or louvres for instance.
- 9.6.13 This ensures that the design of the lighting meets with operational requirements, whilst limiting the light spill onto designated areas immediately adjacent to the site; namely: the Inner Clyde Special Protection Area, Ramsar and Site of Special Scientific Interest (Site of International and National nature conservation importance) and the Disused Railway Line & Erskine Ferry Road Local Nature Conservation Site.
- 9.6.14 A separate detailed lighting strategy will be developed and monitored as part of the CEMP and landscaping details and management will be confirmed in response to planning conditions.
- 9.6.15 **Pollution Prevention Guidelines:** Works contractors will follow standard good practice construction measures to minimise the risk of pollutants entering the River Clyde.

Mitigation

- 9.6.16 **Implementation of and adherence to a Construction Environmental Management Plan (CEMP).** The CEMP will be developed and will remain in place throughout the duration of the construction of the proposed development. Of relevance to the protection of hydrological interests, this will include matters relating to dust and silt control, oils, fuels and materials storage and pollution prevention and control²³. The CEMP will include standard measures and procedures to manage sources of potential pollution such that no pollution would be capable of reaching the water environment. This will be through suitable site management practises using containment systems and suitable treatment or settlement facilities; and
- 9.6.17 The CEMP will include the following mitigation / compensation measures in relation to ecology:
- Details on important ecological features/ habitats, if necessary informed by update ecological surveys;
 - Details on how important ecological features/ habitats are to be protected, procedures for Site clearance, specification for buffer zones and ecological fencing (e.g. tree and woodland protection zones);

²³ The CEMP will incorporate all pollution prevention measures specified in the Pollution Prevention Plan submitted to SEPA in support of the CAR Licence application for the proposed development.

- Implementation of best practice mitigation measures for hydrology, air quality, noise and vibration, as specified in **Chapters 8, 12 and 13**;
- Implementation of an ecologically informed lighting strategy during construction. To include timing of lighting, specification of dark zones and parameters for lighting use during construction;
- Implementation of protected species mitigation strategies, including bats, otter, water voles and badger (as appropriate). Including details of mitigation and compensation measures required; and
- Habitat management to promote biodiversity within retained habitats and areas of new habitat created, as necessary during the construction phase.

Operation

Avoidance/ Mitigation

- 9.6.18 **Sensitive Lighting Strategy:** The design of the proposed site layout should be done in accordance with the proposed lighting strategy for the site (as outlined in **Section 9.5**) to reduce the potential for impacts to ecological receptors by lighting;
- 9.6.19 **The potential for accidental spillages** (from land and vessels) will be Negligible during the operation phase by following established industry guidance and protocols (e.g. bunding of fuel stores).
- 9.6.20 **Foul discharges** to the River Clyde in accordance with WAT-RM-03.
- 9.6.21 **Surface water runoff control** – Permanent SuDS to be managed in accordance with a PPP and CAR licence. The surface water drainage scheme for the site will be designed using SuDS principles such that a level of treatment will be provided prior to discharge of surface waters to the River Clyde.
- 9.6.22 If required, further mitigation and enhancement measures identified through the EIA process are detailed in **Section 9.8** below before likely residual effects from the proposed development are then stated in **Section 9.9**.

9.7 Assessment of Likely Effects

Construction Phase

Inner Clyde Special Protection Area (SPA), Ramsar (wintering redshank population)

- 9.7.1 Likely construction impacts of relevance to the assessment of potential impacts on the Inner Clyde SPA designation in relation to wintering redshank are:
- Changes in surface water quality, for example, as a result of a pollution incident during construction, or through surface run-off carrying increased levels of waterborne pollutants, including chemicals and sediments;
 - Changes in lighting levels in areas where site offices, compounds, welfare facilities, parking areas, fuel storage areas, plant storage areas and / or for task specific lighting depending on weather conditions and time of year; and,
 - Species disturbance from increased visual, noise and vibration disturbance.
- 9.7.2 There are no statutory designated sites for nature conservation located within the site. However, the Inner Clyde Special Protection Area (SPA), Ramsar site and Site of Special Scientific Interest (SSSI) is located directly adjacent to the west/south-west edge of the site. This designated site covers a landmass of approximately 1,825Ha over approximately 20km of the River Clyde.
- 9.7.3 The SPA is designated for its internationally important overwintering population of redshank. The peak over wintering count for redshank in proximity to the site was 30, this equates to approximately 1.43% of the population who over winter at the Inner Clyde SPA.

- 9.7.4** There is potential for surface water run-off from the site during construction. A series of embedded mitigation measures have been outlined in **Section 9.6**. These measures will minimise the risk of silt or pollutants entering the River Clyde and the requirements of the CEMP will be adopted during construction. Therefore, **no significant adverse effects are anticipated**.
- 9.7.5** There is potential that artificial lighting may require to be used at the site during construction operations, to illuminate working areas, particularly during the winter months. There may be potential for a small number of individual redshank to be displaced due to artificial lighting in close proximity to the Inner Clyde SPA/ Ramsar and SSSI site. However, a series of embedded mitigation measures have been outlined, including the implementation of the CEMP and Sensitive Lighting Strategy that will be adopted for the duration of construction activities. These measures will reduce the potential impact of lighting on redshank within the Inner Clyde SPA to **be a temporary adverse effect** on the conservation status of the wintering redshank population, **significant at a Site level** only.
- 9.7.6** Noise levels 70Db or greater are known to illicit a response from birds and potentially cause disturbance. Noise modelling undertaken for various construction activities have predicted potential noise levels, which could disturb birds using the adjacent SPA.
- 9.7.7** Construction noise modelling completed in relation to the proposed development has identified that the noisiest activities to be undertaken at the site are 'concreting' and 'build of the new jetty' (see **Chapter: Noise 13** for further details). 'Concreting activities' comprise the re-laying of concrete hard standing/ development platform and associated access roads between the site entrance and the new jetty and the infilling of the piled jetty structure. 'New jetty construction' activities will comprise of vibro-piling being undertaken to establish the structure of the new jetty. **Figure 9.1.1 and 9.1.2** provide a depiction of the noise impact zones associated with concreting and constructing the new jetty in relation to the SPA respectively.
- 9.7.8** It is predicted that there could be some disturbance of redshank up to 100m from concreting activities and up to 50m for all other activities modelled. This could illicit a local displacement response of Redshank within 50-100m of the proposed location of the new jetty. Error! Reference source not found. **Table 9.10** shows the predicted indicative noise levels at various distances from the construction phase boundary.

Table 9.10:: Predicted Indicative Construction Noise Levels

Activity	Predicted Indicative Construction Noise Levels (dB LAeq,1h) at Distance (m) from Construction Phase Boundary				
	20	50	100	200	500
Earthmoving	79	71	65	59	53
Concreting	85	77	71	65	59
Road Pavement	74	66	60	54	48
New Jetty Construction	83	75	69	63	55

- 9.7.9** **Figure 9.1** provided in **Appendix 9.1 – Figures** shows that up to 3779m² of the SPA lies within 100m and has potential to be impacted by noise levels of 71dB due to concreting activities. This comprises approximately 0.021% of the SPA area. The 2018 '*Proposed Remediation Works Ecological Assessment Report*' (Page 51) provides a heatmap of overwintering redshank recorded within the SPA. This showed that redshank the number of individuals recorded in this area was very low (i.e. there were 4 locations with 1-5 individuals identified), this equates to 0.95% of the population of redshank over wintering at the Inner Clyde SPA.

- 9.7.10 **Figure 9.2** provided in **Appendix 9.1 - Figures** shows that up to 456m² of the SPA is located within 100m and has potential to be impacted by noise levels of 69dB by new jetty construction activities. This comprises approximately 0.002% of the SPA area. The 2018 '*Proposed Remediation Works Ecological Assessment Report*' (Page 51) provides a heatmap of overwintering redshank recorded within the SPA. The over wintering bird survey for redshank showed that the number of individuals recorded in this area was very low (i.e. there were 1 location with 1-5 individuals identified), this equates to 0.25% of the population of redshank over wintering at the Inner Clyde SPA.
- 9.7.11 There is the potential for **short term, temporary adverse effects** of noise in relation to works associated with the jetty construction on a **small** number of individual redshank within the Inner Clyde SPA. This will be **significant at a Local level** on the ecological interests of the Inner Clyde SPA, Ramsar and SSSI as a result of the proposed construction. However, the Inner Clyde SPA provides a vast area that is suitable for redshank, and a series of embedded mitigation and avoidance measures outlined in **Section 9.6** which will reduce the potential for disturbance.
- 9.7.12 These potential impacts will be further minimised as a result of sensitive timing of piling works associated with jetty construction to minimise the potential impacts of noise on redshank as outlined in **Section 9.8 - Further Mitigation**.
- Inner Clyde SSSI (non-SPA/Ramsar features) (wintering birds and saltmarsh habitats)**
- 9.7.13 The following construction impacts relevant to the assessment of potential impacts on the Inner Clyde SSSI designation in relation to wintering redshank are:
- Changes in surface water quality, for example, as a result of a pollution incident during construction, or through surface run-off carrying increased levels of waterborne pollutants, including chemicals and sediments;
 - Changes in lighting levels in areas where site offices, compounds, welfare facilities, parking areas, fuel storage areas, plant storage areas and / or for task specific lighting depending on weather conditions and time of year; and,
 - Species disturbance from increased visual, noise and vibration disturbance.
- 9.7.14 There are no Statutory designated sites for nature conservation located within the site. However, the Inner Clyde Special Protection Area (SPA), Ramsar site and Site of Special Scientific Interest (SSSI). This designated site covers a landmass of approximately 1,825ha, a small section of which is located directly adjacent to the west/south-west edge of the site.
- 9.7.15 The Inner Clyde SSSI designation includes non-breeding over-wintering: cormorant, eider, goldeneye, oystercatcher, red-breasted merganser, and red-throated diver. The SSSI is also notified for its saltmarsh habitat. The Ramsar citation also reflects the habitats supporting the bird interest including: tidal mudflats and shoreline of semi-natural coastal vegetation including saltmarsh.
- 9.7.16 There is potential for surface water run-off from the site during construction. There is the potential for **short term, temporary adverse effects** in relation to construction works. However, the dilution rate of the River Clyde will mean that potential significant effects are likely at **Site level**. A series of embedded avoidance and mitigation measures have been outlined in **Section 9.5** to minimise the risk of silt or pollutants entering the River Clyde and the requirements.
- 9.7.17 There is potential that artificial lighting may require to be used at the site during construction operations, to illuminate working areas, particularly during the winter months. There may be potential for a small number of individual birds (all species) to be displaced due to artificial lighting in close proximity to the Inner Clyde SPA/ Ramsar and SSSI site. However, a series of embedded mitigation measures have been outlined in **Section 9.6**, including the implementation of the CEMP and Sensitive Lighting Strategy that will be adopted for the duration of construction activities. These measures will reduce the potential impact of lighting on redshank within the Inner Clyde SPA to **be a temporary adverse effect** on the conservation status of the wintering redshank population likely to be **significant at a Site level**.
- 9.7.18 Noise levels of 70Db or greater are known to illicit a response from birds and potentially cause disturbance. Noise modelling undertaken for various construction activities have predicted potential noise levels, which could disturb birds using the adjacent SPA.

- 9.7.19 The Inner Clyde SPA and SSSI areas cover the same area. Therefore, as outlined in Section 9.6.11 **Error! Reference source not found.** the construction noise modelling undertaken showed that 3779m² of the SSSI lies within 100m with the potential for noise levels of 71dB to be experienced due to concreting activities. This comprises approximately 0.021% of the SSSI area. The 2018 '*Proposed Remediation Works Ecological Assessment Report*' (Page 48) provides a heatmap of all overwintering bird species (except redshank) recorded within the SSSI. The non SPA / Ramsar over wintering birds survey showed that the number of individuals recorded in this area was low, with four hotspots showing a maximum of 11-15 individual birds recorded (this includes all bird species, except redshank) along the shoreline, this equates to 0.57% of the population of birds over wintering at the Inner Clyde SPA.
- 9.7.20 Figure 9.2 shows that up to 456m² of the SSSI lies within 100m and has potential to be impacted by noise levels of 69dB by new jetty construction activities. This comprises approximately 0.002% of the SSSI area. The 2018 '*Proposed Remediation Works Ecological Assessment Report*' (Page 48) provides a heatmap of all overwintering bird species (except redshank) recorded within the SSSI. The non SPA / Ramsar over wintering birds survey showed that the number of individuals recorded in this area was low, with 1 hotspots showing a maximum of 16-50 individual birds identified (this includes all bird species, except redshank) along the shoreline, this equates to 0.48% of the population of birds over wintering at the Inner Clyde SPA.
- 9.7.21 There is the potential for noise disturbance to result in a **short term, temporary adverse effect** in relation to works associated with the jetty construction on a **small** number of non-breeding over-wintering birds (excluding redshank) within the Inner Clyde SSSI. However, the Inner Clyde SSSI provides a vast area that is suitable for non-breeding over-wintering birds, and a series of embedded mitigation will be implemented to reduce the likelihood of disturbance, as outlined in **Section 9.6.** and effects on the ecological interests of the Inner Clyde SSSI are likely to be **significant at a Local level.**
- 9.7.22 These potential impacts will be further minimised as a result of sensitive timing piling works associated with jetty construction to minimise the potential impacts of noise on redshank as outlined in **Section 9.8 - Further Mitigation.**

Disused Railway Line & Erskine Ferry Road LNCS

- 9.7.23 The construction impacts which are relevant to the assessment for non-statutory designated areas are:
- Changes in surface water quality, for example, as a result of a pollution incident during construction, or through surface run-off carrying increased levels of waterborne pollutants, including chemicals and sediments; and,
 - Species disturbance from light spill on to the LNCS.
- 9.7.24 The Disused Railway Line & Erskine Ferry Road LNCS, is situated adjacent to the northern/north-eastern boundary of the site.
- 9.7.25 There is the potential that artificial lighting may require to be used at the site during construction operations, to illuminate working areas, particularly during the winter months. However, a series of embedded mitigation measures have been outlined in **Section 9.6,** including the implementation of the CEMP and Sensitive Lighting Strategy that will be adopted for the duration of construction activities. Considering the above, **no significant adverse effects** are anticipated on the conservation value of the Disused Railway Line & Erskine Ferry Road LNCS as a result of lighting.
- 9.7.26 There is potential for surface water run-off from the site during construction. A series of embedded mitigation measures have been outlined in **Section 9.6.** These measures will minimise the risk of silt or pollutants entering the LNCS and the requirements of the CEMP will be adopted during construction. Therefore, **no significant adverse effects are anticipated.**

The Saltings LNR

- 9.7.27 The construction impacts which are relevant to the assessment for non-statutory designated areas are:
- Changes in surface water quality, for example, as a result of a pollution incident during construction, or through surface run-off carrying increased levels of waterborne pollutants, including chemicals and sediments; and

9.7.28 The Saltings LNR, is situated approximately 310 m north-west of the site at its closest point and is comprised of regenerated woodland and meadow and is notable for its wetland habitats and bird assemblage. The site is separated from The Saltings LNCS by built structures and the Inner Clyde SPA/Ramsar/SSSI.

9.7.29 There is potential for surface water run-off from the site during construction. A series of embedded mitigation measures have been outlined in **Section 9.6**. These measures will minimise the risk of silt or pollutants entering the LNCS and the requirements of the CEMP will be adopted during construction. Therefore **no significant adverse effects are anticipated**.

Overwintering birds in Terrestrial Habitats On Site - Non-SPA/ SSSI Species

9.7.30 The construction impacts which are relevant to the assessment for overwintering birds on proposed development site are:

- Dust deposition on retained habitats during site clearance and/or construction;
- Changes in lighting levels in areas where site offices, compounds, welfare facilities, parking areas, fuel storage areas, plant storage areas and / or for task specific lighting depending on weather conditions and time of year; and
- Species disturbance from via increased visual, noise and vibration disturbance.

9.7.31 A total of 36 species of bird were recorded on the wider Carless land holding during the overwintering surveys. The bird community was dominated by a typical assemblage of common woodland and scrub birds including blackbird, song thrush, robin, wren, dunnock, great tit and blue tit. Larger common birds included carrion crow, woodpigeon and magpie. More unusual records included brambling and woodcock, both observed on only one occasion. A number of raptor species used the site during the winter, with sightings of kestrel, sparrowhawk and buzzard.

9.7.32 The potential for release of dust during the construction phase of the development and associated mitigation to minimise the potential impacts on the on-site over wintering birds is considered in detail in **Chapter 12 – Air Quality**. The embedded mitigation measures within **Chapter 12** will minimise the risk of dust generated. If there was an accidental release of dust within the site, this could result in a **short term adverse effect** at a **Site level**.

9.7.33 There is the potential that artificial lighting may require to be used at the site during construction operations, to illuminate working areas, particularly during the winter months. A series of embedded mitigation measures including a Sensitive Lighting Strategy have been outlined in **Section 9.5**. There are likely to be very low numbers of birds using the site during construction and the CEMP (including a sensitive lighting strategy) will be adopted during construction. Therefore, **no significant adverse effects** are anticipated.

9.7.34 The 2018 '*Proposed Remediation Works Ecological Assessment Report*' (Page 161) provides a heatmap of overwintering within the site. This shows that there were very low numbers of overwintering birds recorded within the site. The effective implementation of embedded mitigation, including best practice measures to reduce noise and vibration, as per the CEMP (see **Chapter 13**) is expected to reduce impacts to be **short term** and **negligible** on any over wintering birds present within the site. **No significant adverse effects** are therefore anticipated.

Otter

9.7.35 The construction impacts which are relevant to the impact assessment for otters are:

- Habitat loss/ disturbance or fragmentation: The existing jetty structure is to be demolished and replaced;
- Changes in surface water quality, for example, as a result of a pollution incident during construction, or through surface run-off carrying increased levels of waterborne pollutants, including chemicals and sediments; and
- Changes in lighting levels in areas where site offices, compounds, welfare facilities, parking areas, fuel storage areas, plant storage areas and / or for task specific lighting depending on weather conditions and time of year; and

- 9.7.36** Otter activity was noted along the shoreline of the Inner Clyde. Sprainting evidence was limited and it was concluded that the intertidal areas along the southern boundary of the site were mainly being used by otter for foraging and commuting. One resting site was identified on the southern boundary of the site, underneath a fallen tree which had created a number of dry sheltered areas. Old spraint was found within one of these areas and on an adjacent rock. Anal jelly (an otter secretion) was also found outside the entrance to the resting site. This site is located more than 30m from the proposed development area and is sheltered from the potential for disturbance due to the existing site topography. There is also potential for otter to use the ponds on the wider Carless landholding as sub-optimal foraging.
- 9.7.37 Proposed works to be undertaken on the jetty and in proximity to the shore line of the River Clyde may require a European Protected Species derogation licence, should significant disturbance be considered likely. In addition, works will be carried out under the watching brief of an ECoW. A specific Otter Mitigation Strategy will be incorporated into the CEMP for the site, including methods statements to minimise the risk of disturbance to any otters using the site. Given the distances involved, the large size of the home range of otters, and the expanse of other suitable habitat for use by otters in the wider Carless landholding, these precautionary measures should reduce any likely effects of potential disturbance to otters along the River Clyde to be **temporary adverse at a site level**, and therefore **no significant adverse effect**.
- 9.7.38** There is potential for surface water run-off from the site during construction. A series of embedded mitigation measures have been outlined in **Section 9.6**. These measures will minimise the risk of silt or pollutants entering the River Clyde and the requirements of the CEMP will be adopted during construction. Therefore **no significant effects** are anticipated.
- 9.7.39 There is the potential that artificial lighting may require to be used at the site during construction operations, to illuminate working areas, particularly during the winter months. A Sensitive Lighting Strategy will be implemented to ensure that there is no light spill on to the River Clyde. Otters will therefore still be expected to commute and forage along the river, and **no significant adverse effects** anticipated.

Operational Phase

Inner Clyde Special Protection Area (SPA), Ramsar (wintering redshank population)

- 9.7.40 The operational impacts which are relevant to the assessment of the Inner Clyde SPA/ Ramsar site in relation to overwintering Redshank are:
- Species disturbance via increased visual and noise disturbance; and
 - Changes in lighting levels due to the installation of external lighting.
- 9.7.41 Operational noise modelling completed in relation to the operation of the proposed development has identified that operational noise levels at the site boundary will not exceed 55-60dB. Noise levels 70Db or greater are known to illicit a response from birds and potentially cause disturbance. As such, **no significant adverse effects** on overwintering redshank populations within the Inner Clyde SPA are anticipated as a result of operational noise.
- 9.7.42 Artificial lighting will be required to be installed for use during the operational phase of the development. A Sensitive Lighting Strategy will be developed for the operational phase of the proposed development to ensure that there is no direct light spill on to the Inner Clyde SPA/ Ramsar/ SSSI and the Dis-used Railway LNCS sites. As part of this, a series of lighting control strategies will also be adopted to zone operational areas to allow lighting to be switched off when not in use (particularly during the hours of darkness), further details are included within Chapter 14: Lighting. As such, **no significant adverse effects** on overwintering redshank populations overwintering within the Inner Clyde SPA are anticipated as a result of lighting during the operation of the site.

Inner Clyde SSSI (non SPA/Ramsar features) (wintering birds and saltmarsh habitats)

- 9.7.43 The operational impacts which are relevant to the assessment of the Inner Clyde SSSI site in relation to overwintering birds (i.e. excluding Redshank) and saltmarsh habitats are:
- Species disturbance via increased visual and noise disturbance; and
 - Changes in lighting levels due to the installation of external lighting.

9.7.44 Operational noise modelling completed in relation to the operation of the proposed development has identified that operational noise levels at the site boundary will not exceed 55-60dB. Noise levels 70Db or greater are known to illicit a response from birds and potentially cause disturbance. As such, **no significant adverse effects** on overwintering birds (excluding redshank) within the Inner Clyde SSSI are anticipated as a result of operational noise.

9.7.45 Artificial lighting will be required to be installed for use during the operational phase of the development. A Sensitive Lighting Strategy will be developed for the operational phase of the proposed development to ensure that there is no direct light spill on to the Inner Clyde SSSI. As part of this, a series of lighting control strategies will also be adopted to zone operational areas to allow lighting to be switched off when not in use (particularly during the hours of darkness), further details are included within Chapter 14: Lighting. As such, **no significant adverse effects** on overwintering birds (excluding redshank) within the Inner Clyde SSSI are anticipated as a result of lighting during the operation of the site.

Disused Railway Line & Erskine Ferry Road LNCS

9.7.46 The operational impacts which are relevant to the assessment for non-statutory designated areas are:

- Species disturbance via increased visual and noise disturbance; and
- Changes in lighting levels due to the installation of external lighting.

9.7.47 Operational noise modelling completed in relation to the operation of the proposed development has identified that operational noise levels at the site boundary will not exceed 55-60dB. Noise levels 70Db or greater are known to illicit a response from birds and potentially cause disturbance. As such, **no significant adverse effects** on the Disused Railway Line & Erskine Ferry Road LNCS are anticipated as a result of operational noise.

9.7.48 Artificial lighting will be require to be installed for use during the operational phase of the development. A Sensitive Lighting Strategy will be developed for the operational phase of the proposed development to ensure that there is no direct light spill on to the Disused Railway Line & Erskine Ferry Road LNCS. As part of this, a series of lighting control strategies will also be adopted to zone operational areas to allow lighting to be switched off when not in use (particularly during the hours of darkness), further details are included within Chapter 14: Lighting. As such, **no significant adverse effects** on the Disused Railway Line & Erskine Ferry Road LNCS are anticipated as a result of lighting during the operation of the site.

The Saltings LNR

9.7.49 The operational impacts which are relevant to the assessment for non-statutory designated areas are:

- Species disturbance via increased visual and noise disturbance.

9.7.50 The Saltings LNR, is situated approximately 310 m north-west of the site at its closest point and is comprised of regenerated woodland and meadow and is notable for its wetland habitats and bird assemblage. The site is separated from the Saltings LNCS by built structures and the Inner Clyde SPA/Ramsar/SSSI.

9.7.51 Given the embedded avoidance and mitigation measures that will be implemented, **no significant adverse effects** on the Saltings LNCS are anticipated in relation to light or noise associated with the operation of the proposed site.

Overwintering birds in Terrestrial Habitats On site - Non-SPA/ SSSI Species

9.7.52 The operational impacts which are relevant to the assessment for overwintering birds utilising the site are:

- Species disturbance via increased visual and noise disturbance; and
- Changes in lighting levels due to the installation of external lighting.

9.7.53 As indicated in paragraph 9.6.49, operational noise modelling has confirmed that **no significant adverse effects** are anticipated on the overwintering bird assemblage, in relation to potential for disturbance as a result of noise and vibration.

9.7.54 Artificial lighting will be required to be installed for use during the operational phase of the development. A Sensitive Lighting Strategy will be developed as part of the embedded mitigation for the operation of the site. As part of this, a series of lighting control strategies will also be adopted to zone operational areas to allow lighting to be switched off when not in use (particularly during the hours of darkness), further details are included within **Chapter 14: Lighting**. As such, **no significant adverse effects** on birds on-site are anticipated as a result of lighting during the operation of the site.

Otter

9.7.55 The operational impacts which are relevant to the assessment for otters are:

- Mortality/ injury of individual animals during site operation;
- Changes in water quality due to an increase in the risk of contamination of surface water run-off due to vehicle movements etc.; and
- Changes in lighting levels due to the installation of external lighting.

9.7.56 It is anticipated that the jetty will only be used to launch completed vessels. This operation will be very infrequent (several times per year) and will be undertaken during day-light hours. These operations should not be undertaken during dusk or dawn when otters are most active. During vessel launch, it is likely that otters would utilise the south bank of the River Clyde for commuting and foraging purposes. There will be **no significant adverse effects** on resting, foraging and commuting Otters due to the operation of the site, and the Favourable Conservation Status of the local otter population will be maintained.

9.7.57 The potential for surface water run-off during site operations and relevant mitigation to minimise potential impacts on the River Clyde are included in Chapter 8. The operational site design will include embedded mitigation measures to minimise the risk of silt or pollutants entering the River Clyde. Therefore it is anticipated that there will be **no significant adverse effects** to otters as a result of surface water run-off.

9.7.58 Artificial lighting will require to be installed for use during the operational phase of the development, this will be done in line with the Sensitive Lighting Strategy outlined within embedded mitigation. This will include, ensuring that there is no light spill on to the Inner Clyde SPA/ Ramsar/ SSSI. Therefore, it is likely that there will be **no significant adverse effects** of light on the otters who are utilising the River Clyde for commuting and foraging otters.

Summary of Construction and Operational Effects

9.7.59 **Table 9.11** provides a summary of the assessment undertaken of for construction and operational activities associated with the proposed development.

Table 9.11: Summary of Construction and Operational Effects

Feature/ Affected Group	Importance of Feature	Potential Impacts	Construction Effects	Operational Effects	Proposed Further Measures Required
Inner Clyde Special Protection Area (SPA), Ramsar (wintering redshank population)	International	Changes in surface water quality.	No significant adverse effect	No significant adverse effect	N/A
		Changes in lighting levels due to the installation of external lighting	Temporary adverse effect, significant at site level	No significant adverse effect	N/A
		Species disturbance via increased visual, noise and vibration disturbance	Short term, temporary adverse effects, significant at site level	No significant adverse effect	Sensitive timing of piling associated with jetty construction
Inner Clyde SSSI (non SPA/Ramsar features) (wintering birds and saltmarsh habitats)	International	Changes in surface water quality due to an increase in the risk of contamination of surface water run-off due to vehicle movements etc.	Short term, temporary adverse effects, significant at site level.	N/A	N/A
		Changes in lighting levels due to the installation of external lighting	Temporary minor adverse effect, significant at site level	No significant effect	N/A
		Species disturbance via increased visual, noise and vibration disturbance	Short term, temporary adverse effects, significant at Local level.	No significant adverse effect	Sensitive timing of piling associated with jetty construction
Disused Railway Line & Erskine Ferry Road LNCS	Local	Changes in surface water quality due to an increase in the risk of contamination of surface water run-off due to vehicle movements etc.	No significant adverse effect	No significant adverse effect	N/A
		Changes in lighting levels due to the installation of external lighting	No significant adverse effect	No significant adverse effect	N/A
The Saltings LNR	Local	Changes in surface water quality due to an increase in the risk of contamination of surface water run-off due to vehicle movements etc.	No significant adverse effect	No significant adverse effect	N/A

Feature/ Affected Group	Importance of Feature	Potential Impacts	Construction Effects	Operational Effects	Proposed Further Measures Required
Overwintering birds in Terrestrial Habitats On Site - Non-SPA/ SSSI Species	Local	Dust deposition on retained habitats during site clearance and/or construction	Short term adverse impact at site level	N/A	N/A
		Changes in lighting levels due to the installation of external lighting	No significant adverse effect	No significant adverse effect	N/A
		Species disturbance via increased visual, noise and vibration disturbance	No significant adverse effect	No significant adverse effect	Sensitive timing of piling associated with jetty construction
Otter	Local	Habitat disturbance: Use of jetty	No significant adverse effect	No significant adverse effect	CEMP, ECoW supervision, Otter Mitigation Strategy and EPS licence if required.
		Changes in surface water quality due to an increase in the risk of contamination of surface water run-off due to vehicle movements etc.	No significant adverse effect	No significant adverse effect	N/A
		Changes in lighting levels due to the installation of external lighting	No significant adverse effect	No significant adverse effect	N/A

9.8 Further Mitigation and Enhancement

- 9.8.1 The assessment provided in **Section 9.7** indicates that in the absence of any further mitigation, the construction phase of the proposed development is not likely to result in significant adverse effects on ecological interests above Site level importance, as assessed in relation to both the CIEEM Guidelines and the TCPA EIA Regulations. However, notwithstanding the absence of identified likely significant effects, the assessment process has identified further mitigation which should be implemented during the construction and operational phases of the proposed development to protect important ecological features.

Construction Mitigation

Avoidance

- 9.8.2 **Haulage and access routes** for vehicles will be agreed and exclusion zones set up to ensure that materials, vehicles and the site compound do not enter ecologically sensitive areas.

Mitigation

- 9.8.3 **Bird Hazard Management Plan (BHMP):** A BHMP will be developed and will require to be signed off by Glasgow Airport prior to works commencing at the site. The aim of this document is to avoid endangering safe movement of aircraft through avoiding attraction and increasing bird hazard risk at the site. This will include the following sections as a minimum: monitoring of standing water, earthworks, re-instatement of grass verges; species numbers and spacing of trees and shrubs.

Operational Mitigation

- 9.8.4 **Launch of Vessels:** It is anticipated that the jetty will only be used to launch completed vessels. This operation will be very infrequent (several times per year) and will be undertaken during day-light hours. These operations should not be undertaken during dusk or dawn to avoid unnecessary disturbance of foraging and commuting otters.

Enhancement

- 9.8.5 **A Landscape and Ecological Management Plan (LEMP)** will be created for the occupation phase of the development. This will include management prescriptions for habitats and ecological features within the development to ensure their biodiversity value is maintained, along with the identification of a mechanism for management. Management prescriptions will likely include, the appropriate management of retained and any newly created habitats to promote their establishment and longevity and to safeguard the provision of resources for commuting and foraging bats, breeding birds and invertebrates. This should include the appropriate timing, frequency and management to avoid the potential incidental mortality of protected species and to provide structural diversity that provides segregation of the site and the Inner Clyde SPA, Ramsar and SSSI and the Disused Railway LNCS sites.

Legal Compliance Measures

- 9.8.6 A number of important ecological features / protected species have been assessed for potential impacts during construction and occupation, based on the implementation of inherent scheme design and embedded mitigation, and 'no significant effect' has been concluded. As such, no additional mitigation or compensation measures are required to address significant effects within the context of the TCPA EIA Regulations. In addition, a number of identified ecological features / protected species are considered to be of insufficient importance to be included in this impact assessment, such that significant effects were not considered likely.
- 9.8.7 Nevertheless, in accordance with relevant statutory provisions listed in **Section 9.2**, consideration needs to be given to appropriate management measures during the design and implementation of the development, so as to ensure no breach of the protective legislation.

These measures are identified for each ecological feature below, and should be included in the CEMP for the proposed development:

- **Trees to be retained** on site and those present along the site boundary should be protected through the establishment of appropriate buffer zones during construction in line with *BS 5837:2012: Trees in Relation to Design, Demolition and Construction*.
- **Otter Mitigation Strategy:** Works to and in the vicinity of the River Clyde known to be used by otters may require precautionary method of working and/ or mitigation measures to be implemented to ensure compliance with the legislative protection afforded to this species. An otter mitigation strategy will be included in the CEMP for the construction phase, as appropriate, to address these legal compliance issues:

An update otter survey will be completed prior to commencement of the construction phase, to ensure the baseline is kept up to date and that appropriate mitigation measures are applied.

Depending on the results of the update surveys prior to development, it may be appropriate to implement precautionary mitigation measures to avoid impacts on otter during construction works.

A European Protected Species Licensing (EPSL) application may require to be made to Scottish Natural Heritage in relation to the construction of the replacement jetty, once planning consent has been granted. This will ensure that the Favourable Conservation Status of Otter on the River Clyde can be maintained throughout the proposed construction works. This will be managed by the ECoW and will require the submission of up to date otter survey results, a supporting information report and detailed method statements in relation to the proposed jetty construction works. Appropriate management measures will include:

- The maintenance and protection of retained watercourses during construction. This may be facilitated by fencing and signage, as necessary; and
- **Operational Hours:** Works in relation to the jetty should be avoided during dusk/ dawn and the hours of darkness to avoid un-necessary disturbance of foraging and commuting otters.
- **Where practicable, work to be restricted to daylight hours during the winter piling window.** This will generally allow for more than 12 hours each day without any piling activity. During these periods, transiting mammals (otters) would be able to move between upstream foraging areas without potential noise disturbance. This will also reduce the potential disturbance impacts on overwintering birds.
- **Nesting Bird Checks:** The nesting season for most bird species is between March and August inclusive. In order to avoid killing and injury of nesting birds and damage/ destruction of active nests, clearance of suitable nesting habitat will be timed, wherever possible, to take place in autumn and winter in order to avoid the nesting season (which extends from March to September inclusive). This will include enabling vegetation clearance works in advance of commencement of the construction works, wherever possible. Where clearance works are to be carried out during the nesting season, these will be completed under an Ecological Watching Brief. Suitable vegetation will be inspected by a suitably qualified ecologist (ECOW) within 48 hours of its removal, to confirm the absence of active nests. Where nests are identified, these will be retained in-situ within an appropriate buffer.
- **Trenches and excavations will be covered** at the end of each working day, or will include ramps, and stored pipes will be capped (or stored vertically), to prevent entrapment of animals. During longer periods of site shut down, trenches and excavations will be infilled or covered.
- A **site speed limit** of 15 mph for all construction traffic will be in place.

9.9 Residual Effects

9.9.1 The assessment provided in **Section 9.7** indicates that in the absence of any further mitigation, the construction phase of the proposed development is not likely to result in significant adverse effects on ecological interests as assessed in relation to both the CIEEM Guidelines and the TCPA EIA Regulations. Further mitigation and enhancement measures are then identified in **Section 9.8** above to afford appropriate protection to identified important ecological features. Taking account of all proposed mitigation and enhancement measures, **Table 9.12** below concludes this assessment by reporting the significance of likely residual effects on identified ecological features likely to be impacted by the proposed development.

Table 9.12: Summary of Likely Residual Effects

Feature/ Affected group	Importance of feature	Potential impacts	Further Measures	Significance of Likely Residual Effects (in both EcIA and EIA EIA Terms)
Inner Clyde Special Protection Area (SPA), Ramsar (wintering redshank population)	International	Species disturbance via increased visual, noise and vibration disturbance	Sensitive timing of piling associated with jetty construction	No significant adverse effect
Inner Clyde SSSI (non SPA/Ramsar features) (wintering birds and saltmarsh habitats)	International	Species disturbance via increased visual, noise and vibration disturbance	Sensitive timing of piling associated with jetty construction	No significant adverse effect
Overwintering birds in Terrestrial Habitats On Site - Non-SPA/ SSSI Species	Local	Species disturbance via increased visual, noise and vibration disturbance	Sensitive timing of piling associated with jetty construction	No significant adverse effect
Otter	Local	Habitat disturbance: Use of jetty	CEMP, ECoW supervision, Otter Mitigation Strategy and EPS licence if required.	No significant adverse effect

9.10 Monitoring

9.10.1 The CIEEM Guidelines prescribe the requirement for monitoring of mitigation, compensation and / or enhancement measures where there are uncertainties in predicting the effectiveness of measures, or mitigation packages are novel i.e. to determine whether the predicted efficiency of the mitigation meets expectations.

9.10.2 The embedded and further mitigation sections outline requirements for survey updates for: otter, badger and water vole, these and other surveys will be guided by the monitoring to be undertaken by an Ecological Clerk of Works.

9.11 Cumulative Effects

- 9.11.1 For the reasons stated in **Section 9.3** there is no potential for likely significant cumulative ground conditions to arise from the proposed development in combination with relevant cumulative developments.

9.12 Summary

- 9.12.1 An impact assessment has been undertaken of the likely effects of the construction, and operational phases of the Proposed Development on the sensitive terrestrial ecological receptors at the site.
- 9.12.2 The assessment has been undertaken in line with the Guidelines for Ecological Impact Assessment issued by the Chartered Institute of Ecology and Environmental Management.

Baseline conditions

- 9.12.3 A series of surveys were undertaken to establish the ecological baseline conditions at the site and to identify potential sensitivities at the site. The baseline ecological conditions at the site were as follows:

- The proposed development site is dominated by bare ground considered to be of negligible nature conservation value. A number of protected/ notable species were identified to use the site and its surroundings. Overwintering birds and otters on site were identified as potentially being ecologically significant at the site.
- Terrestrial habitat surveys within the wider Carless landholding revealed a mosaic of early successional woodland, scrub and more open vegetation communities typical of recolonising brownfield sites. Habitats were dominated by relatively early successional woodland, and the swamp habitats which had colonised the holding tanks in the land in the south-east (i.e. outside the proposed development site itself). These were not considered to be wide spread and common habitats, therefore were not considered to be significant.
- A number of statutory and non-statutory designated sites for nature conservation were identified within 2km of the site.

- 9.12.4 The baseline study identified the following ecological features. The potential impacts of the proposed development were assessed:

- Inner Clyde Special Protection Area (SPA), Ramsar (wintering redshank population)
- Inner Clyde SSSI (non SPA/Ramsar features) (wintering birds and saltmarsh habitats)
- Disused Railway Line & Erskine Ferry Road LNCS
- The Saltings LNR
- Overwintering birds in Terrestrial Habitats On Site - Non-SPA/ SSSI Species
- Otter

Mitigation and enhancement

- 9.12.5 A number of mitigation measures have been incorporated into the design, construction and operational phases of the proposed development to avoid significant adverse environmental effects on sensitive ecological receptors. These cover the following main themes:
- Protection of ecologically sensitive features;
 - Ecological Clerk of Works (ECoW) and Environmental Monitoring throughout construction;
 - Pollution Prevention;
 - Construction Environmental Management Plan, including Species Specific Management Plans;

- Sensitive Lighting Strategy;
- Landscape and Ecological Management Plan; and
- Incorporation of sensitive timing and adaptation of working methods to minimise disturbance to wildlife.

Residual effects

9.12.6 Taking account of all proposed mitigation and enhancement measures, no significant residual ecological effects were identified by the ecological assessment process in relation to the proposed construction and operations at the site.

9.13 References

CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108, 708–746.

Morrison CA, Robinson RA, Clark JA and Gill JA (2010). Spatial and temporal variation in population trends in a long-distance migratory bird. *Diversity and Distributions: A Journal of Conservation Biogeography*. Volume 16, Issue 4, July 2010 Pages 620-627

SNH (2008) Inner Clyde Information Sheet on Ramsar Wetlands (RIS). Scottish Natural Heritage.

SNH (2000) Special Protection Area (SPA) Citation: Inner Clyde (UK9003061), Argyll and Bute, West Dunbartonshire, Renfrewshire and Inverclyde. Scottish Natural Heritage.

Websites

British Trust for Ornithology: <https://www.bto.org/about-birds/species-focus/willow-warbler>

Scottish Biodiversity List, available at: <https://www.webarchive.org.uk/wayback/archive/20160402063428/http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL>

West Dunbartonshire Council Local Biodiversity Action plan 2015, available at: <https://www.west-dunbarton.gov.uk/council/strategies-plans-and-policies/council-wide-plans-and-strategies/sustainable-development/biodiversity/>

10 Marine Ecology

10.1 Introduction

- 10.1.1 This chapter of the EIA Report provides an assessment of the likely significant effects from the proposed development on marine ecology. The assessment is based on the characteristics of the site and surrounding area and the key parameters of the proposed development detailed in **Chapter 2 – Site and Surrounding Area** and **Chapter 3 – The Proposed Development** respectively.
- 10.1.2 This chapter has been prepared by ABPmer. In accordance with Regulation 5(5)(b) of the EIA Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.1**.
- 10.1.3 The aims of this chapter are to:
- Identify the relevant context in which the marine ecology assessment has been undertaken;
 - Describe the methods used to undertake the assessment;
 - Outline the relevant baseline conditions currently existing at the site and surroundings;
 - Consider how the implementation of the proposed remediation works will affect current baseline conditions, resulting in a likely future baseline scenario;
 - Identify the likely direct and indirect marine ecology effects of the proposed development;
 - Identify any mitigation and enhancement measures required to address identified effects;
 - Assess likely residual effects; and,
 - Assess likely cumulative effects on marine ecology from the proposed development in combination with other relevant cumulative developments.
- 10.1.4 This chapter is supported by the following figures and technical reports provided in **Appendices 10.1 – 10.4**:
- **Appendix 10.1 – Figures;**
 - **Appendix 10.2 – Marine Ecology Survey Report;**
 - **Appendix 10.3 – Underwater Noise Assessment;**
 - **Appendix 10.4 – Marine Ecological Effects Scoped out of Assessment.**
- 10.1.5 The assessment provided in this chapter has also informed a holistic assessment of the compliance of the project with the objectives of the Water Framework Directive provided in **Appendix 7.2 – WFD Assessment**.

10.2 Policy Context, Legislation, Guidance and Standards

Legislation

- 10.2.1 The overarching legislative framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. As noted in Chapter 5, the proposed development requires to be authorised through the granting of both planning permission from WDC and a marine licence from the Scottish Ministers (Marine Scotland) in accordance with the Town and Country Planning (Scotland) Act 1997 and the Marine (Scotland) Act 2010 respectively.
- 10.2.2 Subject specific legislation of relevance to this assessment is:
- The Convention for the protection of the marine environment of the North-East Atlantic (the OSPAR convention);
 - UK Post-2010 Biodiversity Framework;

- The Marine (Scotland) Act 2010 (in relation to the protection of seals and certain areas);
 - The Conservation of Habitats and Species Regulations 2017 ('the Habitats Regulations) ;
 - The Water Environment Water Services (Scotland) Act 2003;
 - The Water Environment (Controlled Activities) (Scotland) Regulations 2011;
 - Nature Conservation (Scotland) Act 2004; and.
 - The Wildlife and Countryside Act 1981 (WACA).
- 10.2.3 Any wild animal listed under Schedule 5 of the Wildlife and Countryside Act 1981 (WACA) is protected from being killed, injured or disturbed under provisions in the Habitats Directive and Section 9(4) and Schedule 5 of the WACA (as amended by the Countryside and Rights of Way Act 2000). Protected WACA marine species recorded in the River Clyde region include cetacean species and basking shark (typically restricted to the outer River Clyde and Firth of Clyde).
- 10.2.4 All cetacean species found in Scottish territorial waters are also classed as European Protected Species (EPS) and are afforded protection under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). Fish species listed under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) include:
- River lamprey;
 - Atlantic salmon – protected in freshwater only;
 - Allis shad; and
 - Twaite shad.
- 10.2.5 The main legislation that protects seals in Scottish waters is the Marine (Scotland) Act 2010. This Act also provides for Scottish Ministers to designate Seal Conservation Areas. The Habitat Regulations also prohibit certain methods of catching or killing seals. It is also an offence to intentionally or recklessly harass seals at significant haul-out sites under the Protection of Seals (Designation of Haul-out Sites) (Scotland) Order 2014.
- 10.2.6 The OSPAR convention included the establishment of a list of threatened and or declining species and habitats. This list provides an overview of the biodiversity in need of protection in the North-East Atlantic. The list is being used by the OSPAR Commission to guide the setting of priorities for further work on the Convention and protection of marine biodiversity OSPAR protected habitats and species.
- 10.2.7 The UK Biodiversity Action Plan (UK BAP) was published back in 1994, and was the UK Government's response to the Convention on Biological Diversity (CBD). The UK was the first country to produce a national biodiversity action plan, and the UK BAP described the biological resources of the UK and provided detailed plans for conservation of these resources. Action plans for the most threatened species and habitats were set out to aid recovery. The UK BAP has now been succeeded by the UK Post-2010 Biodiversity Framework, which focuses more on action at the devolved nation level and demonstrates how the UK contributes to achieving the UN Aichi Biodiversity Targets. The UK BAP lists of priority species and habitats remain, however, important and valuable reference sources. Notably, they have been used to help draw up statutory lists of priority species and habitats in Scotland as required under Section 2(4) of the Nature Conservation (Scotland) Act 2004.
- 10.2.8 The UK list of Priority Habitats and Species was published in 2007 in line with the then UK Biodiversity Action Plan (1994). In total, 86 marine species are present on the list, including all regularly occurring British cetaceans, marine fish species and sessile species. There are also 15 other fish species which are diadromous migratory fish (including Atlantic salmon, sea trout, European eels, lamprey species and shad species) and ten broad marine habitats.

Policy

- 10.2.9 The planning policy framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Planning policy considerations of specific relevance to this assessment are:

- **Adopted West Dunbartonshire Local Plan (2010)**, in particular policies:
 - GD1: Development Control; and,
 - GD 2(9): Carless, Old Kirkpatrick;
- **West Dunbartonshire LDP Proposed Plan 2015**, in particular:
 - 'Changing Places' Carless Redevelopment Strategy (Section 3.6); and policies:
 - DS7: Contaminated Land; and,
 - GN6 – The Water Environment.
- **West Dunbartonshire LDP2 Proposed Plan (2018)**, in particular proposed policies:
 - Carless Policy 1 – Business and Industrial Development
 - Policy ENV9: Contaminated Land;
 - ENV5 - Water Environment; and,
 - ENV10 - Implementation of the SEA Environmental Report.
- **Scottish Planning Policy (SPP) (2014)**, in particular the Principal Policy on Sustainability (paragraphs 24-35).
- **Scottish Government Planning Circular 1/2015: Relationship between the statutory land use planning system and marine planning and licencing.**

10.2.10 In accordance with sections 15 and 58 of the Marine and Coastal Access Act (2009), the marine licence application for the proposed marine works (i.e. the extent of the proposed development located below MHWS) must be determined in accordance with the 'appropriate marine policy documents', unless relevant considerations indicate otherwise. The appropriate marine policy documents which are of relevance to this assessment comprise:

- **UK Marine Policy Statement (2011);**
- **Scotland's National Marine Plan (2015)**, in particular policies:
 - GEN1 - General Planning Principle;
 - GEN 9 - Natural Heritage;
 - GEN12 - Water Quality and Resource;
 - GEN19 - Sound Evidence;
 - GEN21 - Cumulative Impacts; and,
 - WILD FISH 1 – Impacts on Diadromous Fish Species.

Guidance and Relevant Technical Standards

10.2.11 The following guidance and technical standards have informed this assessment:

10.2.12 The assessment has been completed in accordance with the Chartered Institute of Ecology and Environmental Management's (CIEEM) latest guidelines for ecological impact assessment in the UK and Ireland which combines advice for terrestrial, freshwater, coastal and marine environments (CIEEM, 2018). The CIEEM Guidelines state that 'eCIA is a process of identifying, quantifying and evaluating the potential effects of development-related or other proposed actions on habitats, species and ecosystems'. It requires an assessment of likely significant effects on important ecological features, and as such, does not require consideration of effects on every species or habitat that may be present within the site (CIEEM, 2018).

- With specific respect to the underwater noise assessment provided in **Appendix 10.3**, a logarithmic spreading model has been used to predict the propagation of sound pressure with range from noise sources such as piling. This model is represented by a logarithmic equation and incorporates factors for noise attenuation and absorption losses based on empirical data from coastal environments. This model has been advocated by the UK regulators in a number of EIAs for recent coastal developments. The application of this

model is therefore considered appropriate for this study. A range of available published criteria has been used to assess the potential physiological and behavioural effects of underwater noise on marine mammals, fish and shellfish (namely Southall et al., 2007; Hawkins et al., 2014; Popper et al., 2014; National Oceanic and Atmospheric Administration (NOAA), 2016).

- MMO (2014). A Strategic Framework for Scoping Cumulative Effects
 - Natural England, (2014). Development of a generic framework for informing Cumulative Impact Assessments (CIA) related to Marine Protected Areas through evaluation of best practice. Natural England Commissioned Report NECR147; and
 - Marine Biosecurity Planning Guidance for Scotland (Payne *et al.*, 2014).

10.3 Methodology

Overview

Assessment Scope

- 10.3.1 This chapter presents an assessment of likely significant effects on marine ecology receptors from the proposed development. The assessment has been prepared in accordance with the EIA Regulations. The following marine ecology receptors have been considered as part of the assessment:
- Nature conservation protected habitats and species;
 - Benthic habitats and species (including non-native species);
 - Fish species; and,
 - Marine mammals.
- 10.3.2 The principal aspects considered within this assessment are:
- Change in water quality on fish as a result of the release of sediment contaminants during construction;
 - Underwater noise from construction activities on fish and marine mammal receptors;
 - Benthic habitat (and associated species) loss and change as a result of the jetty footprint; and
 - Non-native species transfer and introduction during operation.
- 10.3.3 This assessment has considered likely effects from the construction and operational phases of the proposed marine works. As a permanent industrial facility, no decommissioning phase is presently envisaged for the whole proposed development, but if decommissioning were to occur it is likely that the structures installed as part of the proposed marine works would remain in situ providing they are environmentally stable. Any effects on marine ecology from the retention of the structure in situ would therefore be similar to the likely operational phase effects considered below, although as that there would be no further vessels using the proposed heavy lift quay, a reduction in vessel traffic and associated potential impacts would be likely. The operational phase assessment in this chapter therefore represents an assessment of likely 'worst-case effects' post construction and a separate decommissioning phase assessment is not considered to be required.
- 10.3.4 In accordance with the Carless Marine Fabrication Complex EIA Scoping Report and subsequent EIA Scoping Opinion provided in **Appendix 4.1**, and in light of the finalised design of the proposed development (including the proposed marine works), the following potential effects have been scoped out of detailed consideration within the assessment:
- Changes in SSC during construction (benthic habitats and marine mammals);
 - Accidental spillages during construction (benthic habitats and marine mammals);
 - Smothering during construction (benthic habitats);

- Noise disturbance during construction (benthic species and shellfish);
- Indirect changes in benthic habitat extent and quality as a result of the jetty during operation (benthic habitats and species);
- Lighting during operation (fish);
- Noise disturbance during operation (fish and marine mammals);
- Habitat change during all project phases (fish and marine mammals);
- Changes in water quality during operation (marine mammals); and
- Collision risk/visual disturbance during all project phases (marine mammals).

10.3.5 The rationale for the exclusion of these potential effects from this assessment is outlined in **Appendix 10.4**.

Assessment Process

10.3.6 In undertaking the assessment presented, the following activities have been carried out:

- EIA Scoping (see below);
- Collection and review of baseline data through a site specific marine ecology survey and desk-based review;
- EIA Assessment which includes:
 - Assessment of Likely Effects: **Section 10.7** presents an assessment of the likely effects from construction and operation of the proposed development on marine ecology (with consideration of embedded mitigation);
 - Further Mitigation and Enhancement: Where likely effects have been assessed as being at a Moderate or above level, further mitigation measures have been identified;
 - Residual impacts: Taking account of all proposed mitigation, **Section 10.9** presents an assessment of the likely effects of the proposed development on marine ecology and confirms the significance of these effects in the context of the TCPA EIA Regulations; and
 - Cumulative and in-combination: An assessment of likely effects on marine ecology from the proposed development in combination with other relevant cumulative developments.

Consultation

10.3.7 This assessment has been informed by an EIA Scoping Report (PBA, 2017) and subsequent EIA Scoping Opinion issued by WDC (March 2018) in respect of the EIA for the proposed marine works. The EIA Scoping Opinion, which is provided in full in **Appendix 4.1**, included a list of standard requirements for consideration in this chapter. In addition, of specific relevance to this assessment:

- Marine Scotland Science requested that water quality effects on fish should be scoped into the assessment; and,
- Scottish Natural Heritage (SNH) requested consideration of operational effects on marine mammals.

10.3.8 These pathways have therefore been assessed within this chapter.

10.3.9 Further to the submission of the EIA Scoping Report for the proposed development, the following subject specific consultation activities have also been undertaken:

- Consultation with Scottish Environment Protection Agency (SEPA) on migratory fish data for the region; and.

- Consultation with Marine Scotland and SNH (January - February 2019) to advise of design and construction changes to the proposed marine works in order to minimise disturbance effects on SPA qualifying features and avoid underwater noise effects on migratory salmon.

Study Area

10.3.10 Two distinct Study Areas have been adopted for this assessment:

- **Local Study Area:** This has been based on the spatial extent of potential effects on benthic habitats and species based on an analysis of related predicted hydrodynamic, physical processes and water quality effects. This is considered to cover an area of approximately 1 km upstream and downstream of the area of the proposed marine works within the site. Any potential effects will be limited well within this extent; and,
- **Wider Study Area:** With respect to mobile receptors (fish and marine mammals) which might be impacted by underwater noise effects (particularly in construction), a Wider Study Area has been considered based on the noise range outputs from an underwater noise assessment. This is considered to cover an area of approximately 3 km upstream and downstream of the area of the proposed marine works within the site.

Information Sources

Desk Top Study

10.3.11 The following key data sources have been reviewed to identify the relevant baseline characteristics of the site and the surrounding environment:

- Sightings and monitoring data on marine mammals compiled as part of the Clyde Marine Mammal Project²⁴;
- Information and data on fish species in the River Clyde from SEPA and the Clyde River Foundation; and
- Data on marine species compiled on the National Biodiversity Network (NBN)²⁵.

Fieldwork

10.3.12 An Intertidal Phase 1 Habitat Survey was undertaken in October 2017 (see Appendix 10.2). The survey involved habitat mapping based on the Marine Habitat Classification for Britain and Ireland Version 15.03 classification (JNCC, 2015) and standardised Phase 1 mapping methodology as detailed in the Marine Monitoring Handbook, Procedural Guidance No. 3-1 (Wyn and Brazier, 2001) and Countryside Council for Wales (CCW) Handbook for Marine Intertidal Phase 1 Survey and Mapping (Wyn *et al.* 2000). Several invertebrate samples were also collected to help characterise the infaunal assemblage within the survey area, as shown in **Figure 10.1** in **Appendix 10.1**.

10.3.13 Incidental sightings of seals were collected as part of the project specific shore bird counts between September 2017 and March 2018. In total 126 hours of observation were undertaken over the seven month survey period.

Approach to Assessment

Consideration of Relevant Receptors

10.3.14 Based on the information sources outlined above, the current and likely future baseline characteristics of the site and the surrounding area was characterised. This led to the identification of the following relevant sensitive receptors to consider within the assessment (as detailed within Section 7.4):

- Nature conservation protected habitats and species;

²⁴ www.clydeporpoise.org

²⁵ www.nbn.org.uk

- Benthic habitats and species (including non-native species);
- Fish species; and
- Marine mammals.

10.3.15 The sensitivity of a marine species and habitats is considered to be a product of:

- The likelihood of damage (termed intolerance or resistance) due to a pressure. This could include behavioural effects, physiological damage or even mortality of individuals or populations; and
- The rate of (or time taken for) recovery (termed recoverability, or resilience) of marine species once the pressure has abated or been removed.

Determining the Importance of Ecological Receptors

10.3.16 In order to determine whether there are likely to be significant effects, it is necessary to identify whether an ecological feature is 'important'. To achieve this, where possible, species and their populations have been valued on the basis of a combination of their rarity, status and distribution, using contextual information where it exists.

10.3.17 The importance of each ecological feature within the Study Area has been determined having regard to a number of contributory factors relating to conservation status.

10.3.18 The CIEEM Guidelines recognise that determining ecological importance is a complex process, which is a matter of professional judgement guided by the importance and relevance of a number of factors. These include designation and legislative protection as well as biodiversity value and secondary/ supporting value (e.g. where habitats may function as a buffer or resource associated with an adjacent designated area). Consideration of each ecological feature having regard to these factors allows their importance to be determined having regard to the geographic frame of reference below:

- International and European;
- National;
- Regional (Firth of Clyde Region); and,
- Local (Clyde River).

Impact Assessment Methodology

10.3.19 To facilitate the marine ecology impact assessment process a standard analysis methodology has been applied. This methodology has been developed from a range of sources, including the TCPA and MW EIA Regulations 2017, new EIA Directive (2014/52/EU), statutory guidance, consultations and ABPmer's extensive previous EIA project experience.

10.3.20 The chapter has furthermore been undertaken following the principles of the Chartered Institute of Ecology and Environmental Management's (CIEEM) latest guidelines for ecological impact assessment (EclA) in the UK and Ireland (which consolidate advice for terrestrial, freshwater coastal and marine environments) (CIEEM, 2018).

10.3.21 The impact assessment assesses whether important marine ecological features will be subject to impacts (positive or negative), the characterisation of these impacts (extent, magnitude, duration, reversibility, timing and frequency) and their effects in the absence of mitigation. Specific considerations that have been made in undertaking the assessments include:

- Magnitude (local/strategic);
- Spatial extent (small/large scale);
- Duration (temporary/short/intermediate/long-term);
- Frequency (routine/intermittent/occasional/rare);
- Reversibility;
- The margins by which set values are exceeded (e.g. water quality standards);
- Probability of occurrence;

- The sensitivity of the receptor (resistance/adaptability/recoverability);
- The importance of the feature (see Table 7.1);
- The baseline conditions of the system; and
- Existing long-term trends and natural variability; and
- Confidence, or certainty, in the impact prediction;

10.3.22 An assessment has then been undertaken of the significance of the residual ecological effects of the project (after mitigation), including cumulative effects.

Establishment of Effect Significance

Determining Significance

10.3.23 To assess the significance of effects, the magnitude of an impact pathway and the probability of it occurring is evaluated to understand the exposure to change, and this is assessed against the sensitivity of a feature to understand its vulnerability. Finally, this is compared against the importance of a feature to generate a level of significance for effects resulting from each impact pathway.

10.3.24 The CIEEM guidelines state that an effect should be determined as being significant when it ‘either supports or undermines biodiversity conservation objectives for important ecological features’. It relates to the weight that should be afforded to effects when decisions are made, and to the consequences, in terms of legislation, policy and/or development control. So, a significant negative effect on a feature of importance at one level would be likely to generate the need for development control mechanisms (if permissible at all), such as planning conditions or legal obligations, in order that proposals will accord with relevant planning policies. In determining significance, consideration is given to aspects of the structure and function of designated sites and habitats, the conservation status of species, and the likely resilience of ecological features to change.

10.3.25 An effect on an important ecological feature may be considered to be significant at a variety of geographic scales from international to local. The effect may be significant at the same geographic scale at which the feature is determined to be important or at a lesser geographical scale, depending on the characterisation of the impact.

10.3.26 Whilst this assessment adopts an Ecological Impact Assessment (EclA) approach and therefore expresses the significance of ecological effects with reference to a geographic frame of reference (as advocated in the CIEEM Guidelines), significance is also expressed using the generic EIA significance criteria used for other topics within the EIA Report. This approach has been taken in order to allow integration with the assessment of all likely environmental from the proposed development.

10.3.27 The generic criteria used throughout this chapter is based on an expression of severity, to describe the significance of environmental impacts. For ease of reference, **Table 10.1** provides a means of relating the two approaches and is provided in order to allow the EclA to be integrated into the wider Environmental Impact Assessment (EIA) without compromising the CIEEM best practice approach.

Table 10.1 - Effect Level and EIA Significance

Effect Level and Significance		Criteria	CIEEM geographical criteria
Significant	Substantial	Only adverse effects are assigned this level of significance as they represent key factors in the decision-making process. These effects are generally, but not exclusively associated with sites and features of international, national or regional importance. A change at a	Ecological impacts assessed as being significant at national or higher geographical scales and that have triggered a response in development control terms are considered to represent impacts that overall fit within

Effect Level and Significance		Criteria	CIEEM geographical criteria
		regional or district scale site or feature may also enter this category.	this assessment, are of severe significance.
	Major	These effects are likely to be important considerations at a local or district scale but, if adverse, are potential concerns to the project and may become key factors in the decision-making process.	Ecological impacts assessed as being significant at the regional scales and that has triggered a response in development control terms are considered to represent impacts that overall within this assessment are of major significance.
	Moderate	These effects, if adverse, 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.	Ecological impacts assessed as being significant at the county scale, and that have triggered a response in development control terms, will be considered to represent impacts that overall within this assessment are of moderate significance.
Not significant	Minor	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 enhancing the subsequent design of the project and consideration of mitigation or compensation measures.	Ecological impacts assessed as being significant at the local scale, and that have triggered a response in development control terms, will be considered to represent impacts that overall within this assessment are of minor significance.
	Negligible	Effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error.	Ecological impacts that have been assessed as not being significant at any geographic level

10.3.28 Following from **Table 10.1**, where ecological effects are assessed as being significant at the local scale or above, and/or would trigger a response in development control terms, appropriate mitigation was devised to reduce residual impacts, as far as possible, to environmentally acceptable levels. Within the assessment procedure, the use of further mitigation measures alters the risk of exposure and/or severity of impact, resulting in the need to re-assess the residual level and significance of likely effects.

10.3.29 Following the assessment of likely effects and their EIA significance, a confidence assessment was undertaken which recognises the degree of interpretation and expert judgement applied. This is presented in the summary table contained within the conclusions section. Confidence was assessed on a scale incorporating three values: low, medium and high.

Approach to Cumulative Impact Assessment

10.3.30 Industry standards for conducting cumulative and in-combination impact assessments include a guidance note published by the MMO (2014) and the CIA framework for MPAs work (NECR174) (Natural England, 2014). The principles of this guidance have been taken account of within this assessment. This section therefore considers that a cumulative/in-combination assessment needs to take account of the total effects of all pressures acting upon all relevant receptors in seeking to assess the overall cumulative/in-combination significance. Additionally, consideration is given to any other activities and plans or projects, including any impacts that do not directly overlap spatially, but may indirectly result in a cumulative/in-combination impact.

10.3.31 The relevant cumulative developments (including marine projects) listed in Section 2.4 was reviewed to identify potential interactions with the construction and/or operation of the proposed development which could result in likely significant environmental effects within the scope of this assessment. A cumulative impact assessment was then undertaken using the same methodology as outlined above and is presented in Section 10.11.

Assumptions and Limitations

10.3.32 Understanding of the migratory periods for Atlantic salmon in the Clyde catchment was based on available information and data. However, there is considered to be some uncertainty regarding the migratory timings of the various life stages of salmonids specifically in the Clyde estuary environment.

10.3.33 As detailed in **Appendix 10.3 – Underwater Noise Assessment**, the assessment of likely underwater noise effects from proposed piling in the marine environment took account of the following design information and associated assumptions:

- A total of 40 steel tubular piles are proposed to be used as part of the proposed marine works, 30 of which will be 762 mm diameter and the 10 of which will be 559 mm diameter;
- A vibratory hammer is likely to be used to drive the majority of the length of the pile with an impact hammer only used for the final socketing to the specified depth or resistance. The impact piling of the 762 mm piles will have an estimated mean unweighted peak Source Level (SL) of 223 dB re 1 µPa m and the 559 mm piles will have an estimated mean unweighted peak SL of 219 dB re 1 µPa m; and,
- The vibratory hammer produces sound energy that is spread out over time and SPLs are generally 10 to 20 dB lower than those generated by impact pile driving.

10.3.34 The underwater noise model is based on established theoretical parameters. However, there is relatively limited empirical field evidence of the behavioural effects of coastal piling noise on fish and marine mammals. There remains, therefore, some uncertainty on the extent and magnitude of behavioural responses in these receptors.

10.4 Current Baseline Conditions

The Site

Site Context

10.4.1 **Figure 3.1 - Site Location Plan** identifies the whole site of the proposed development, including the proposed marine works, in relation to its geographical context. **Figure 3.2 – Proposed Marine Works** identifies the location of existing derelict jetties at the site within which the proposed marine works will be undertaken.

10.4.2 In accordance with an EIA Screening Opinion adopted by the Scottish Ministers (Marine Scotland) on 20th December 2017, the footprint of the proposed marine works will not exceed 2,400m² and will be located within the area of the existing jetties as shown in **Figure 3.2**. These existing jetties presently comprise five linked 'jetty cells' protruding approximately 30m from existing sheet piles at the foreshore south eastwards into the River Clyde. The jetties connect the with solid 'dolphin' structures which are fixed to the seabed. As shown on the submitted **Marine Licence Application Drawings**, the Applicant intends to utilise the third and fourth western-most jetty cells for the proposed marine works.

10.4.3 The existing jetty structure at the site is a legacy of previous uses of the adjacent terrestrial, including as a Ministry of Defence strategic fuel depot in the first half of the 20th Century and then as an oil storage terminal. The Carless Oil Terminal was formally decommissioned in 1992 and some terrestrial demolition works were subsequently undertaken, although the full jetty structure remains in-situ.

10.4.4 The existing jetty structure presently has no direct vehicular access, with access only possible on foot from within the adjacent former Carless Oil Terminal.

Benthic Ecology

- 10.4.5 The proposed marine works are located in the upper reaches of the Clyde Estuary. The estuarine section of the River Clyde supports a wide variety of marine habitats including intertidal mudflats, saltmarsh and dwarf eelgrass *Zostera noltii* beds (SNH, 2010).
- 10.4.6 In order to understand the marine ecological characteristics of the foreshore directly within and nearby to the site, a project specific Phase 1 Intertidal Habitat Survey was undertaken in October 2017. Several invertebrate samples were also collected as part of the survey (**Appendix 10.2**).
- 10.4.7 The foreshore within the survey area was predominately characterised by boulders, cobbles, gravel and artificial hard structures (such as quay walls and berth structures) associated with the former Carless Oil Terminal. Horned wrack *Fucus ceranoides* was present along much of the lower and middle shore with patches of the saltmarsh plant sea aster *Aster tripolium* observed on the upper shore. The gravelly sediment within the samples analysed consisted of an infaunal assemblage characterised predominantly by oligochaetes as well as nematodes and polychaetes. The most abundant benthic species recorded in the two samples was the tubificid oligochaete *Baltidrilus costatus* and microdrile oligochaete *Enchytraeidae*. These worms dominated the assemblage and contributed almost entirely to the total abundance of organisms recorded in the samples. Other oligochaete worms recorded included the brackish water oligochaete *Nais elinguis* and tubificid oligochaete *Monopylephorus irroratus*. In addition, several polychaete species (the sabellid fanworm *Manayunkia aestuarina* and ragworm *Hediste diversicolor*) and nematodes were recorded (ABPmer, 2017).
- 10.4.8 Sessile epifaunal species recorded included the non-native colonial brackish hydroid *Cordylophora caspia* and encrusting bryzoans (*Conopeum reticulum* and *Einhornia crustulenta*). Mobile epifaunal species recorded included the shore crab *Carcinus maenas*, isopod *Jaera albifrons*, amphipods (*Gammarus* spp.), springtails (in the order Collembola), mites (acari) and the larvae of various fly species including midges (Chironomidae), shore flies (Ephydriidae) and marsh flies (Sciomyzidae). Only a single individual gastropod (of the superfamily Truncatelloidea) was recorded in the samples (ABPmer, 2017).
- 10.4.9 The species recorded in the survey were commonly occurring estuarine species considered characteristic of the brackish conditions present along this section of the River Clyde. No habitats or species which are protected or considered nationally rare were recorded in the survey.

The Surrounding Area

Designated Sites

- 10.4.10 The site of the proposed development directly abuts the Inner Clyde Special Protection Area (SPA), Site of Special Scientific Interest (SSSI) and Ramsar Site, although the footprint of the proposed marine works within this (i.e. the area of the third and fourth western-most jetty cells) is located approximately 55m south east of these designations at the closest point. The Inner Clyde SPA and Inner Clyde Ramsar are both designated for non-breeding Redshank *Tringa tetanus* whilst the Inner Clyde SSSI is designated for saltmarsh features as well as a range of waterbird species (**the proximity of the adjacent designations can be viewed in Appendix 10.1; Figure 10.1**). The nearest designated is located over 60 km from the site and is therefore not considered further in this assessment.

Non-native Species

- 10.4.11 Non- native species recorded in the Firth of Clyde and River Clyde area in estuarine conditions include the carpet sea squirt *Didemnum vexillum*, common cord-grass *Spartina anglica* and chinese mitten crab *Eriocheir sinensis* (Yeomans and Clark, 2016; Firth of Clyde Forum, 2012).

Fish Species

- 10.4.12 The River Clyde supports a range of marine and estuarine fish species including flounder, sea bass, mullet, gobies and three-spined sticklebacks (Clyde River Foundation, 2009). Diadromous migratory species (fish that migrate between salt and freshwater) are also recorded in the river Clyde including Atlantic salmon, sea trout, sea lamprey, river lamprey and European eel (Clyde

River Foundation, 2009; O'Reilly *et al.*, 2016). In general, SEPA do not routinely monitor migratory species within the inner and outer estuary. However, non-target species such as the occasional salmonid are recorded during trawl surveys²⁶. Further information of the status and behaviour of migratory species are described further below.

- 10.4.13 Atlantic salmon are an anadromous species which migrate to freshwater to spawn, whilst spending most of its life in the marine environment. Spawning usually takes place in November or December and a nest (redd) is excavated in the gravel of the riverbed by the female, the eggs are deposited, fertilised by the attendant male(s), and then covered over with gravel. After some weeks, depending on the water temperature, the eggs hatch into alevins, which, after they have used up the food material in the yolk sac, become fry. These fry move up to the surface of the gravel and become the main juvenile stage of parr. After one to four years in the river, dependent on growth rate, parr become smolts, which move down the river to the sea generally from April to June. Most salmon return the following summer after one winter spent feeding at sea (with the peak upstream movement of salmon in the Clyde occurring in September). Atlantic salmon migrate through the estuary section of the River Clyde to rivers in the River Clyde catchment. Atlantic salmon reappeared in the Clyde Estuary during the 1960s, and improving water quality allowed its return to the River Clyde in numbers since 1983. The River Clyde now is now considered to support a healthy salmon population
- 10.4.14 The life cycle of the migratory sea trout is similar to that of salmon. However, in contrast to the salmon, the majority of sea trout survives spawning and will return to their natal spawning river on numerous occasions during their life time with some sea trout remaining in the estuary year round.
- 10.4.15 River lamprey and sea lamprey are both anadromous species, spawning in freshwater but completing part of their lifecycle in estuaries or at sea (Henderson, 2003; Maitland, 2003). The sea lamprey adult growth phase is short and lasts around two years. In this time the species is parasitic, feeding on a variety of marine and anadromous fishes, including shad, herring, salmon, cod, haddock and basking sharks. The rarity of capture in coastal and estuarine waters suggests that marine lampreys are solitary hunters and widely dispersed at sea. Unlike sea lamprey, the growth phase of river lamprey is primarily restricted to estuaries. After one to two years in estuaries, river lamprey stop feeding in the autumn and move upstream into medium to large rivers, usually migrating into fresh water from October to December (Maitland, 2003). Both species of lamprey have been recorded in the River Clyde.
- 10.4.16 European eel is a catadromous species which migrates to the marine environment (Sargasso Sea) to spawn. Juvenile European eels (elvers) migrate into estuaries and rivers during late winter and early spring. European eel has been recorded in the River Clyde (O'Reilly *et al.*, 2016).

Marine Mammals

- 10.4.17 The most commonly occurring marine mammals in the River Clyde are the grey seal, common (harbour) seal and harbour porpoise. Other species are only recorded more sporadically.
- 10.4.18 Both grey seal and common seal have haul out sites in the Firth of Clyde and are regularly recorded foraging in the River Clyde (Russel *et al.*, 2017; Duck and Morris, 2016; Clyde Porpoise CIC (2017).
- 10.4.19 Incidental sights of seals in the Study Area were collected as part of the project specific intertidal waterbird counts between September 2017 and March 2018. In total, 126 hours of observations in 84 survey sessions were undertaken over the seven month period. In total, there were 56 seal sightings over the survey period (52 % of sessions). Eight of these were identified as common seal and 46 as grey seal. Sightings were recorded during every month of the survey (Applied Ecology, 2018). This data therefore suggests that seals are recorded relatively frequently in the vicinity of the proposed marine works.
- 10.4.20 Harbour porpoise are considered to be a commonly occurring species in the Firth of Clyde with several 'hotspot' areas known to occur (Brown, 2018; Clyde Porpoise CIC, 2017). Harbour porpoise are also occasionally recorded foraging in the River Clyde.

²⁶ SEPA Data Information Request (November 2018).

10.5 Baseline Evolution and Expected Future Baseline

Current Baseline Evolution

- 10.5.1 The TCPA EIA Regulations require that the EIA Report must describe the likely evolution of the baseline scenario in the absence of the proposed development. In the absence of any development activities, current baseline conditions, including the natural variability in surrounding physical processes and extensive hydrocarbon contamination of sediments, would be likely to remain relatively unchanged.
- 10.5.2 For the purposes of this EIA, the likely evolution of the baseline is predicated upon the approval and implementation of proposed remediation works on the terrestrial part of the site before the construction of the proposed development. Prior remediation will be needed to:
- Reduce to an acceptable level the risk to human health and environmental receptors both on and off the site from hydrocarbon and other contamination in soil; and,
 - Reduce to an acceptable level the risk to the River Clyde from mobile contamination within soils and contaminants floating on and dissolved within the groundwater.
- 10.5.3 Remediation is therefore required both owing to the terrestrial site's current contaminated land and Special Site designations under Part IIA of the Environmental Protection Act 1990 and to make the site suitable for the future intended use (i.e. the construction and operation of the proposed development). As such, a 'no development' baseline evolution scenario is not considered to merit further consideration in this EIA.
- 10.5.4 With respect to the area of the proposed marine works, it is possible that water quality in this area could be improved through land-based remediation of the site (i.e. reduced risk of historic hydrocarbon contaminants migrating into the estuary). Similarly this could contribute to preventing any further deterioration in sediment quality in this part of the estuary.
- 10.5.5 However, as noted in Section 10.3, with the exception of water quality effects on fish, such effects have been scoped out of this assessment and are instead considered elsewhere within **Chapters 6 – Ground Conditions, 7 – Marine Geomorphology and 8 – Hydrology and Flood Risk**.

Expected Future Baseline

Overview

- 10.5.6 The expected future baseline scenario comprises the implementation of the proposed terrestrial remediation works subject to planning application DC18/245 to address known contamination within the current baseline scenario. A detailed description of the proposed remediation works is provided in **Appendix 6.3 – Remediation Strategy**, which was submitted to underpin planning application DC18/245 and is appended to this EIA Report to allow for a full description of the whole development proposed at the site to be provided in accordance with the TCPA EIA Regulations.
- 10.5.7 This section provides a high level overview of expected future baseline conditions for marine ecology receptors.

Future Baseline Conditions

- 10.5.8 Under the future baseline scenario there are unlikely to be any short-term changes to marine ecology conditions. However, factors such as climate change (which can cause range shifts in species as well as changes in food web dynamics and prey availability), ocean acidification and increases in non-native species could lead to changes in distribution, abundance, health and reproduction in marine species, potentially affecting whole populations. There is therefore a high degree of uncertainty regarding future baseline marine ecological conditions.

Predicted Future Receptor Sensitivities and Vulnerabilities

- 10.5.9 Marine species are likely to become increasingly vulnerable to anthropogenic pressures in the future due to the predicted effects of climate change and ocean acidification in combination with more local pressures (MCCIP, 2017).

Summary of Receptor Sensitivity / Importance and Consideration in this Assessment

10.5.10 **Table 10.2** below summarises the receptors that have been considered in this assessment. The importance and sensitivity of relevant receptors under the current and likely future baseline scenarios has been determined with reference to the approach discussed in **Section 10.3**.

Table 10.2 - Assessed Importance and Sensitivity of Marine Ecological Receptors/Receptor

	Importance	Sensitivity	Future Sensitivity/Importance
Benthic habitats and species	Low (local) importance: The benthic ecology survey confirmed the presence of locally common species in the footprint which are not considered nationally scarce. The development footprint does not overlap with any designated sites.	The benthic habitats and species in the Study Area are considered to have a high worst case sensitivity to marine habitat loss and a low sensitivity to water quality changes and underwater noise on the scale predicted.	The future importance of these receptors could change as a result of changes in conservation status and legal protection. The sensitivity of benthic habitats, estuarine fish, diadromous fish and marine mammals in the Study Area is not expected to change.
Fish: General estuarine assemblage	Low to moderate (local to national) importance: Species generally considered commonly occurring and not protected. Some species of commercial importance.	Estuarine fish species in the Study Area are considered to have a low sensitivity to marine habitat loss/change on the scale predicted (due to the high mobility of the species). These species are considered to have a moderate sensitivity to changes in water quality and a moderate to high sensitivity to underwater noise (depending on the species).	
Fish: Diadromous migratory species	Moderate to high (national to international) importance: Species of conservation interest and protected. Atlantic salmon and sea trout are also of recreational fisheries importance.	Diadromous migratory species are considered to have a low sensitivity to marine habitat loss/change on the scale predicted (due to the high mobility of the species). These species are considered to have a moderate sensitivity to changes in water quality and a moderate to high sensitivity to underwater noise (depending on the species).	
Marine mammals	High (international) importance: Species of conservation interest and protected.	Marine mammals are generally considered to have a low sensitivity to changes in water quality and marine habitat loss/change on the scale predicted (due to the high mobility of the species). These species are considered to have a moderate to high sensitivity to underwater noise (depending on the species).	

10.6 Embedded Mitigation

- 10.6.1 As detailed in **Chapter 3 – The Proposed Development**, a number of design features and embedded mitigation measures have been incorporated into the design and construction of the proposed development to avoid, prevent or minimise significant adverse environmental effects and to enhance beneficial effects.
- 10.6.2 As above, the implementation of the proposed remediation works is considered to form an integral part of the likely future baseline scenario. The works will need to have been completed to the extent necessary to demonstrate that the specific land where construction activities are proposed (for the proposed development) has been made suitable for the future intended use, prior to the commencement of such activities. In consequence, whilst the proposed remediation works are not strictly a form of embedded mitigation in respect of the proposed development itself, they can effectively be considered as such for the purposes of assessing likely significant effects from the implementation of the proposed development, including on marine ecological receptors.
- 10.6.3 Embedded mitigation measures of direct relevance to this assessment are detailed below. The embedded mitigation measures identified within **Section 9.6 – Terrestrial Ecology Embedded Mitigation** are also of indirect relevance.

Construction Phase

- Implementation of and adherence to a Construction Environmental Management Plan (CEMP) including a Pollution Prevention Plan (PPP) and Controlled Activities Regulations (CAR) Licence. Of relevance to the protection of marine ecological interests, this will include matters relating to dust and silt control, oils, fuels and materials storage, pollution prevention and control, and the protection of marine ecological receptors. The CEMP will include standard measures and procedures to manage sources of potential pollution such that no pollution would be capable of reaching the water environment. This will be through suitable site management practises using containment systems and suitable treatment or settlement facilities; and,
- Use of vibro piling where practicable for underwater piling: Vibro piling (which produces lower underwater source noise levels than percussive piling) is proposed to be used where possible and is likely to constitute the majority of the piling operations. However, to drive piles to the required design level below the riverbed, in certain circumstances percussive piling will still be required.

Operational Phase

- The potential for accidental spillages (from land and vessels) will be Negligible during the operation phase by following established industry guidance and protocols (e.g. bunding of fuel stores);
 - Surface water runoff control – Permanent SuDS to be managed in accordance with a PPP and CAR licence; and,
 - The surface water drainage scheme for the site will be designed using SuDS principles such that a level of treatment will be provided prior to discharge of surface waters to the River Clyde.
- 10.6.4 If required, further mitigation and enhancement measures identified through the EIA process are detailed in **Section 10.8** below before likely residual effects from the proposed development are then stated in **Section 10.9**.

10.7 Assessment of Likely Effects

- 10.7.1 This section presents an assessment of the likely effects of the construction and operation of the proposed marine works element of the proposed development on marine geomorphology

receptors. In doing so, the assessment considers the following key impact pathways for likely direct and indirect effects:

- Water quality changes on fish as a result of the release of sediment contaminants (including oil) during construction;
- Underwater noise impacts on fish and marine mammals associated with the construction of the proposed marine works (particularly piling);
- Loss of benthic habitats and species as a direct result of the jetty structure footprint;
- Changes to benthic habitats and species due to shading as a direct result of the jetty structure footprint; and,
- Operational phase effects on the introduction and spread of marine non-native species.

10.7.2 As noted in **Section 10.3**, this assessment focuses primarily on likely effects from the construction and operation of the proposed marine works element of the proposed development. In doing so, the assessment has been informed by the assessment of likely effects on marine geomorphology presented in **Chapter 7**. Coastal waterbird features and potential impacts thereon are considered elsewhere in **Chapter 9 – Terrestrial Ecology**.

Construction Phase

Water quality changes on fish as a result of the release of sediment contaminants (including oil) during construction

10.7.3 The potential release of contaminants during construction may result in compounds becoming available for uptake by any fish and/or shellfish in the water column or on surface sediments. Crude oil entering waterways from spills or runoff contain polycyclic aromatic hydrocarbons (PAHs). These compounds are considered to be one of the most toxic components of oil. The route of PAH uptake into fish depends on many environmental factors and the properties of the PAH. The common routes are ingestion, dermal uptake and gills. Fish exposed to these PAHs exhibit an array of toxic effects including genetic damage, morphological deformities, altered growth and development, decreased body size, inhibited swimming abilities and mortality (Langangen *et al.*, 2017).

10.7.4 The nature of the proposed construction works (site clearance, piling etc.) are only considered to cause relatively limited seabed sediment disturbance. In addition, oil and other contaminants that are released into the water column would be expected to be dispersed and diluted by the hydrodynamic conditions in the area. Nevertheless, the overall level of oil based sediment contamination is considered to be high and even a small amount of seabed sediment disturbance is likely to cause localised elevated oil contaminant levels in the water column and on the water's surface. Further mitigation is therefore identified in **Section 10.8** below to address this likely environmental effect.

10.7.5 Based on these factors, the magnitude of change to fish and shellfish species is therefore considered to be medium. Subsequently, exposure of fish and shellfish species to potential contaminants is assessed as medium. Therefore, given the sensitivity of fish and shellfish is considered to be moderate and the overall importance is considered to range from low to high, depending on the ecological value and protected status of individual species, the effect is assessed as **Minor to Moderate Adverse** (and as such potentially significant in the absence of mitigation).

Underwater noise impacts on fish and marine mammals associated with the construction of the proposed marine works (particularly piling)

10.7.6 Elevated underwater noise and vibration levels during marine construction work can potentially disturb fish and marine mammals by causing physiological damage and/or inducing adverse behavioural reactions. To evaluate the potential effects on marine species it is necessary to understand the character of noise propagation underwater and the potential response of species to that noise. The level of sound at any particular point underwater is a function of several factors including: ground geology, ambient background noise, the proximity to anthropogenic noise sources, the level of sound generated by the source (Source Level, SL) and the attenuation of sound as it propagates away from the source.

10.7.7 In order to inform the assessment of underwater noise effects on fish and marine mammals, underwater noise modelling and a review of scientific evidence has been undertaken, as reported in **Appendix 10.3 - Underwater Noise Assessment** and summarised below. The impact assessment has been split into sub-sections below describing likely noise effects separately on fish and marine mammals.

Fish

10.7.8 The peak SL generated by impact piling the largest steel tube piles is above the published criteria for lethal effects and recoverable physical injury. The distance at which the received level of noise is within the limits of injury is 8 m in fish with a swim bladder (i.e. Atlantic salmon, sea trout and European eel) and 4 m in fish with no swim bladder (i.e. river lamprey and sea lamprey) (**Appendix 10.3**).

10.7.9 The distance at which the received level is within the limits of a behavioural reaction in all fish is 1.6 km (**Appendix 10.3**). This indicates that fish are expected to elicit a behavioural reaction within this distance or “behavioural effects zone” during periods of percussive piling. The scale of the reaction is partly dependent on the hearing sensitivity of the species and the size of fish (which affects maximum swimming speed). Fish with a swim bladder that is not involved in hearing (e.g. Atlantic salmon, sea trout and European eel) are likely to exhibit a change in swimming direction or speed. Fish without a swim bladder (e.g. sea lamprey and river lamprey) are anticipated to only show very subtle changes in behaviour in this zone.

10.7.10 Smaller fish, juveniles and fish larvae swim at slower speeds and are likely to move passively with the current. Larger fish are more likely to actively swim and therefore move out of the behavioural effects zone in less time.

10.7.11 Although the levels of noise generated during percussive piling are likely to result in a behavioural reaction in fish, they may not necessarily lead to the displacement of fish from the area as reactions are influenced by behavioural or ecological context (Hawkins and Popper, 2016). For example, migratory fish are only able to migrate to spawning grounds during specific periods and this migration is an important part of their life cycle. A delay or change to migratory patterns would have detrimental effects on growth, survival and reproductive success. Migratory fish may, therefore, have such a strong urge to migrate to and from spawning grounds that they do not actively avoid this area despite the elevated levels of noise. Should this be the case, the levels of noise during percussive piling are not anticipated to result in a risk of injury in any fish species. Should migratory fish, however, actively avoid the area during percussive piling, a delay or change in the pattern of migration could have population level consequences.

10.7.12 Applying the standard impact assessment criteria, the probability of occurrence is high. The construction programme may overlap with the migratory periods of diadromous fish such as Atlantic salmon, sea trout, European eel and lamprey. Migratory fish moving between the Clyde and the sea could potentially pass nearby to the proposed marine works (with a risk of injury potentially occurring in very close proximity to the piling activity). In addition, behavioural response could occur over a larger area. Magnitude and consequently exposure to change is therefore considered to be medium for these migratory species.

10.7.13 The sensitivity of Atlantic salmon, sea trout and European eel is considered to be high with the sensitivity of lamprey species medium (based on the fish noise exposure criteria in **Appendix 10.3**). Atlantic salmon is considered to have a high importance due to its conservation and fisheries status on the Clyde with other diadromous fish species considered to have a moderate importance. On this basis, whilst only temporary in duration, the effect to Atlantic salmon is considered to be **Major Adverse** with the effect to other diadromous fish (such as sea trout, European eel, river lamprey and sea lamprey), considered to be **Moderate Adverse** (and as such potentially significant in the absence of mitigation).

10.7.14 In terms of other fish commonly occurring in the Clyde, the effect is considered to be **Minor to Moderate Adverse** (and as such potentially significant in the absence of mitigation). This is based on these other fish having a range of sensitivities from low to high, and a low to moderate importance in terms of nature conservation status.

Marine mammals

10.7.15 The peak SL generated by impact piling the largest steel tube piles is above the published criteria for a permanent threshold shift (PTS) and a temporary threshold shift (TTS) in harbour

porpoise, grey seal and common seal. A PTS is permanent hearing damage caused by very intensive noise or by prolonged exposure to noise. A TTS involves a temporary reduction of hearing capability caused by exposure to underwater noise. The distance at which the received level of noise is below the limits of PTS is 15 m in harbour porpoise and 2 m in seals. The distance at which the received level of noise is below the limits of TTS is 32 m in harbour porpoise and 4 m in seals (**Appendix 10.3**).

- 10.7.16 At lower sound pressure levels it is more likely that behavioural responses to underwater sound will be observed. These reactions may include the animals leaving the area for a period of time, or a brief startle reaction. Masking effects may also occur at lower levels of noise. Masking is the interference with the detection of biologically relevant communication signals such as echolocation clicks or social signals. Masking has been shown in acoustic signals used for communication among marine mammals (see Clark *et al.*, 2009). Masking may in some cases hinder echolocation of prey or detection of predators. If the signal-to-noise ratio prevents detection of subtle or even prominent pieces of information, inappropriate or ineffective responses may be shown by the receiving organism (**Appendix 10.3**).
- 10.7.17 Harbour porpoise is particularly sensitive to underwater noise and may display a behavioural reaction up to around 3 km from the source of piling. Seals are less sensitive to underwater noise, with behavioural reactions limited to around 30 m. Behavioural responses of these species within these distances could include movement away from a sound source, aggressive behaviour related to noise exposure (e.g. tail/flipper slapping, fluke display, abrupt directed movement), visible startle response and brief cessation of reproductive behaviour (Southall *et al.*, 2007). This area is not a key foraging area for marine mammals and does not have a seal haul out and therefore any marine mammals that happen to be present are likely to evade the area.
- 10.7.18 Applying the standard impact assessment criteria, the probability of occurrence is high. Piling is predicted to cause injury effects within close proximity to the proposed piling and strong behavioural responses over a much wider area (particularly with respect to harbour porpoise). Marine mammal species (particularly seals) are regularly recorded in this area of the Clyde. On a precautionary basis, the magnitude of the change is considered at worst to be moderate during piling. The sensitivity of marine mammal species to piling noise is considered to be moderate for seal species and high for harbour porpoise (based on marine mammal noise exposure criteria in **Appendix 10.3**) and their importance is considered to be high given the level of protection that they are afforded. Therefore, the temporary underwater noise effect on marine mammals during piling is assessed as **Major to Moderate Adverse** (and as such potentially significant in the absence of mitigation).

Operational Phase

Loss of benthic habitats and species as a direct result of the jetty structure footprint

- 10.7.19 The jetty will result in the direct loss of approximately 14.5 m² (<0.001 ha) of marine habitat (predominantly subtidal along with a small amount of intertidal) as a direct result of the footprint of the piles.
- 10.7.20 The footprint of marine habitat loss is considered negligible in the context of extent of the overall amount of similar marine habitats found locally in the River Clyde. In addition, the Marine Habitat Survey reported in **Appendix 10.2**. only recorded commonly occurring species considered characteristic of brackish conditions present along this section of the River Clyde. No habitats or species which are considered nationally rare or protected were recorded in the footprint of the proposed marine works in this marine ecology survey.
- 10.7.21 Based on the evidence provided above, the magnitude of potential impacts and overall exposure is considered to be negligible. The sensitivity of species to direct habitat loss is however considered to be high for all marine habitats and species within the footprint (given the lack of recoverability following piling). The importance of intertidal and subtidal habitats in the footprint of the development is low. On this basis, the effect of direct habitat loss on benthic habitats and species is considered to be **Negligible Adverse**.

Changes to benthic habitats and species due to shading as a direct result of the jetty structure footprint

- 10.7.22 The concrete deck structure will cause shading to the seabed directly underneath the structure. This could potentially cause changes to the benthic community present through restricting the amount of light available to marine species.
- 10.7.23 Reduced light can limit the growth of macrophytes (such as saltmarsh plants) and macroalgae species (such as seaweeds). In addition, microphytobenthos abundance on the sediment surface and within the sediment could also change as a result of shading. This could alter food supply and sediment cohesion to deposit feeding species (Yeh *et al.*, 2015; Tillin and Tyler-Walters, 2016).
- 10.7.24 On this basis, sea aster (present on the upper shore) and intertidal seaweeds are unlikely to be able to grow under the decking. While changes to the infaunal community could also occur a broadly similar benthic assemblage to that already present is considered likely to persist. In addition, the concrete deck structure only shades a very localised area (<0.15 ha) in the context of similar habitats occurring in the wider region. Furthermore, the habitats and species recorded in the footprint are generally considered commonly occurring and are not listed as nationally rare or protected under conservation designations.
- 10.7.25 Based on the evidence provided above, the magnitude of potential impacts and overall exposure is considered to be negligible. The sensitivity of species to benthic habitat change due to shading is considered to be low to medium (depending on the species). The importance of intertidal and subtidal habitats in the footprint of the development is low. On this basis, the effect of changes to benthic habitats and species as a result of shading is considered to be **Negligible Adverse**.

The introduction and spread of marine non-native species

- 10.7.26 Non-native species have the potential to be transported into the local area on vessels' hulls once the quay wall is being used by vessels (i.e. is operational). The fouling of a boat hull and other below-water surfaces can be reduced through the use of protective coatings. These coatings usually contain a toxic chemical (such as copper) or an irritant (such as pepper) that discourages organisms from attaching. Other coatings, such as those that are silicone-based, provide a surface that is more difficult to adhere to firmly, making cleaning of the hull less laborious. The type and concentration of coatings that can be applied to a boat hull is regulated, and can vary from country to country. Maintenance of hulls through regular cleaning will minimise the number of fouling organisms present. Hull cleaning can take place on land or in-water. In both cases, care should be taken to prevent the organisms from being released into the water. By following best management practices, the impact of the cleaning procedure on the environment can be minimised.
- 10.7.27 Non-native invasive species also have the potential to be transported via vessel ballast water. Seawater may be drawn into tanks when the ship is not carrying cargo, for stability, and expelled when it is no longer required. This provides a vector whereby organisms may be transported long distances.
- 10.7.28 In view of existing best practice procedures, the probability of the introduction and spread of non-native species from the operational phase is considered to be low. However, given that the magnitude of change is unknown, magnitude ranges from negligible to large depending upon the scale and nature of any non-native species introduction, thus the exposure ranges from negligible to low at worst. The sensitivity of all intertidal and subtidal receptors to non-native species introductions is expected to range from low to moderate. Vulnerability is therefore considered to be low. In addition, importance is considered to be low given the habitats and species are commonly occurring in the local area and of low conservation concern. The overall effect is therefore considered to be **Negligible Adverse**.

10.8 Further Mitigation and Enhancement

Construction Phase

Water quality changes on fish as a result of the release of sediment contaminants (including oil)

- 10.8.1 The assessment provided in **Section 10.7** indicates that in the absence of any further mitigation, the construction phase of the proposed marine works is likely to result in Minor to Moderate Adverse effects on fish species due to the disturbance and release of hydrocarbon contaminants from riverbed sediments. Depending on the species impacted, this could be considered significant in the context of the EIA Regulations.
- 10.8.2 Further mitigation is therefore proposed to minimise the avoidance of likely significant adverse effects, comprising the undertaking of a site investigation (SI) within the footprint of the proposed marine works (limited to 2,400m² in accordance with the Marine Works EIA Screening Opinion), for both geo-technical and geo-environmental purposes. Following this, any remediation works necessary to reduce levels of sediment contamination, limit contamination dispersal into the water column and to make the area suitable for future intended use (as a heavy lift quay) will be implemented and verified as the first stage of the proposed marine works (i.e. prior to construction), as detailed within the submitted **Heavy lift Quay Construction Sequence Document**. Conditions requiring the undertaking of this SI and any necessary subsequent remediation works are therefore expected to be attached to any planning permission and marine licence granted for the proposed development; and,

Underwater noise impacts on fish and marine mammals associated with the construction of the proposed marine works (particularly piling)

- 10.8.3 The assessment provided in **Section 10.7** indicates that in the absence of any further mitigation, the undertaking of piling in the marine environment is likely to result in:
- Major Adverse effects on Atlantic Salmon;
 - Moderate Adverse effects on other diadromous fish; and,
 - Moderate to Major Adverse effects on marine mammals.
- 10.8.4 All of these effects would be considered significant in the context of the EIA Regulations. Further mitigation measures are therefore proposed to avoid such likely significant adverse effects, comprising:
- **Piling restrictions (migratory Atlantic Salmon):** All piling activities are proposed to take place between mid-November and April to reduce overlap with the key sensitivity periods for migratory Atlantic Salmon.
 - **Soft start (fish and marine mammals):** The gradual increase of piling power, incrementally, until full operational power is achieved will be used as part of the piling methodology. This will give fish and marine mammals the opportunity to move away from the area before the onset of full impact strikes. The duration of the soft start is proposed to be 20 minutes in line with the JNCC “Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals during piling” (JNCC, 2010).
 - **Daylight working (fish and marine mammals):** Work to be restricted to daylight hours during the winter piling window. This will generally allow for more than 12 hours each day without any piling activity. During these periods, transiting marine mammals such as foraging seals would be able to move between upstream foraging areas and downstream haul out sites without any potential noise disturbance. This will also allow fish to move upstream and downstream of the proposed development without any potential barrier to movement caused by the piling activity.

Operational Phase

- 10.8.5 As likely operational effects have all been assessed as **Negligible Adverse**, no further operational phase mitigation measures are specifically required to ensure the avoidance of likely

significant adverse effects. However, on a precautionary basis, in order to manage potential non-native species risks as a result of the proposed development, a Marine Biosecurity Plan will be developed, implemented and maintained by the Applicant. The plan will be prepared in accordance with the Marine Biosecurity Planning Guidance for Scotland (Payne *et al.*, 2014). This best practice document provides guidance on developing site-based biosecurity plans for a number of activities, including construction programs.

10.9 Residual Effects

10.9.1 Water quality changes on fish during construction and underwater noise impacts on fish and marine mammals during construction were assessed as **Minor to Moderate Adverse**. However, with the mitigation measures outlined in **Section 10.8**, likely residual impacts for these pathways would reduce to **Minor Adverse**. All other pathways were assessed as **Negligible** and not requiring mitigation.

10.9.2 Taking account of proposed mitigation and enhancement measures, the likely residual effects on marine ecology from the construction and operation of the proposed marine works are identified in **Table 10.3** below.

Table 10.3 - Residual Effects – Marine Ecology

Development Phase	Potential Impact Pathway	Pre-Mitigation Effect Level	Mitigation/ Monitoring	Residual Effect Level	Residual EIA Significance	Confidence
Construction	Water quality changes on fish as a result of the release of sediment contaminants (including oil) during construction	Minor to Moderate Adverse.	Marine SI and remediation works	Minor Adverse	Not significant	Moderate: Some baseline data available and potential effects are understood are generally well understood.
	Underwater noise impacts on fish and marine mammals associated with the construction of the proposed marine works (particularly piling)	Minor to Major Adverse (depending on the species).	Piling restrictions (Atlantic salmon) Soft start procedures (fish and marine mammals) Daylight working (fish and marine mammals)	Minor Adverse	Not significant	Moderate: The underwater noise model is based on theoretical parameters and there is limited empirical field evidence of the behavioural effects of piling noise on fish and marine mammals
Operational	Loss of benthic habitats and species as a direct result of the jetty structure footprint	Negligible Adverse	None required	Negligible Adverse	Not significant	High: Baseline conditions and potential impacts on benthic receptors are generally well understood.
	Changes to benthic habitats and species due to shading as a direct result of	Negligible Adverse	None required	Negligible Adverse	Not significant	High: Baseline conditions and potential impacts on benthic receptors

Development Phase	Potential Impact Pathway	Pre-Mitigation Effect Level	Mitigation/Monitoring	Residual Effect Level	Residual EIA Significance	Confidence
	the jetty structure footprint					are generally well understood.
	The introduction and spread of marine non-native species during operation	Negligible	Development of a Biosecurity Plan	Negligible	Not significant	Moderate: Scientific understanding of the introduction of non-native species is generally good although some uncertainty still surrounds the level of risk associated with the introduction of species.

10.10 Monitoring

10.10.1 No monitoring is considered to be proportionate or required specifically in relation to the likely residual (not significant) effects of the construction and operation of the proposed development on marine ecology.

10.11 Cumulative Effects

Construction Phase

10.11.1 Relevant cumulative developments listed in **Section 2.4** were reviewed to identify potential interactions with the construction and/or operation of the proposed development which could result in likely significant environmental effects within the scope of this assessment. Of particular relevance to this assessment are the following marine projects which have the potential to impact on marine ecology receptors:

- Clyde Waterfront Renfrew Riverside (CWRR) development: Planning consent was granted for the development in November 2018 with construction expected to start at the end of 2019. The waterfront regeneration project includes the construction of a bridge crossing the river. Marine works for the bridge element of the project include channel piling and dredging for a layby berthing structure (The Glasgow City Region City Deal, 2018).
- Dumbarton Waterfront: Proposed housing developments including a seawall upgrade at the Sandpoint Marina site and works to stabilise the basin and harbour walls at Castle Street.
- Esso Bowling and Scott's Yard: Redevelopment of the area to increase business and industry opportunities. This includes works under planning application DC18/013 (for voluntary remediation works) to reinforce the Clyde riverbank.

10.11.2 In combination with the relevant cumulative developments highlighted above, the construction phase of the proposed development has the potential to generate cumulative effects on fish species in relation to:

- **Potential underwater noise impacts:** Construction of the CWRR river crossing will require in channel piling which has the potential to cause underwater noise impacts to migratory fish (particularly Atlantic salmon). However, a number of mitigation measures were proposed including a seasonal piling restriction during sensitive migratory periods for the species. Seasonal restrictions and restrictions on the construction methods were proposed to mitigate potential noise impacts associated with any potential marine works for Dumbarton Waterfront, Esso Bowling and Scott's Yard (noting that these have yet to be confirmed). Therefore, assuming these measures are implemented as well the project

specific mitigation for the Carless proposed marine works (identified in 10.8), likely cumulative underwater noise effects have been assessed as **Minor Adverse** (i.e. not significant) at worst; and,

- Potential water quality impacts: Changes in water quality could also occur as a result of construction activity (piling and dredging) for the CWRR river crossing and any potential marine works for Dumbarton Waterfront, Esso Bowling and Scott's Yard. This would be due to the release of sediment bound contaminants and elevated suspended sediment concentrations due to the construction activities. However, with the seasonal restrictions highlighted above as well as adhering to best practice and site-specific mitigation during construction, potential impacts from these potential developments are expected to be minimised (noting that these have yet to be confirmed). Water quality impacts as a result of the Carless proposed marine works were assessed as Minor Adverse assuming that the proposed marine remediation works is undertaken. On this basis, likely cumulative water quality effects have been assessed as **Minor Adverse** (i.e. not significant) at worst.

Operation Phase

10.11.3 Owing to the nature and location of the proposed development and the other relevant cumulative developments, no potential for operational phase cumulative effects has been identified.

10.12 Summary

10.12.1 This chapter of the EIA Report provides an assessment of the likely significant effects from the proposed development on marine ecology. The following marine ecology receptors have been considered as part of the assessment:

- Nature conservation protected habitats and species;
- Benthic habitats and species (including non-native species);
- Fish species; and
- Marine mammals.

10.12.2 The proposed development requires to be authorised through planning permission granted by WDC and a marine licence from the Scottish Ministers, and therefore that both terrestrial and marine spatial planning policies are applicable. To facilitate the marine ecology impact assessment process a standard analysis methodology has been applied. The impact assessment assesses whether important marine geomorphological features will be subject to impacts (positive or negative), the characterisation of these impacts (extent, magnitude, duration, reversibility, timing and frequency) and their effects in the absence of mitigation. An assessment has then been undertaken of the significance of the residual ecological effects of the project (after mitigation), including cumulative effects.

Baseline Conditions

10.12.3 The site is located immediately adjacent to the Inner Clyde SPA and Inner Clyde Ramsar, both of which are designated for non-breeding Redshank. The site is also located immediately adjacent to the Inner Clyde Site of SSSI which is designated for saltmarsh features as well as a range of waterbird species.

10.12.4 Project specific marine ecology survey work found the foreshore to be predominately characterised by boulders, cobbles, gravel and artificial hard structures (such as quay walls and berth structures). The benthic assemblage recorded was characterised by a range of commonly occurring estuarine species characteristic of the brackish conditions present along this section of the River Clyde.

10.12.5 The River Clyde supports a range of marine and estuarine fish species including flounder, sea bass, mullet, gobies and three-spined sticklebacks, as well as diadromous migratory species including Atlantic salmon, sea trout, sea lamprey, river lamprey and European eel.

10.12.6 With respect to marine mammals, grey seal and common (harbour) seal have been frequently recorded in the vicinity of the proposed marine works with harbour porpoise also recorded in the River Clyde.

Assessment of Likely Effects

10.12.7 The key impact pathways on marine ecology receptors during construction relate to potential water quality changes on fish as a result of the release of sediment contaminants and underwater noise on fish and marine mammals. Water quality effects on fish were assessed as **Minor to Moderate Adverse (i.e. significant)** given that overall level of oil based sediment contamination is considered to be high and even a small amount of seabed sediment disturbance is likely to cause localised elevated oil contaminant levels. Underwater noise effects on marine mammals and fish were assessed as **Minor to Major Adverse** (depending on the species) due to the potential for injury effects near to the proposed marine works and strong behavioural reactions at greater distances.

10.12.8 The key impact pathways on marine ecology receptors during operation relate to potential benthic habitat and species loss and change as a result of the footprint of the development and the potential spread of non-native species. Benthic habitat and species loss (as a result of the placement of piles) and change (as a result of shading effects) were both assessed as **Negligible Adverse** due to the highly localised nature of the footprint and low importance of the assemblages occurring in the area. The potential spread of non-native species was also assessed as **Negligible Adverse** through following best management practices and adhering to a Marine Biosecurity Plan.

Mitigation and enhancement

10.12.9 During the construction phase it is proposed that marine remediation works are undertaken before any construction activity commences to reduce potential water quality impacts to fish species.

10.12.10 In order to reduce potential underwater noise impacts as a result of piling activity it is proposed that seasonal piling restrictions are applied to reduce overlap with the key sensitivity periods for migratory Atlantic salmon. In addition, the use of soft start procedures and daylight only working will be implemented to reduce potential noise impacts to fish and marine mammals.

Residual effects

10.12.11 Water quality changes on fish during construction and underwater noise impacts on fish and marine mammals during construction were assessed as Minor to Major Adverse. However, with the mitigation measures outlined above, residual impacts for these pathways have been assessed as Minor Adverse (i.e. not significant). All other pathways were assessed as Negligible Adverse and not requiring mitigation.

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11 Transport and Access

11.1 Introduction

11.1.1 This chapter of the EIA Report provides an assessment of the likely significant effects from the proposed development on transport. The assessment is based on the characteristics of the site and surrounding area and the key parameters of the proposed development detailed in **Chapter 2 – Site and Surrounding Area** and **Chapter 3 – The Proposed Development** respectively.

11.1.2 This chapter has been prepared by PBA. In accordance with Regulation 5(5)(b) of the EIA Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.1**.

11.1.3 The aims of this chapter are to:

- Identify the relevant context in which the assessment of likely significant traffic and transport effects has been undertaken;
- Describe the methods used to undertake the assessment;
- Outline the relevant baseline conditions currently existing at the site and surroundings;
- Consider how the implementation of the proposed remediation works would affect current baseline conditions, resulting in a likely future baseline scenario;
- Identify the likely direct and indirect transport effects of the proposed development under the likely future baseline scenario;
- Identify mitigation and enhancement measures, where required, to address likely effects;
- Assess likely residual effects; and,
- Assess likely cumulative effects on transport from the proposed development in combination with other relevant cumulative developments.

11.1.4 This chapter is supported by the following figures and technical reports provided in **Appendices 11.1 - 11.2**:

- **Appendix 11.1 – Figures (Figure 11.1 – Construction HGV Routing Plan)**; and
- **Appendix 11.2 - Transport Assessment (TA)**.

11.2 Policy Context, Legislation, Guidance and Standards

Legislation

11.2.1 The overarching legislative framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. There is no subject-specific legislation of relevance to this assessment.

Policy

11.2.2 The planning policy framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Planning policy considerations of specific relevance to this assessment are:

11.2.3 Planning policy considerations of specific relevance to this assessment are:

- **Adopted West Dunbartonshire Local Plan (2010)**, in particular policies:
 - GD1 - Development Control;
 - GD 2(9) - Carless, Old Kirkpatrick;
 - R 4(A): Forth and Clyde Canal;

- T 2 - Access Improvements; and,
 - T 4 - Accessibility to New Development.
 - **West Dunbartonshire LDP Proposed Plan 2015**, in particular:
 - ‘Changing Places’ Carless Redevelopment Strategy (Section 3.6); and policies:
 - DS1 - Successful Places and Sustainable Design;
 - GN7 – Forth and Clyde Canal; and,
 - SD1 – The Transport Network.
 - **West Dunbartonshire LDP2 Proposed Plan (2018)**, in particular proposed policies:
 - Carless Policy 4 – Green Network and Green Infrastructure;
 - Policy FCC1 – Forth & Clyde Canal;
 - CP1 – Creating Places;
 - CON1 - Transportation Requirements for New Development;
 - CON3 - Core Paths and Natural Routes; and,
 - ENV10 - Implementation of the SEA Environmental Report.
 - **Scottish Planning Policy (SPP) (2014)**, in particular:
 - Principal Policy on Sustainability (paragraphs 24-35);
 - Principal Policy on Placemaking (paragraphs 36-57); and,
 - Promoting Sustainable Transport and Active Travel (Paragraphs 269-291).
 - **Scottish Government Planning Advice Note (PAN) 75 Planning for Transport (August 2005)**.
- 11.2.4 This planning policy framework highlights the need for development proposals to be supported by adequate transport infrastructure and to avoid adverse impacts on the functioning of the transport network.
- 11.2.5 Other land use policy considerations of relevance to this assessment are:
- The Regional Transport Strategy for the West of Scotland (2008); and,
 - West Dunbartonshire Local Transport Plan (2013).
- 11.2.6 In accordance with sections 15 and 58 of the Marine and Coastal Access Act (2009), the marine licence application for the proposed marine works (i.e. the extent of the proposed development located below MHWS) must be determined in accordance with the ‘appropriate marine policy documents’, unless relevant considerations indicate otherwise. Taking account of the fact any effects on marine transport have been scoped out of this assessment, appropriate marine policy documents which are of relevance to this assessment comprise:
- **UK Marine Policy Statement (2011)**;
 - **Scotland’s National Marine Plan (2015)**, in particular policies:
 - GEN1 - General Planning Principle;
 - GEN19 - Sound Evidence; and,
 - GEN21 - Cumulative Impacts.

Guidance and Relevant Technical Standards

The IEA Guidelines

- 11.2.7 This assessment of likely significant transport effects has been undertaken using established methodologies and has concentrated on examining the capacity of relevant local transport infrastructure to accommodate the proposed development. It has been undertaken in

accordance with the guidance set out within the Institute of Environmental Assessment (IEA) document 'Guidelines on the Environmental Assessment of Road Traffic (Guidance Note 1)', 1993 (hereafter 'the IEA Guidelines').

11.2.8 The following guidance and technical standards have also informed this assessment:

- Transport Assessment Guidance (2012);
- National Roads Development Guide (2017); and,
- Design Manual for Roads and Bridges (DMRB).

11.3 Methodology

Overview

Assessment Scope

11.3.1 This chapter presents an assessment of likely significant effects on transport from the proposed development. The assessment has been prepared in accordance with the EIA Regulations.

11.3.2 The principal aspects considered within this assessment are:

- Changes in vehicle flows and usage patterns within the road network, with associated environmental and amenity effects²⁷; and,
- Changes in physical access

11.3.3 In accordance with the Carless Marine Fabrication Complex EIA Scoping Report and subsequent EIA Scoping Opinion provided in **Appendix 4.1**, the following effects have been scoped out of detailed consideration within the assessment:

- Effects on the Trunk road network;
- Effects on parking. As all staff and visitor parking will be accommodated on site, no parking effects in the surrounding area are considered likely;
- Effects on paths (including Core Paths) and the NCN / towpath surrounding the site. Whilst staff and visitors may use local walking and cycling routes to access the proposed development once operational, these routes do not intersect with the site and the proposed development would not alter their accessibility; and
- Effects on maritime transport activities and marine users.

Assessment Process

11.3.4 In undertaking this assessment, the following activities have been carried out:

- Scoping, both for the EIA and TA (see below);
- Post-scoping correspondence with relevant stakeholders including West Dunbartonshire Council Roads Department, Sustrans and Scottish Canals (see below);
- Desk-based review of available information including previous studies;
- A site-visit and walkover of the site and surrounding pedestrian, cycle and local road network;
- Traffic and Non-Motorised User (NMU) data collection (see below);
- Evaluation of current baseline traffic conditions;

²⁷ In accordance with the IEA Guidelines, this chapter assesses likely significant effects from predicted changes in traffic flows in relation to severance, driver delay; pedestrian and cyclist amenity; fear and intimidation; driver delay; and accident and safety. Assessments of likely significant noise and air quality effects resulting from predicted changes in traffic flows are assessed elsewhere in **Chapters 11** and **12** of the EIA Report respectively. In addition, an assessment of likely significant visual amenity effects, including on the Core Path network, is provided in **Chapter 14**.

- Consideration of the effect of the implementation of the proposed remediation works and relevant cumulative developments upon current traffic conditions, resulting in a future baseline scenario;
- Production of a Transport Assessment (TA) for the proposed development; and,
- Identification and assessment of likely significant effects, taking into account proposed mitigation and enhancement measures and including consideration of likely cumulative effects from relevant cumulative developments not already accounted for in the future baseline scenario.

Consultation

11.3.5 This assessment has been informed by an EIA Scoping Report (PBA, October 2017) and subsequent EIA Scoping Opinion issued by WDC (March 2018) in respect of the EIA for the proposed development. The EIA Scoping Opinion, which is provided in full in **Appendix 4.1**, included a list of standard requirements for consideration in this chapter. In addition, the following should be noted:

- Peel Ports advised that as the Clydeport Harbour Authority they should be consulted on the siting and design of the proposed quay to ensure continued navigational rights.
- WDC Roads Department advised that the proposed approach to assessment set out in Chapter 12 of the EIA Scoping Report is generally acceptable and noted the following:
 - Requested that further details are provided in the EIA Report regarding abnormal loads (type and frequency) and access routes; and,
 - That Scottish Canals should be consulted at planning application stage in relation to impacts on the Erskine Ferry Road Swing Bridge.

11.3.6 Information on accommodating abnormal loads is included in the supporting Transport Assessment. Scottish Canals were consulted and suggested working on the assumption that the bridge is capable of carrying traffic that complies with the Construction and Use Regulations 1986 with a 40/44T Gross Vehicle Weight (GVW).

11.3.7 In tandem with EIA Scoping, the Applicant consulted WDC Roads Department on the proposed scope of a TA to support a planning application for the proposed development. The junctions to be considered in the TA and this assessment of likely significant effects were agreed between the Applicant and WDC through this process (as detailed below).

Study Area

11.3.8 The Study Area adopted in this assessment comprises links and routes forming part of the adopted road network within the vicinity of the site which have the potential to experience significant changes in flows or access conditions during the construction or operational phases of the proposed development. In geographical terms, the Study Area is framed around:

- Erskine Ferry Road, including bridge over the FCC and access junction to the private road which leads into the site; and,
- A814 Dumbarton Road, including at the junction with Erskine Ferry Road; and,
- Links from the Forth and Clyde Canal and pedestrian routes to and from the site.

11.3.9 Further details of the spatial scope of the analysis undertaken of likely changes in traffic flows and travel patterns as a result of the proposed development are provided within **Appendix 11.2 - Transport Assessment (TA)**.

Information Sources

Desk Top Study

11.3.10 The following desktop exercises have been undertaken:

- A review of how the proposed development site within the national, regional and local policy context;
- A review of the wider transport network and services (including consideration of routes for abnormal loads);
- A review of collision data (www.crashmap.co.uk)
- A trip generation and distribution exercise;
- Review of expected parking provision within the site in relation to relevant standards; and,
- Modelling of junction performance.

Fieldwork

11.3.11 To establish current baseline flows and gain a greater understand the profile and pattern of traffic movements on roads likely to be impacted by the proposed development, traffic surveys of various types were undertaken at the junctions and locations highlighted on **Figure 11.1 – Traffic Survey Locations** within **Appendix 11.1**:

- Junction Turning Counts (0900 – 1900 hours) carried out on Tuesday 27th March 2018; and,
- 2 no. Automatic Tube Counters (7 days) that were installed between Thursday the 22nd March and Wednesday the 28th March.

Approach to Assessment

Consideration of Relevant Receptors

11.3.12 Based on the information sources outlined above, the relevant baseline characteristics of the site and surrounding area were characterised. This led to the identification of relevant sensitive or important receptors to consider within the assessment, as detailed within **Section 11.4 – Current Baseline Conditions**.

11.3.13 The sensitivity of identified relevant receptors was determined using professional judgement, based on both the existing value of the receptor (e.g. the role of a specific link or junction) and its susceptibility to being impacted by changes in flows or access conditions. Receptor sensitivity was therefore determined in accordance with the matrix shown in **Table 11.1**.

Table 11.1 – Sensitivity of Receptors

Susceptibility to Change	Value				
	International	National	Regional	Local	Community
High	High	High	High	Medium	Medium
Medium	High	High	Medium	Medium	Low
Low	Medium	Medium	Low	Low	Low

Impact Assessment Methodology

11.3.14 The likely magnitude of change on relevant receptors (i.e. specific links, junctions and Core Path) and as a result of changes in traffic flows and public access was characterised with reference to the criteria provided in **Table 11.2** below. Consideration was also given to whether the change would be beneficial (i.e. likely to produce environmental benefits) or adverse (i.e. likely to produce environmental disbenefits).

Table 11.2 – Magnitude of Change

Magnitude	Description
Negligible	Changes in traffic flows/patterns less than 10%;
Low	Slight very short or highly localised changes of no significance and/or where changes in traffic flows/patterns are between 10% and 30%;
Medium	Limited change by extent, duration or magnitude which may be considered significant and/or where changes in traffic flows/patterns are between 30% and 60%; and
High	Considerable change by extent, duration or magnitude of more than local significance or in breach of recognised acceptability, legislation, policy or standards, and/or where changes in traffic flows/patterns are greater than 60%.

Establishment of Effect Significance

11.3.15 The IEA Guidelines (1993) suggest where predicted increases in traffic flows from a development proposal are lower than 10%, likely effects on environmental receptors can be stated as being not significant and no further assessment is required. Changes in flow above 10% affecting have the potential to generate likely significant effects depending on the sensitivity of the affected receptor (i.e. transport link/junction) and therefore may require more detailed assessment, with any changes in flow above 30% always requiring further consideration.

11.3.16 In line with standard EIA practice, a significance matrix (**Table 11.3**) was used to combine the sensitivity of identified receptors (**Table 11.1**) with the predicted magnitude of change affecting the receptor (**Table 11.2**) in order to identify the level of likely traffic effects from the proposed development. Effects identified at levels of Moderate level or above are considered to be significant in the context of the TCPA EIA Regulations.

Table 11.3 – EIA Significance Matrix –Transport and Access Effects

Sensitivity	Magnitude of Change			
	High	Medium	Low	Negligible
High	Substantial	Moderate/Substantial	Moderate	Slight
Medium	Moderate/Substantial	Moderate	Slight/Moderate	Slight
Low	Moderate	Slight/Moderate	Slight	Negligible
Negligible	Slight	Slight/Negligible	Negligible	Negligible

Approach to Cumulative Impact Assessment

11.3.17 As detailed in **Section 2.4**, the following list of cumulative developments were considered in this assessment:

- DC18/122 – Golden Jubilee Hospital (Erection of single storey & two storey extension to existing hospital & associated works). Decision 13/09/2018.
- DC18/230- Golden Jubilee Hospital (Placement of a CAT Laboratory Mobile Unit) App received 15/10/2018
- DC18/135 - 667A Dumbarton Road Clydebank G81 4HD Conversion & extension of 2 commercial units to form 6 retail units & 2 general industrial/storage units including associated external alterations – Decision received 11/10/18 & Application withdrawn.
- DC16/012 - Clyde Gate Cable Depot Road Clydebank. Erection of maritime survival training facility Status: Approve consent. Received 24/03/16

11.3.18 The nature and location of the relevant cumulative developments mean that none are likely to generate high footfall or result in significant cumulative transport effects in combination with the proposed development. In addition, it has been agreed with WDC Roads Department through TA Scoping that no future background traffic growth is likely. No traffic growth has therefore been factored into the expected future baseline scenario (**Section 11.5**) and a separate assessment of likely significant cumulative effects is not required.

Assumptions and Limitations

11.3.19 Key parameters used to analyse baseline traffic flows and to assess the impact of additional flows from the proposed development were:

Traffic Distribution

11.3.20 The site has a single point of access from an unnamed private road to the west, which connects with Erskine Ferry Road and in turn links to the A814 Dumbarton Road. The assessment of likely traffic effects from the construction and operation of the proposed development assumed that all traffic flows generated would utilise this single existing access route. For the avoidance of doubt, the provision of potential future additional access routes into the wider Carless landholding to the east was not assessed as any such route would not serve the proposed development.

Measurements

11.3.21 Geometric parameters were taken from OS MasterMap with lane markings measured on-site. Phasing and staging was observed during site visits with intergreens calculated using the quickGreen package²⁸.

Temporal Focus

11.3.22 The assessment periods are the identified AM and PM weekday peak hours: 08:00 to 09:00 and 16:30 to 17:30).

11.3.23 The impact assessment has assumed an opening year of 2021 / 2022 for the proposed development. As agreed West Dunbartonshire Council Roads through scoping of the Capacity Assessment provided within **Appendix 11.2 – TA**, no future traffic growth was taken account of.

Modelling Scenarios

11.3.24 As agreed with WDC, this assessment has considered likely transport effects from the proposed development on top of the expected future baseline scenario, taking account of the implementation of the proposed remediation works as applied for separately under planning application DC18/245.

Trip Generation

11.3.25 Construction phase traffic was estimated based on the expected type, nature and duration of construction activities throughout the construction phase of the proposed development. The following assumptions were therefore adopted:

- 6500 one-way HGV movements over the expected 18-month construction period;
- Approximately one-way 30 HGV movements per day over the initial 2-month phase of the construction programme when fill material for development platforms, foundations and flood defences will be brought to site; and,
- After the initial 2 months, daily HGV movements for the remaining 16-month construction programme are likely to be up to 10-15 (one-way), with movements reducing in the last 6 months of the programme when the focus of works will be on internal fitout.

11.3.26 To provide robust analysis of operational phase trip generation, the industry standard TRICS database was used to calculate likely trip generation, as detailed fully within **Appendix 11.2 – TA**. This was based on the number of trips generated by a 30,000m² Industrial Unit, well beyond

²⁸ <http://www.jctconsultancy.co.uk/Software/quickGreen/quickGreen.php>

the likely magnitude of development which could be provided within the site and therefore presents a robust assessment of the impact on the surrounding road network.

11.3.27 Baseline traffic surveys at Erskine Ferry Road takes account of existing industrial activity including users of the un-named private road leading to the site (i.e. the neighbouring Logitech and Subsea 7 facilities).

11.4 Current Baseline Conditions

11.4.1 **Appendix 11.2 - TA** includes a full baseline review with supporting figures; this section of the EIA Report chapter contains a summary focusing on the identification of sensitive receptors within the Study Area which have the potential to experience likely significant effects and therefore need to be considered in the impact assessment within **Sections 11.6 – 11.10**). This section considers in turn:

- Walking and Cycling Routes;
- Public Transport; and,
- The Road Network.

Walking and Cycling Routes

11.4.2 The site is secured by perimeter fencing and does not currently support any public access, in part owing to its contaminated and derelict state. However, there are opportunities for walkers, cyclists and others visiting specific locations or accessing outdoor space for recreational purposes throughout the Study Area.

11.4.3 The proposed development site is generally accessible by foot along and adjacent to the main vehicular access routes to the site, as well as the NCR7 Towpath along the southern side of the Forth & Clyde Canal, which runs parallel with Dumbarton Road (A814). There are also connections from the furthest eastern extent of the site to the towpath, which connects to Farm Road (beyond Clydemuir Primary School) and on to Dumbarton Road near to Duntocher Road. Both routes cross Erskine Ferry Road.

11.4.4 There are no continuous footways along either side of the unnamed private road which connects the site with Erskine Ferry Road.

11.4.5 The disused railway line immediately north of the site is designated by WDC as a Local Nature Conservation Site and informal access is therefore afforded to it, as well as The Saltings Local Nature Reserve on the other side of Erskine Ferry Road. However, none of these have direct access routes for NMU into the site.

11.4.6 There are a number of Core Paths within the vicinity of the site, although as with NCR7, no Core Path has direct connectivity with the site.

Public Transport

11.4.7 The nearest bus services that provide bus opportunities for the site are found in very close proximity on either side of the A814 Dumbarton Road (5 mins / 500 metres). A bus stop & shelter and a bus cage (road marking) is located on the north side of the A814 just beyond the signal junction to allow people travelling from Glasgow to alight and those travelling towards Dumbarton to board.

11.4.8 In the opposite direction (effective south-east bound – towards Glasgow) there is a similar arrangement of bus stop/shelter and cage allowing bus users to board and alight.

11.4.9 The local bus services operate as follows with all buses (1, 1A, 1B and 1E (Balloch – Glasgow Express) running on a 30min frequency, apart from service 1E. Out of Glasgow towards Helensburgh there is the 1B, Balloch (1A) and Old Kilpatrick (1 – The one).

11.4.10 The nearest rail station is located at Kilpatrick which is on the Dalmuir line and provides a half-hourly service from Dumbarton to Cumbernauld, via Glasgow Queen Street.

11.4.11 The station can be reached from the site on foot via Lisset Glen with a remote footpath providing a connection beneath the A898. This footpath is signed from the A814 Dumbarton Road with

pedestrian wayfinding signs and allows the quickest route to and from the station. It is not a lit path and may prove to be unpopular for some pedestrians and in the hours of darkness.

The Road Network

Local Road Network

- 11.4.12 The site has a single point of access from an unnamed private road to the west, which connects with Erskine Ferry Road and in turn links to the A814 Dumbarton Road. The unnamed private road presently provides access for staff and deliveries to adjacent industrial premises east of the site, namely a Logitech high precision manufacturing facility and a Subsea 7 pipeline welding centre.
- 11.4.13 Erskine Ferry Road is a single carriageway undivided road with one traffic lane in either direction. The road itself only affords access to a small number of properties – the Erskine Ferry Road Recycling Centre, Subsea 7 and Logitech. From the junction of unnamed private road and Erskine Ferry Road, the road leads north east towards a 4-way traffic signal junction on the A814 Dumbarton Road at the junction with Barclay Street, crossing the Forth & Clyde Canal by means of a barrier-controlled swing bridge. Footways exist on both sides of Erskine Ferry Road and also on Erskine Ferry Bridge itself, where they are protected by steel parapet walls and a metal fence.
- 11.4.14 Erskine Ferry bridge is a fully operational swing bridge maintained by Scottish Canals which itself forms part of the Forth and Clyde Canal Scheduled Monument. The bridge is understood to have a 44-tonne loading capacity and operates on an occasional basis to allow water borne transport to pass. When this is required no pedestrians or vehicles can enter or exit Erskine Ferry Road and are held back by the traffic signals.
- 11.4.15 The A814 Dumbarton Road carries around 5,500 vehicles per day and Barclay Street, the Unnamed Private Road and Erskine Ferry Road (including Bridge) with NCN Crossing carry around 1,000.

11.4.16 Strategic Road Network

- 11.4.17 Erskine Ferry Road meets the A814 Dumbarton Road at a 4-way signalised junction immediately north east of Erskine Ferry Bridge. the A814 Dumbarton Road road carries traffic from Bowling in the west towards Clydebank and on to Glasgow. The road runs parallel with the Forth & Clyde Canal and has street lighting, footways and bus stops close to the junction serving movements both east and west. A full pedestrian phase is available at the signals to allow safe crossing of the A814 Dumbarton Road.
- 11.4.18 The road carries a reasonable volume of traffic on a daily basis (around six thousand vehicles) and allows connections to the wider strategic road network on the A898 (the road that crosses the River 'Erskine Bridge') and the A82 (Great Western Road) which carries traffic between Dumbarton and Argyll & Bute and Glasgow. The Erskine Bridge eventually provides a connection to the area south of the River Clyde close to the Applicant's existing facility.
- 11.4.19 The A82 (Great Western Road) is a busy trunk road that carries a significant volume of traffic from Glasgow north westwards passed Dumbarton, Balloch, Loch Lomond and onwards towards Tyndrum, Glencoe and Fort William.

Accident Records

- 11.4.20 A review of Crashmap identified only one recorded road traffic collision in the local area (on the approach to the traffic signal junction of the A814 Dumbarton Road and Erskine Ferry Road) within a five-year period. This was a slight injury incident which occurred in Feb of 2014 and involved 2 vehicles with one casualty sustaining slight injury. No incidents occurred (with injury sustained) on Erskine Ferry Road in the same period.
- 11.4.21 In respect of the full data that is available over 19 years there have been 13 recorded incidents in the local area and only one on Erskine Ferry Road itself. This particular incident occurred at or close to the junction with the unnamed private road that leads towards the site and involved 2 no. vehicles and 1 no. reported casualty (slight injury).
- 11.4.22 Maritime Transport There is no measurable maritime transport baseline to report as no activities are presently water borne from the site or adjacent industrial premises to the River Clyde. The

NCR7 Towpath on the south western bank of the Forth and Clyde Canal forms a physical barrier that prevents access from the site directly into the Canal for water borne transport.

11.5 Baseline Evolution and Expected Future Baseline

Current Baseline Evolution

- 11.5.1 The TCPA EIA Regulations require that the EIA Report must describe the likely evolution of the baseline scenario in the absence of the proposed development. In the absence of any development activities current baseline conditions, including extensive hydrocarbon contamination of soils and groundwater, would be likely to remain relatively unchanged, except for natural growth of existing vegetation within the site.
- 11.5.2 For the purposes of this EIA, the likely evolution of the baseline is predicated upon the approval and implementation of proposed remediation works before the commencement of the proposed development (the construction of the proposed development). Prior remediation will be needed to:
- Reduce to an acceptable level the risk to human health and environmental receptors both on and off the site from hydrocarbon and other contamination in soil;
 - Reduce to an acceptable level the risk to the River Clyde from mobile contamination within soils and contaminants floating on and dissolved within the groundwater; and therefore,
- 11.5.3 Remediation is therefore required both to remove the site's current contaminated land and Special Site designations under Part IIA of the Environmental Protection Act 1990 and to make the site suitable for the future intended use (i.e. the construction and operation of the proposed development). As such, a 'no development' baseline evolution scenario is not considered to merit further consideration in this EIA.
- 11.5.4 Whilst not forming part of the proposed development assessed in this EIA, an overview of the proposed remediation works is provided for completeness in **Chapter 6 – Ground Conditions**. In addition to intrusive works within the site, the proposed remediation works include a commitment by the Applicant to undertake further SI and subsequent remediation works on land to the east within the wider Carless landholding. This will be outwith the site of the proposed development considered in this EIA. Planning application DC18/245 for the proposed remediation works was submitted to West Dunbartonshire Council as the relevant local planning authority on 1st November 2018 and validated on 14th November 2018.

Expected Future Baseline

Expected Changes in Conditions within the site

- 11.5.5 In relation to traffic and transport, the only likely effect of implementing the proposed remediation works will be that construction traffic (staff and plant vehicles) associated generated by the works will temporarily access the site and move around within it. This will apply on an ongoing basis until full completion of the proposed remediation works in accordance with planning application DC18/245. In response to a query from WDC Roads Department in relation to planning application DC18/245, the Applicant has estimated that during the undertaking of the proposed remediation works:
- Approximately 20 staff are likely to be on-site during peak activities in undertaking the proposed remediation works. It is assumed that staff will travel to site by car and be accommodated within the site, as there are suitable areas of cleared hardstanding outwith the area of the site where intrusive remediation works are proposed. Additionally, **Section 11.4** above confirms there are public bus stops nearby on the A814 Dumbarton Rd close to Erskine Ferry Road; and,
 - HGV trips to/from the site are expected to be on average less than 1 per day as a result of the proposed remediation works. The proposed on-site remediation treatment means that once the necessary plant is brought to site there are likely to be minimal trips, e.g. waste vehicles to uplift any residual contaminated material requiring off-site disposal.

11.5.6 The construction traffic routing plan provided to WDC in relation to planning application DC18/245 is the same as provided for the proposed development within **Figure 11.2** of this EIA Report and within **Appendix 11.2 – TA**.

11.5.7 As some overlap between the completion of the proposed remediation works and initial construction phases of the proposed development is expected, traffic generated by the proposed remediation works under the expected future baseline scenario is likely to be present on site in combination with traffic generated by the initial phases of construction of the proposed development. At the full completion of the proposed remediation works the construction traffic associated with these works would cease, leaving only construction (and subsequent operational) traffic generated by the proposed development.

Expected Changes in Conditions outwith site

11.5.8 As noted in **Section 11.3** above, the nature and location of the relevant cumulative developments mean that none are likely to generate high footfall or result in significant cumulative transport effects in combination with the proposed development. In addition, it has been agreed with WDC Roads Department through TA Scoping that no future background traffic growth is likely. No traffic growth beyond current baseline flows has therefore been factored into the expected future baseline scenario.

Summary of Receptor Sensitivity / Importance and Consideration in this Assessment

11.5.9 Drawing upon **Sections 11.4**, and **11.5**, **Table 11.6** below provides a summary of the sensitivity under the future baseline scenario of identified receptors which are likely to experience transport and access effects from the proposed development. **Table 11.6** therefore confirms which receptors have been carried forward to the impact assessments presented in **Sections 11.7 – 14.9** below. It should be noted that, where relevant, junctions have been identified as separate receptors from the overall road link(s) which they form part of, as the current operating level and sensitivity of a link or junction to changes in traffic flow may differ.

Table 11.4 - Transport Receptor Sensitivity

	Receptor (Users of..)	Future Baseline Sensitivity	Development Phase where effect(s) considered likely	Rationale (based on users of identified receptor)
1	Unnamed Private Road and Erskine Ferry Road (including Bridge) – link	High	Construction and Operational	Erskine Ferry Road must be crossed by pedestrians and cyclists using the NCN. The unnamed private road immediately west of the site connects with Erskine Ferry Road and together they provide the only access route to the site and neighbouring industrial premises (Logitech and Subsea 7 facilities).
2	A814 / Erskine Ferry Road - junction	High	Construction and Operational	This is a key junction such that any traffic effects would impact on the wider functioning of the A814 as a key route also used by bus services.
3	A814 Dumbarton Road (N) - link	Medium	Construction and Operational	These receptors presently operate below capacity and are of local / regional value only.
4	Barclay Street - link	Medium	Operational	

	Receptor (Users of..)	Future Baseline Sensitivity	Development Phase where effect(s) considered likely	Rationale (based on users of identified receptor)
5	A814 Dumbarton Road (S)) - link	Medium	Operational	
6	Unnamed Private Road and Erskine Ferry Road - junction	Medium	Construction and Operational	

11.6 Embedded Mitigation

11.6.1 As detailed in **Chapter 3 – The Proposed Development**, a number of design features and embedded mitigation measures have been incorporated into the design and construction of the proposed development to avoid, prevent or minimise significant adverse environmental effects and to enhance beneficial effects. Embedded mitigation measures of relevance to this assessment are:

Construction Phase

- All staff parking and plant/materials storage will be accommodated on suitable land within the site or the wider Carless landholding, such that no external parking or storage will be required;
- Where possible, efforts will be taken to minimise disruption to users of the unnamed private road in order that good accessibility be maintained along the only access route to the site and the neighbouring industrial premises;
- Development and implementation of a Construction Environmental Management Plan (CEMP) including constituent Construction Traffic Management Plan (CTMP) to minimise construction phase impacts on the surrounding road network. The CEMP and CTMP will include measures relating to the following as standard: construction traffic routing, site access/deliveries, parking, contractor management, parking, fuels and materials storage, standard dust and noise suppression techniques, and standard pollution prevention and control techniques. The CTMP will be developed in accordance with the submitted Transport Assessment (**Appendix 11.2**), which includes a section on the principles of managing construction traffic.

Operational Phase

- Development and implementation of a Travel Plan to promote sustainable travel choices by staff and visitors to the site.

11.6.2 If required, further mitigation and enhancement measures identified through the EIA process are detailed in **Section 11.8** below before likely residual effects from the proposed development are then stated in **Section 11.9**.

11.7 Assessment of Likely Effects

Construction Phase

11.7.1 As noted in **Section 11.3**, the Applicant has estimated there will be around 6,500 HGV movements (one-way) over an 18-month construction period (worst case). This includes approx. 30 movements per day over an initial 2-month phase when fill material for development platforms, foundations and flood defences will be brought to site. After the initial 2 months, daily

HGV movements are likely to be up to 10-15, with movements reducing in the last 6 months of the programme when the focus of works will be on internal fitout.

11.7.2 **Table 11.5** below outlines the trip generated during the construction phase and the percentage impact above the baseline.

Table 11.5 Annual Average Daily Traffic (AADT) During Construction

No.	Street	Estimated Annual Average Daily Traffic (AADT)	Estimated Construction Traffic Annual Average Daily Traffic (AADT) (worst case)	Percentage Increase
1	Unnamed Private Road and Erskine Ferry Road (including Bridge)	1,028	1,128	10%
3	A814 Dumbarton Road (N)	5,723	5,823	2%

11.7.3 **Table 11.5** shows that the magnitude of change is low at both locations. Minimal impacts are expected during peak hours as a result of the measures included in the CTMP (Section 11.6), where construction deliveries will be scheduled to occur outwith these periods.

11.7.4 No abnormal loads are expected to be required, as large pieces of construction and operational plant including cranes and steel-work can be transported to site in standard HGVs and assembled on-site. No traffic effects resulting from abnormal load movements are therefore considered likely.

11.7.5 Based on the analysis presented above, **Table 11.6** below identifies the level of likely construction phase traffic and transport effects resulting from the proposed development in the absence of any further mitigation (i.e. 'pre-mitigation').

Table 11.6 – Assessment of Likely Construction Phase Transport Effects

	Receptor (Users of..)	Type of Effect(s)	Sensitivity	Likely Magnitude of Change	Likely Level of Effect	Rationale
1	Unnamed Private Road and Erskine Ferry Road (including Bridge)	Severance Pedestrian & Cyclist Amenity Fear and Intimidation Accidents and Safety	High	Low	Moderate Adverse	<p>This receptor is expected to experience around a 10% increase in traffic as a result of the construction of the proposed development. This increase in traffic would be a Low magnitude of change, resulting in a Moderate Adverse effect owing to the identified sensitivity of each receptor. –</p> <p>The predicted increase in construction traffic is at the lowest possible level which could be considered significant under the IEA Guidelines; and,</p> <p>Existing infrastructure can accommodate the predicted level of construction traffic (including vehicles capable of delivering the largest identified load).</p>
2	A814 / Erskine Ferry Road junction	Severance Pedestrian & Cyclist Delay Pedestrian & Cyclist Amenity Fear and Intimidation Driver Delay Accidents and Safety	High	Negligible	Slight Adverse	<p>This receptor is expected to experience less than 10% increase in traffic as a result of the construction of the proposed development. This increase in traffic would be a negligible magnitude of change, resulting in a Slight Adverse effect owing to the identified sensitivity of each receptor. –</p> <p>The predicted increase in construction traffic is at the lowest possible level which could be considered significant under the IEA Guidelines; and,</p> <p>Existing infrastructure can accommodate the predicted level of construction traffic (including vehicles capable of delivering the largest identified load).</p>

	Receptor (Users of..)	Type of Effect(s)	Sensitivity	Likely Magnitude of Change	Likely Level of Effect	Rationale
3	A814 Dumbarton Road (N)	Severance Pedestrian & Cyclist Amenity Fear and Intimidation Accidents and Safety	Medium	Negligible	Slight Adverse	These receptors are expected to experience less than 10% increase in traffic as a result of the construction of the proposed development. This relatively low increase in traffic would be a Low Adverse magnitude of change, resulting in a Slight effect.
6	Unnamed Private Road and Erskine Ferry Road junction		Medium	Low	Slight / Moderate Adverse	This receptor is expected to experience around a 10% increase in traffic as a result of the operation of the proposed development. This increase in traffic would be a Low magnitude of change, resulting in a Slight / Moderate effect. The predicted increase in construction traffic is at the lowest possible level which could be considered significant under the IEA Guidelines; and, Existing infrastructure can accommodate the predicted level of construction traffic (including vehicles capable of delivering the largest identified load).

Operational Phase

Traffic Flow

11.7.6 **Appendix 11.1 – Transport Assessment** presents an analysis of the likely number of vehicular trips associated with the operational phase of the proposed development. An assessment of the impact on traffic flows, journey times, queue lengths and parking provision was undertaken, with the key results summarised below. This is then used to inform the identification of likely significant operational effects from the proposed development (in the absence of any further mitigation).

11.7.7 **Table 11.7** below shows likely trip generated at peak hours during the operational phase of the proposed development, as previously agreed with WDC Roads as part of the *Junction Capacity Assessment* presented in full in the appendices to the TA which is **Appendix 11.2 of this ES**.

Table 11.7 – Operational Phase Peak Hours Traffic Movements

Time Period	Arrive	Depart
08:00 to 09:00	59	11

Time Period	Arrive	Depart
16:30 to 17:30	7	50

11.7.8 These peak hour trips have been distributed based on surveyed traffic flows and as shown in **Table 11.8** below.

Table 11.8 - Operational Phase Peak Hours Traffic Distribution

Time Period	Arrive		Depart	
	To North	To South	From North	From South
08:00 to 09:00	54%	46%	74%	26%
16:30 to 17:30*	53%	45%	39%	50%

*missing values arrive / depart from Barclay Street

11.7.9 **Table 11.9** below shows the estimated 2021 base Annual Average Daily Traffic (AADT) on each of the links identified as key receptors with and without the proposed development in place.

Table 11.9 – Annual Average Daily Traffic (AADT)

	Receptor	Estimated Annual Average Daily Traffic (AADT)	With Development Estimated Annual Average Daily Traffic (AADT)	Percentage Increase
1	Unnamed Private Road and Erskine Ferry Road (including Bridge) with NCN Crossing	1,028	1,208	18%
3	A814 Dumbarton Road (N)	5,723	5,797	1%
4	Barclay Street	1,047	1,069	2%
5	A814 Dumbarton Road (S))	5,228	5,311	2%

11.7.10 **Table 11.9** above indicates the likely percentage increase in traffic as a result of the operation of the development are minimal on the A814 Dumbarton Road and Barclay Street (1% to 2%), with a higher percentage change predicted to affect Erskine Ferry Road because it has much lower baseline flows.

11.7.11 With reference to the IEA Guidelines (1993), predicted increases in flow on the A814 Dumbarton Road (North and South) and Barclay Street are less than 10% and therefore require no further consideration as only a Negligible magnitude of change would occur on each receptor. The unnamed private road providing access to the site from the west and the connecting Erskine Ferry Road are together predicted to experience an increase in flow exceeding 10%. This receptor is therefore subject to detailed assessment in **Table 11.10** below.

Table 11.10 - Assessment of Likely Pre-Mitigation Operational Effects

	Receptor (<i>Users of..</i>)	Type of Effect(s)	Sensitivity (based on associated users)	Magnitude of Change	Level of Effect	Rationale
1	Unnamed Private Road and Erskine Ferry Road (including Bridge) with NCN Crossing	Severance Pedestrian & Cyclist Delay Pedestrian & Cyclist Amenity Fear and Intimidation Driver Delay Accidents and Safety	High	Low	Moderate Adverse	This receptor is expected to experience a greater than 10% increase in traffic as a result of the operation of the proposed development. This increase in traffic would be a Low Adverse magnitude of change, resulting in a Moderate Adverse effect.
2	A814 / Erskine Ferry Road Junction		High	Negligible	Slight Adverse	This receptor is expected to experience a less than 10% increase in traffic as a result of the operation of the proposed development. This increase in traffic would be a Negligible magnitude of change, resulting in a Slight Adverse effect.
3	A814 Dumbarton Road (N)		Medium	Negligible	Slight Adverse	This receptor is expected to experience a less than 10% increase in traffic as a result of the operation of the proposed development. This increase in traffic would be a negligible magnitude of change, resulting in a Slight Adverse effect.
4	Barclay Street		Medium	Negligible	Slight Adverse	T This receptor is expected to experience a less than 10% increase in traffic as a result of the operation of the proposed development. This increase in traffic would be a negligible magnitude of change, resulting in a Slight Adverse effect.
5	A814 Dumbarton Road (S))		Medium	Negligible	Slight Adverse	This receptor is expected to experience a less than 10% increase in traffic as a result of the operation of the proposed development. This increase in traffic would be a negligible magnitude of change, resulting in a Slight Adverse effect.
6	Unnamed Private Road / Erskine Ferry Road Junction		Medium	Low	Slight / Moderate Adverse	This receptor is expected to experience a greater than 10% increase in traffic as a result of the operation of the proposed development. This increase in traffic would be a Low Adverse

	Receptor (<i>Users of..</i>)	Type of Effect(s)	Sensitivity (based on associated users)	Magnitude of Change	Level of Effect	Rationale
						magnitude of change, resulting in a Slight / Moderate Adverse effect.

11.7.12 All receptors have a slight adverse impact except for the Unnamed Private Road and Erskine Ferry Road (including Bridge) with NCN Crossing and their junction (1 and 6). These receptors are currently lightly trafficked and so any increase in traffic will have an adverse impact, though no greater than moderate, on Severance, Pedestrian & Cyclist Delay, Pedestrian & Cyclist Amenity, Fear and Intimidation and Accidents and Safety.

11.8 Further Mitigation and Enhancement

Construction Phase

- 11.8.1 No further mitigation beyond the development and implementation of a CTMP as embedded mitigation is considered necessary to address likely construction phase effects.
- 11.8.2 Every effort will be made to ensure the accessibility of Erskine Ferry Road and the unnamed private road, thereby minimising negative impacts to users along a key access route which connects to the site during the construction phase and beyond. The Construction Traffic Management Plan will outline measures to achieve this.

Operational Phase

- 11.8.3 The predicted Moderate Adverse level of effect on the unnamed private road and Erskine Ferry Road results only from a high percentage change terms to low baseline flows. Furthermore, the technical assessments presented in Appendix 11.2 – TA and the Junction Capacity Assessments appended to the TA demonstrate that the predicted increase in traffic flow would not adversely affect the functioning of the unnamed private road and Erskine Ferry Road as providing a single access route to both the site and adjacent industrial premises. On this basis, no further mitigation is considered to be required in order to address the likely adverse effects identified in Section 11.7.
- 11.8.4 Whilst no further mitigation is considered to be required specifically to address traffic impacts from the proposed development, it is considered that there is an opportunity to improve the functioning of the local road network through the following enhancement measures:
- 11.8.5 As these measures are not specifically required to accommodate the proposed development, WDC Roads Department would be responsible for their implementation.
- 11.8.6 Consideration could be given to linking the traffic signal operations with the bridge operations such that the traffic lights stop traffic when the bridge is opened.
- 11.8.7 Given that the proposed development would be the largest trip generator served from Erskine Ferry Road and the associated unnamed private road, consideration could be given to changing the priority markings and instating give-way lines at the exit from the Recycling Centre at the end of Erskine Ferry Road.

11.9 Residual Effects

- 11.9.1 Taking account of all proposed mitigation and enhancement measures, the likely residual effects from the construction and operation of the proposed development are identified in **Table 11.11** below.
- 11.9.2 As no further mitigation has been identified in Section 11.8 as being required and the implementation of potential enhancement measures is not within the control of the Applicant, the level of all likely transport effects remains the same as assessed in Section 11.7.

Table 11.11 - Summary of Likely Residual Traffic and Transport Effects

	Receptor	Receptor Sensitivity	Residual Magnitude of Change	Residual Level of Effect	Residual EIA Significance
Construction Phase					
1	Unnamed Private Road and Erskine Ferry Road (including Bridge) and NCN Crossing	High	Low	Slight Adverse	Significant
2	A814 / Erskine Ferry Road junction	High	Negligible	Slight Adverse	Not significant
3	A814 Dumbarton Road (N)	Medium	Negligible	Slight Adverse	Not significant
6	Unnamed Private Road and Erskine Ferry Road junction	Medium	Low	Slight / Moderate Adverse	Not significant
Operational Phase					
1	Unnamed Private Road and Erskine Ferry Road (including Bridge) and NCN Crossing	High	Low	Moderate Adverse	Significant
2	A814 / Erskine Ferry Road junction	High	Negligible	Slight Adverse	Not significant
3	A814 Dumbarton Road (N)	Medium	Negligible	Slight Adverse	Not significant
4	Barclay Street	Medium	Negligible	Slight Adverse	Not significant
5	A814 Dumbarton Road (S))	Medium	Negligible	Slight Adverse	Not significant
6	Unnamed Private Road and Erskine Ferry Road junction	Medium	Low	Slight / Moderate Adverse	Not significant

11.9.3 Those receptors where the impact is identified as significant are expected to relate primarily to the construction period. Once the site is operational it is expected that all HGV movements will be made via the River Clyde rather than by road. The increase in car trips (increased staff) would be offset by the reduction in HGV movements. It is estimated that 10% of future trips will be HGV trips (TRICS result for Industrial Unit) and, based on this, the percentage increase is lower, as shown in Table 11.12.

Table 11.12 Annual Average Daily Traffic (AADT) with Deliveries via Clyde

No.	Street	Estimated Annual Average Daily Traffic (AADT)	With Development Estimated Annual Average Daily Traffic (AADT)	Percentage Increase
4	Erskine Ferry Road (including Bridge) and NCN Crossing	1,028	1,186	15%

11.9.4 It should be noted that the percentage impact is high because the base flows are low and the actual increase is in the region of 160 movements (two way) over a 24-hour period with no (or limited) larger vehicles access the site by road.

11.10 Monitoring

11.10.1 Notwithstanding the identification of likely residual significant adverse effects, the absence of any required further mitigation (**Section 11.8**) means that no monitoring of such effects is considered to be proportionate or required.

11.11 Cumulative Effects

11.11.1 As detailed in **Section 2.4**, no relevant cumulative developments have been identified which could result in likely significant cumulative effects in combination with the proposed development. In consequence, a separate assessment of likely significant cumulative effects is not required.

11.12 Summary

11.12.1 This chapter of the EIA has provided an assessment of the likely effects from the proposed development on traffic, transport and access. The assessment builds upon a Transport Assessment provided in **Appendix 7.2**. The Transport Assessment contains a more detailed analysis of predicted changes in traffic flows and travel patterns resulting from the proposed development.

11.12.2 In accordance with relevant policy requirements and guidelines, the assessment identifies and examines the sensitivity of receptors comprising the users of key links within the local road network surrounding the site. With the adoption of a Construction Traffic Management Plan (CTMP) as part of a wider Construction Environmental Management Plan (CEMP), the assessment concludes that the construction phase of the proposed development is not likely to result in any significant effects on identified receptors.

11.12.3 To identify likely operational traffic effects from the proposed development on the identified receptors, consideration was given to the predicted percentage change in traffic flows on selected links within the local road network. Other factors including the existing level of base flows and whether the proposed development would have any road safety implications were also taken account of in order to determine the level and thus EIA significance of likely operational phase effects.

11.12.4 The assessment concludes that predicted increases in peak traffic flows of up to 2% on the A814 Dumbarton Road, 2% on Barclay Street and 18% on the Unnamed Private Road and Erskine Ferry Road (including Bridge and NCN crossing) during operation. Only the Unnamed

Private Road and Erskine Ferry Road (including Bridge and NCN crossing) have a significant residual EIA significance.

- 11.12.5 The predicted Moderate Adverse level of effect on the unnamed private road and Erskine Ferry Road results only from a high percentage change terms to low baseline flows. Furthermore, the technical assessments presented in Appendix 11.2 – TA and the Junction Capacity Assessment appended to the TA demonstrate that the predicted increase in traffic flow would not adversely affect the functioning of the unnamed private road and Erskine Ferry Road as providing a single access route to both the site and adjacent industrial premises. On this basis, no further mitigation is considered to be required in order to address the likely adverse effects identified in Section 11.7.

12 Air Quality

12.1 Introduction

- 12.1.1 This chapter of the EIA Report provides an assessment of the likely significant effects from the proposed development on air quality. The assessment is based on the characteristics of the site and surrounding area and the key parameters of the proposed development detailed in **Chapter 2 – Site and Surrounding Area** and **Chapter 3 – The Proposed Development** respectively.
- 12.1.2 This chapter has been prepared by PBA. In accordance with Regulation 5(5)(b) of the EIA Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.1**.
- 12.1.3 The aims of this chapter are to:
- Identify the relevant context in which the air quality assessment has been undertaken;
 - Describe the methods used to undertake the assessment;
 - Outline the relevant baseline conditions currently existing at the site and surroundings;
 - Consider how the implementation of the proposed remediation works would affect current baseline conditions, resulting in a likely future baseline scenario;
 - Identify the likely direct and indirect air quality effects of the proposed development under the future baseline scenario;
 - Identify mitigation and enhancement measures where required to address likely effects;
 - Assess likely residual effects; and,
 - Assess likely cumulative effects on air quality from the proposed development in combination with other relevant cumulative developments.
- 12.1.4 This chapter is supported by **Figure 12.1 – Air Quality Monitoring Locations** provided in **Appendix 12.1 – Figures** and **Appendix 12.2 – Traffic Data**.

12.2 Policy Context, Legislation, Guidance and Standards

Legislation

- 12.2.1 The overarching legislative framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Subject specific legislation of relevance to this assessment are detailed in the section below.
- #### The Air Quality Strategy
- 12.2.2 The Air Quality Strategy (2007) (DETR, 2007) establishes the policy framework for ambient air quality management and assessment in the UK. The primary objective is to ensure that everyone can enjoy a level of ambient air quality which poses no significant risk to health or quality of life. The Strategy sets out the National Air Quality Objectives (NAQOs) and Government policy on achieving these objectives.
- 12.2.3 Part IV of the Environment Act 1995 introduced a system of Local Air Quality Management (LAQM). This requires local authorities to regularly and systematically review and assess air quality within their boundary, and appraise development and transport plans against these assessments. The objectives adopted in Scotland for the purpose of Local Air Quality Management are set out in the Air Quality (Scotland) Regulations 2000, the Air Quality (Scotland) Amendment Regulations 2002 and the Air Quality (Scotland) Amendment Regulations 2016.
- 12.2.4 Where an objective is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the objectives within its AQMA.

12.2.5 The Local Air Quality Management Technical Guidance 2016 (LAQM.TG(16); Defra and the Scottish Government, 2016) provides advice as to where the NAQOs apply. These include outdoor locations where members of the public are likely to be regularly present for the averaging period of the objective (which vary from 15 minutes to a year). Thus, for example, annual mean objectives apply at the façades of residential properties, whilst the 24-hour objective (for PM₁₀) would also apply within the garden. They do not apply to occupational, indoor or in-vehicle exposure.

EU Limit Values

12.2.6 The Air Quality Standards (Scotland) Regulations 2010 implements the European Union's Directive on ambient air quality and cleaner air for Europe (2008/50/EC), and includes limit values for NO₂. These limit values are numerically the same as the NAQO values but differ in terms of compliance dates, locations where they apply and the legal responsibility for ensuring that they are complied with. The compliance date for the NO₂ EU Limit Value was 1 January 2010, five years later than the date for the NAQO.

12.2.7 Directive 2008/50/EC consolidated the previous framework directive on ambient air quality assessment and management and its first three daughter directives. The limit values remained unchanged, but it now allows Member States a time extension for compliance, subject to European Commission (EC) approval.

12.2.8 The Directive limit values are applicable at all locations except:

- Where members of the public do not have access and there is no fixed habitation;
- On factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply; and
- On the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access.

Habitats

12.2.9 As detailed in **Chapters 9 – Terrestrial Ecology** and **Chapter 10 – Marine Ecology**, the site directly abuts the Inner Clyde Special Protection Area (SPA), Site of Special Scientific Interest (SSSI) and Ramsar Site, as designated under relevant natural heritage legislation outlined in Sections 9.2 and 10.2. This includes the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) ('the Habitats Regulations'), which primarily provide measures for the protection of European Sites and European Protected Species, but also require local planning authorities to encourage the management of other features that are of major importance for wild flora and fauna. As stated in the Nature Conservation (Scotland) Act 2004, if a development is "*likely to damage*" a SSSI, the Nature Conservation Act requires that Scottish Natural Heritage is consulted. Specific critical levels have been established to define concentrations of atmospheric pollutants above which direct adverse impacts on ecological receptors may occur. The critical level for NO_x is detailed overleaf.

Air Quality Objectives

Human Health

12.2.10 The NAQOs for NO₂ and PM₁₀ set out in the Air Quality Regulations (Scotland) 2000 and the Air Quality (Scotland) (Amendment) Regulations 2002, are shown in **Table 12.1**.

Table 12.1 – NO₂ and PM₁₀ Objectives

Pollutant	Time Period	Objective
Nitrogen dioxide (NO ₂)	1-hour mean	200 µg/m ³ not to be exceeded more than 18 times a year
	Annual mean	40 µg/m ³
Particulate matter (PM ₁₀)	24-hour mean	50 µg/m ³ not to be exceeded more than 7 times a year
	Annual mean	18 µg/m ³

Pollutant	Time Period	Objective
Particulate matter (PM _{2.5})	Annual mean	10 µg/m ³ (to be achieved by 2020)

12.2.11 The objectives for NO₂ and PM₁₀ were to have been achieved by 2005 and 2010, respectively, and continue to apply in all future years thereafter. Analysis of long term monitoring data suggests that if the annual mean NO₂ concentration is less than 60 µg/m³ then the one-hour mean NO₂ objective is unlikely to be exceeded where road transport is the main source of pollution. This concentration has been used to screen whether the one-hour mean objective is likely to be achieved (Defra, 2016).

Ecological Sites

12.2.12 Objectives for the protection of vegetation and ecosystems have been set by the UK Government and were to have been achieved by 2000. They are summarised in **Table 12.2** and are the same as the EU limit values. The objectives do not strictly apply to this site as they only apply (a) more than 20 km from an agglomeration (about 250,000 people), and (b) more than 5 km from Part A industrial sources, motorways and built up areas of more than 5,000 people. However, Scottish Natural Heritage has adopted a more precautionary policy approach and applies the objective to all internationally designated conservation sites and SSSIs regardless of their location. The Highways Agency follows this approach and requires an assessment of the impacts of roads traffic emissions on nature conservation sites (Designated Sites) within 200 m of a road. When pollutant concentrations exceed a critical level it is considered that there is a risk of harmful effects.

Table 12.2 – Vegetation and Ecosystem Objectives (Critical Levels)

Pollutant	Time Period	Objective
Nitrogen Oxides (expressed as NO ₂)	Annual mean	30 µg/m ³

12.2.13 Critical loads for nitrogen deposition onto sensitive ecosystems have been specified by United Nations Economic Commission for Europe (UNECE). They are defined as the amount of pollutant deposited to a given area over a year, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge. Exceedance of a critical load is used as an indication of the potential for harmful effects to occur.

Policy

12.2.14 The planning policy framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Planning policy considerations of specific relevance to this assessment are:

- **Adopted West Dunbartonshire Local Plan (2010)**, in particular policies:
 - GD1: Development Control; and,
 - GD 2(9): Carless, Old Kirkpatrick;
- **West Dunbartonshire LDP Proposed Plan 2015**, in particular:
 - ‘Changing Places’ Carless Redevelopment Strategy (Section 3.6)
 - DS4 – Air Quality.
- **West Dunbartonshire LDP2 Proposed Plan (2018)**, in particular proposed policies:
 - ENV8 – Air, Light and Noise Pollution; and,
 - ENV10 - Implementation of the SEA Environmental Report.
- **Scottish Planning Policy (SPP) (2014)**, in particular:
 - Principal Policy on Sustainability (paragraphs 24-35); and

- Valuing the Natural Environment Subject Policy (Paragraphs 193 - 233).
- **Scottish Government Planning Advice Note (PAN) 51 Planning Environmental Protection and Regulation (Revised October 2006).**

12.2.15 In accordance with sections 15 and 58 of the Marine and Coastal Access Act (2009), the marine licence application for the proposed marine works (i.e. the extent of the proposed development located below MHWS) must be determined in accordance with the 'appropriate marine policy documents', unless relevant considerations indicate otherwise. Appropriate marine policy documents of relevance to this assessment comprise:

- **UK Marine Policy Statement (2011);**
- **Scotland's National Marine Plan (2015)**, in particular policies:
 - GEN1 - General Planning Principle;
 - GEN 9 - Natural Heritage;
 - GEN 14 – Air Quality;
 - GEN19- Sound Evidence; and,
 - GEN21- Cumulative Impacts.

Guidance and Relevant Technical Standards

12.2.16 The following guidance and technical standards have informed this assessment:

- Local Air Quality Management Technical Guidance 2016 (LAQM:TG16) (Defra, 2016);
- Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) Guidance on Land-Use Planning and Development Control: Planning for Air Quality (Moorcroft and Barrowcliffe et al., 2017);
- IAQM Guidance on Assessment of Dust from Demolition and Construction (Holman et al., 2014);

12.3 Methodology

Overview

Assessment Scope

12.3.1 This EIA Report chapter presents an assessment of likely significant effects in relation to air quality from the proposed development. The assessment has been prepared in accordance with the TCPA EIA Regulations.

12.3.2 The principal aspects considered within this assessment are:

- Existing air quality within the study area;
- Construction phase effects on dust and elevated PM₁₀ concentrations; and,
- Operational road traffic effects on local air quality.

12.3.3 In accordance with the Carless Marine Fabrication Complex EIA Scoping Report and subsequent EIA Scoping Opinion provided in **Appendix 4.1**, the following potential effects have been scoped out of detailed consideration within the assessment:

- Operational exhaust gas emissions resulting from the the use of plant and machinery, including for steel fabrication

Assessment Process

12.3.4 In undertaking the assessment, the following activities have been carried out:

- EIA Scoping and consultation (see below);
- Desktop review of current and expected future baseline environmental conditions at the site and surrounding area;

- Assessment of likely construction and operational air quality effects; and,
- Identification and assessment of residual likely significant effects, taking into account proposed mitigation and enhancement measures and including consideration of likely cumulative effects.

Consultation

- 12.3.5 This assessment has been informed by an EIA Scoping Report (PBA, October 2017) and subsequent EIA Scoping Opinion issued by WDC (March 2018) in respect of the EIA for the proposed development. The EIA Scoping Opinion, which is provided in full in **Appendix 4.1**, included a list of standard requirements for consideration in this chapter.
- 12.3.6 Further to the submission of the EIA Scoping Report, consultation has also been carried out with WDC's Environmental Pollution Group to agree the scope of and approach to this assessment.

Study Area

- 12.3.7 The Study Areas adopted for this assessment are:
- For the construction phase assessment, the Study Area is defined as up to 350m from the Site boundary for the assessment of future dust emissions; and,
 - For the operation phase assessment, the Study Area is defined as all roads within 250m of the site and any other roads predicted to experience an increase of greater than 500 vehicles per day as a result of the proposed development. The study area for ecological receptors is defined as roads within 200 m of a designated ecological site, with an increase in traffic associated with the development exceeding 1000 vehicles per day (The Highways Agency, 2007).

Information Sources

Desk Top Study

- 12.3.8 Information on existing air quality has been obtained by collating the results of monitoring carried out by WDC. Background concentrations for the site have been defined using the national pollution maps published by Defra. These cover the whole country on a 1x1 km grid (Defra, 2018).

Approach to Assessment

Consideration of Relevant Receptors

- 12.3.9 Based on the information sources outlined above, the current and likely future baseline characteristics of site and the surrounding area has been characterised. This led to the identification of relevant sensitive receptor locations to consider within the assessment, as detailed within **Section 12.4 – Baseline Conditions**. Identified sensitive receptor locations include:
- Human health - places where members of the public might be expected to be regularly present over the averaging period of the objectives. For the annual mean and daily mean objectives that are the focus of this assessment, sensitive receptors will generally be residential properties, schools, nursing homes, etc; and,
 - Ecological – statutorily designated sites. According to the Air Pollution Information System (APIS), the particular type of Saltmarsh habitat (Littoral Sediment) present within the Inner Clyde SSSI which abuts the site is not sensitive to nitrogen or acid deposition (APIS, 2018). The assessment of road traffic impacts on the SSSI therefore only considers the impact of increased NOx concentrations within the habitat.

Impact Assessment Methodology

Construction Impacts

- 12.3.10 The IAQM has issued revised guidance on the assessment of dust from demolition and construction (Holman *et al.*, 2014). Within the IAQM guidance, an 'impact' is described as a change in pollutant concentrations or dust deposition and an 'effect' is described as the consequence of an impact.
- 12.3.11 During pre-construction demolition and construction, the main potential effects are dust annoyance and locally elevated concentrations of PM₁₀. The suspension of particles in the air is dependent on surface characteristics, weather conditions and on-site activities. Impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source.
- 12.3.12 Separation distance is also an important factor. Large dust particles (greater than 30 µm), responsible for most dust annoyance, will largely deposit within 100 m of sources. Intermediate particles (10-30 µm) can travel 200-500 m. Consequently, significant dust annoyance is usually limited to within a few hundred metres of its source. Smaller particles (less than 10µm) are deposited slowly and may travel up to 1 km; however, the impact on the short-term concentrations of PM₁₀ occurs over a shorter distance. This is due to the rapid decrease in concentrations with distance from the source due to dispersion.
- 12.3.13 The IAQM guidance recommends that the risk of dust generation is combined with the sensitivity of the area surrounding the site to determine the risk of dust impacts from construction and demolition activities. Depending on the level of risk (high, medium, low or negligible) for each activity, appropriate mitigation is selected.
- 12.3.14 In accordance with the IAQM, the dust emission magnitude is defined as either large, medium or small (**Table 12.3**) taking into account the general activity descriptors on site and professional judgement.
- 12.3.15 The sensitivity of the study area to construction dust impacts is defined based on the examples provided within the IAQM 2014 guidance (**Table 12.4**), taking into account professional judgement.

Table 12.3- Criteria for Dust Emissions Magnitude

Dust Emission Magnitude	Activity
Large	Demolition >50,000 m ³ building demolished, dusty material (e.g. concrete), on-site crushing/screening, demolition >20 m above ground level
	Earthworks >10,000 m ² site area, dusty soil type (e.g. clay), >10 earth moving vehicles active simultaneously, >8 m high bunds formed, >100,000 tonnes material moved
	Construction >100,000 m ³ building volume, on site concrete batching, sandblasting
	Trackout >50 HDVs out / day, dusty soil type (e.g. clay), >100 m unpaved roads
Medium	Demolition 20,000 - 50,000 m ³ building demolished, dusty material (e.g. concrete) 10-20 m above ground level

Dust Emission Magnitude	Activity
	Earthworks 2,500 - 10,000 m ² site area, moderately dusty soil (e.g. silt), 5-10 earth moving vehicles active simultaneously, 4 m – 8 m high bunds, 20,000 - 100,000 tonnes material moved
	Construction 25,000 - 100,000 m ³ building volume, on site concrete batching
	Trackout 10 - 50 HDVs out / day, moderately dusty surface material, 50 -100 m unpaved roads
Small	Demolition <20,000 m ³ building demolished, non-dusty material, <10 m above ground level, work in winter
	Earthworks <2,500 m ² site area, non-dusty soil, <5 earth moving vehicles active simultaneously, <4 m high bunds, <20,000 tonnes material moved
	Construction <25,000 m ³ , non-dusty material
	Trackout <10 HDVs out / day, non-dusty soil, < 50 m unpaved roads

Table 12.4 – Area Sensitivity Definitions

Area Sensitivity	People and Property Receptors	Ecological Receptors
High	>100 dwellings, hospitals, schools, care homes within 50 m 10 – 100 dwellings within 20 m Museums, car parks, car showrooms within 50 m PM ₁₀ concentrations approach or are above the daily mean objective.	National or Internationally designated site within 20 m with dust sensitive features / species present
Medium	>100 dwellings, hospitals, schools, care homes within 100 m 10 – 100 dwellings within 50 m < 10 dwellings within 20 m Offices/shops/parks within 20 m PM ₁₀ concentrations below the daily mean objective.	National or Internationally designated site within 50 m with dust sensitive features / species present Nationally designated site or particularly important plant species within 20 m

Area Sensitivity	People and Property Receptors	Ecological Receptors
Low	>100 dwellings, hospitals, schools, care homes 100 - 350m away 10 – 100 dwellings within 50 – 350 m < 10 dwellings within 20 – 350 m Playing fields, parks, farmland, footpaths, short term car parks, roads, shopping streets PM ₁₀ concentrations well below the daily mean objective.	Nationally designated site or particularly important plant species 20 – 50 m Locally designated site with dust sensitive features within 50 m

12.3.16 Based on the dust emission magnitude and the area sensitivity, the risk of dust impacts is then determined (**Table 12.5**), taking into account professional judgement.

Table 12.5 – Risk of Dust Impacts

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

12.3.17 Based on the assessed risk of dust impacts, appropriate mitigation is finally selected from the IAQM guidance using professional judgement. The adoption of appropriate mitigation means that no residual significant adverse effects are considered likely to occur owing to construction dust emissions.

Operation Impacts

12.3.18 In accordance with the ‘Land-Use Planning and Development Control: Planning for Air Quality’ technical guidance (Moorcroft and Barrowcliffe et al, 2017) and the Highways Agency’s Design Manual for Roads and Bridges (DMRB) (The Highways Agency, 2007), a detailed assessment of likely operational phase air quality effects from traffic is not required, as the predicted AADT flows for the development, provided in **Appendix 12.2**, are below the thresholds²⁹ where the need for a detailed assessment would be triggered. This indicates that no significant adverse operational phase air quality effects are considered likely. To ensure assessment proportionality, a brief qualitative assessment of likely operational phase air quality effects from traffic has therefore been undertaken. This has considered the current baseline concentrations and the development traffic quantum.

Establishment of Effect Significance

Construction

12.3.19 The construction impact significance criteria are based on the IAQM 2014 guidance. The guidance recommends that no assessment of the significance of effects is made without mitigation in place, as mitigation is assumed to be secured by planning conditions, legal requirements or required by regulations (Holman *et al.*, 2014).

²⁹ The IAQM thresholds are a change in Light Duty Vehicles (LDVs) flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere; or, a change in Heavy Duty Vehicles (HDVs) flow of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere. The DMRB threshold for the need to undertake a detailed assessment in relation to effects on statutorily designated sites is if the designated site is within 200m of a road with a predicted increase in total road traffic of more than 1,000 AADT, or an increase in HDV traffic of more than 200 AADT, as a result of the development proposal.

12.3.20 With appropriate mitigation in place, the residual effect of construction impacts on air quality is assessed as not significant.

12.3.21 *Operation*

12.3.22 The assessment of effect significance in relation to road traffic impacts is based upon the IAQM guidance criteria (Moorcroft and Barrowcliffe *et al.*, 2017). If traffic flows associated with the development exceed the thresholds defined by the IAQM (**Paragraph 12.3.22**), a further assessment is required to determine whether or not the impact of development traffic is likely to be significant. If however the thresholds are not exceeded (as is the case for the proposed development), the effects on human health of road traffic associated with the development are deemed to be not significant and no further assessment is required.

Approach to Cumulative Impact Assessment

12.3.23 Potential cumulative air quality effects could occur in relation to dust or road traffic emissions should the construction or operation of cumulative developments and the proposed development occur at the same time. The relevant cumulative developments identified in **Section 2.4** have been considered in combination with the proposed development to identify any likely cumulative air quality effects. However:

- No significant cumulative construction dust effects are considered likely as all relevant cumulative developments are anticipated to employ similar dust mitigation techniques as the proposed development in order to adhere to IAQM Guidance and therefore to avoid significant adverse effects.
- As assessed in **Chapter 11 - Transport**, none of the relevant cumulative developments are likely to result in significant cumulative transport effects in combination with the proposed development. When combined with the low level of traffic generation from the proposed development, the cumulative effect of traffic on air quality is not likely to be significant.

12.3.24 The potential for likely significant cumulative effects has therefore been scoped out of the assessment.

Assumptions and Limitations

12.3.25 The assessment uses predicted AADT flows generated by the proposed development to determine the likely significant effects in relation to air quality. The traffic flows will have inherent uncertainties associated with them.

12.3.26 For the reasons stated above, only a brief qualitative assessment of road traffic impacts has been carried out. This approach was agreed with WDC's Environmental Pollution Group.

12.4 Current Baseline Conditions

The Site and Surrounding Area

12.4.1 WDC has investigated air quality within its area as part of its responsibilities under the LAQM regime. To date, no AQMAs have been declared in the local authority area.

Monitoring

Nitrogen Dioxide

12.4.2 WDC carries out monitoring at two automatic monitoring stations, however they are located within close proximity to the site. The Council also deploys NO₂ diffusion tubes at a number of locations. In 2017, the Council undertook passive (diffusion tube) monitoring at 35 locations. The diffusion tubes for 2017 were prepared and analysed by Glasgow Scientific Services (GSS) using a preparation of 20% TEA in water and the national adjustment factor of 0.91 was used to bias adjust concentrations at these tubes. The closest monitoring location to the site is DT1, in Clydebank, approximately 1.4 km away. Data for the closest and most representative monitoring sites are presented in **Table 12.6** below and their locations are shown in **Figure 12.1**.

Table 12.6 – Measured NO₂ Concentrations

Site ID	Site Type	Within AQMA	Annual Mean (µg/m ³)				
			2013	2014	2015	2016	2017
DT1	Roadside	N	32.9	25	26.8	23.1	23.8
DT4	Kerbside	N	25.8	19.7	20.0	18.7	19.7
Objective			40				

2013 – 2017 data taken from the 2018 Air Quality Annual Progress Report (APR) for West Dunbartonshire Council (WDC, 2018).

12.4.3 **Table 12.6** shows that measured NO₂ concentrations at the closest monitoring locations to the proposed development, DT1 and DT4, have been well below the annual mean objective between 2013 and 2017.

PM₁₀ and PM_{2.5}

12.4.4 WDC does not carry out any monitoring of PM₁₀ or PM_{2.5} in close proximity to the site.

Background Concentrations

12.4.5 In addition to these measured concentrations, estimated background concentrations for the site have been obtained from the national maps provided by Defra (Defra, 2018). Background concentrations for the site are shown in **Table 12.7**.

12.4.6 The background concentrations are all well below the relevant objectives.

Table 12.7 – Estimated Annual Mean Background Concentrations

Year	Location	Annual Mean (µg/m ³)			
		NO _x	NO ₂	PM ₁₀	PM _{2.5}
2017	247 671	11.3	8.5	10.0	6.9
	246 671	10.3	7.8	9.6	6.7
	246 672	12.1	9.1	10.2	7.0
2020	247 671	9.4	7.2	9.8	6.7
	246 671	8.6	6.6	9.4	6.5
	246 672	9.9	7.5	10.0	6.8
Objectives		-	40	18	10

12.5 Baseline Evolution and Expected Future Baseline

Current Baseline Evolution

12.5.1 The TCPA EIA Regulations require that the EIA Report must describe the likely evolution of the baseline scenario in the absence of the proposed development. In the absence of any development activities current baseline conditions, including extensive hydrocarbon contamination of soils and groundwater, would be likely to remain relatively unchanged, except for natural growth of existing vegetation within the site.

12.5.2 For the purposes of this EIA, the likely evolution of the baseline is predicated upon the approval and implementation of proposed remediation works on the terrestrial part of the site before the construction of the proposed development. Prior remediation will be needed to:

- Reduce to an acceptable level the risk to human health and environmental receptors both on and off the site from hydrocarbon and other contamination in soil; and,
- Reduce to an acceptable level the risk to the River Clyde from mobile contamination within soils and contaminants floating on and dissolved within the groundwater.

- 12.5.3 Remediation is therefore required both owing to the terrestrial site's current contaminated land and Special Site designations under Part IIA of the Environmental Protection Act 1990 and to make the site suitable for the future intended use (i.e. the construction and operation of the proposed development). As such, a 'no development' baseline evolution scenario is not considered to merit further consideration in this EIA.
- 12.5.4 Whilst not forming part of the proposed development assessed in this EIA, an overview of the proposed remediation works is provided for completeness in **Chapter 6 – Ground Conditions**. In addition to intrusive works within the site, the proposed remediation works include a commitment by the Applicant to undertake further SI and subsequent remediation works on land to the east within the wider Carless landholding. This will be outwith the site of the proposed development considered in this EIA. Planning application DC18/245 for the proposed remediation works was submitted to West Dunbartonshire Council as the relevant local planning authority on 1st November 2018 and validated on 14th November 2018.

Expected Future Baseline

Expected Changes in Conditions within site

- 12.5.5 In relation to air quality, there will be no changes within the site due to the implementation of the proposed remediation works.

Expected Changes in Conditions outside of the site

- 12.5.6 In relation to air quality, there will be no changes outside of the site due to the implementation of the proposed remediation works.

Predicted Future Baseline Conditions

- 12.5.7 **Table 12.6** shows that there is no clear trend in measured NO₂ concentrations in close proximity to the site between 2013 and 2017. However, **Table 12.7** indicates an improving trend in predicted background concentrations of NO₂, PM₁₀ and PM_{2.5} between 2017 and the development opening year, 2020. These reductions are predicted due to the introduction of Euro 6 / VI vehicle emission standards.

12.6 Embedded Mitigation

- 12.6.1 As detailed in **Chapter 3 – The Proposed Development**, a number of design features and embedded mitigation measures have been incorporated into the design and construction of the proposed development to avoid, prevent or minimise significant adverse environmental effects and to enhance beneficial effects. Embedded mitigation measures of relevance to this assessment are:

Construction Phase

- Development, approval and implementation of a dust management plan as part of a Construction Environmental Management Plan (CEMP). Subject to the agreement of WDC and the Scottish Ministers (Marine Scotland), all standard construction dust mitigation measures recommended within the IAQM 2014 guidance (Holman et al., 2014) for a 'low risk site' will be included in the CEMP.

Operational Phase

- Travel Plan to promote sustainable travel choices by staff and visitors to the site. This will reduce the number of single-occupancy car journeys made to and from the site.

- 12.6.2 If required, further mitigation and enhancement measures identified through the EIA process are detailed in **Section 12.8** below before likely residual effects from the proposed development are then stated in **Section 12.9**.

12.7 Assessment of Likely Effects

Construction Phase

- 12.7.1 The main potential effects during construction are dust deposition and elevated PM₁₀ concentrations. The following activities have the potential to cause emissions of dust:
- Site preparation including delivery of construction material, erection of fences and barriers;
 - Demolition of existing buildings on site;
 - Earthworks including digging foundations and landscaping;
 - Materials handling such as storage of material in stockpiles and spillage;
 - Construction and fabrication of units; and
 - Disposal of waste materials off-site.
- 12.7.2 Typically, the main cause of unmitigated dust generation on construction sites is from demolition and vehicles using unpaved haul roads, and off-site from the suspension of dust from mud deposited on local roads by construction traffic. The main determinants of unmitigated dust annoyance are the weather and the distance to the nearest receptor.
- 12.7.3 Based on the IAQM criteria (**Table 12.3**), the dust emissions magnitude is considered to be large due to the size of the development. The study area is considered to be of low sensitivity, due to appropriate distance of the site to the surrounding residential dwellings (**Table 12.4**). Appropriate mitigation corresponding to a low risk site is therefore required during the construction phase (**Table 12.5**).

Operational Phase

Human Health Receptors

- 12.7.4 **Appendix 12.2** provides traffic data for the completed development. The proposed development is expected to generate far less than 500 vehicle movements a day on all roads within the vicinity of the site. The increase in traffic as a result of the development is therefore well below the IAQM/EPUK guidance criteria (Moorcroft and Barrowcliffe *et al.*, 2017) for a further assessment of the impacts on human health receptors to be considered necessary.

Ecological Receptors

- 12.7.5 The proposed development is expected to generate a total of 180 AADT on Erskine Ferry Road, approximately 110 m from the Inner Clyde SSSI. Therefore, the increase in traffic on Erskine Ferry Road as a result of the development is well below the DMRB criteria for a further assessment of the impacts on the Inner Clyde SSSI to be considered necessary.

12.8 Further Mitigation and Enhancement

Construction Phase

- 12.8.1 With the implementation of proposed embedded mitigation including the incorporation of all standard IAQM construction dust mitigation measures for a low risk site within the CEMP (**Section 12.6**), construction phase impacts in relation to air quality are considered not significant. No further specific mitigation is therefore required.

Operational Phase

- 12.8.2 The assessment has demonstrated that changes in traffic associated with the proposed development will be below IAQM and DMRB thresholds on all relevant roads surrounding the site. Impacts from the likely increase in road traffic emissions on human health and ecological receptor locations (including the Inner Clyde SSSI) are therefore not significant and no further mitigation is required.

12.9 Residual Effects

12.9.1 Taking account of proposed mitigation measures, the likely residual effects from the construction and operation of the proposed development are shown below in **Table 12.8**.

Table 12.8 - Table of Significance

Potential Effect	Mitigation / Enhancement Measures	Residual Significant of Likely Effects
Dust deposition and elevated PM ₁₀ concentrations (Temporary)	Standard low risk mitigation measures from the IAQM 2016 guidance to be applied.	Not Significant
Elevated NO ₂ , PM ₁₀ and PM _{2.5} concentrations from operational traffic (Permanent)	No direct mitigation required.	Not Significant

12.10 Monitoring

12.10.1 In the absence of any likely residual significant air quality effects, no monitoring of likely residual effects is considered to be proportionate or required.

12.11 Cumulative Effects

12.11.1 For the reasons stated in **Section 12.3** it is not necessary to provide a separate cumulative impact assessment in respect of likely air quality effects.

12.12 Summary

12.12.1 The air quality effects associated with the construction and operation phases of the proposed development have been assessed. The assessment was undertaken in accordance with guidance from the Institute of Air Quality Management (IAQM) and national and local policy, including Proposed Policy DS4 – Air Quality set out within the West Dunbartonshire LDP Proposed Plan 2015 and Proposed Policy ENV8 – Air, Light and Noise Pollution within the West Dunbartonshire LDP2 Proposed Plan (2018).

12.12.2 The air quality effects associated with the construction and operation phases of the proposed development have been assessed. The chapter described the existing baseline air quality close to the proposed development, and assessed the impact of the construction and operation of the development on local air quality. The main air pollutants of concern related to construction are dust and fine particulate matter (PM₁₀), and for road traffic they are nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}). The site does lie not within an Air Quality Management Area (AQMA). Measured Nitrogen Dioxide (NO₂) concentrations at monitoring locations representative of the site have been below the annual mean objective between 2013 and 2017. Background concentrations for the site are also below the objectives for NO₂, and particulates (PM₁₀ and PM_{2.5}).

12.12.3 The construction phase assessment has identified appropriate mitigation to employ against construction dust impacts. Construction phase effects are judged to be not significant when the identified mitigation measures are applied through a Construction Environmental Management Plan (CEMP) for the site.

12.12.4 The increase in traffic as a result of the development has been compared against criteria contained within the IAQM guidance on land use planning and development control and the Highways Agency's Design Manual for Roads and Bridges. The assessment has demonstrated that road traffic associated with the development will be below the criteria for a further assessment to be considered necessary. The effect of road traffic emissions on human health and ecological receptors is therefore not significant and no further direct mitigation is required. Notwithstanding this, a Travel Plan will be developed and implemented during the operational phase of the proposed development to promote sustainable travel choices by staff and visitors

to the site. This will reduce the number of single-occupancy car journeys made to and from the site.

12.12.5 Overall, the operational air quality effects of the proposed development are judged to be not significant within the context of the TCEPA EIA Regulations.

12.13 References

Department of the Environment, Food and Rural Affairs (Defra) (2018). '2015 Based Background Maps for NO_x, NO₂, PM₁₀ and PM_{2.5}'. Available: <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015> .

Department of the Environment, Food and Rural Affairs (Defra) in partnership with the Scottish Executive, The National Assembly for Wales and the Department of the Environment for Northern Ireland (2016). 'Local Air Quality Management Technical Guidance, LAQM.TG(16)'. HMSO, London.

Department of the Environment, Transport and the Regions (DETR, 2007) in Partnership with the Welsh Office, Scottish Office and Department of the Environment for Northern Ireland (2007). 'The Air Quality Strategy for England, Scotland, Wales, Northern Ireland' HMSO, London.

Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

Directive 92/43/EEC of the conservation of natural habitats and of wild fauna and flora.

Environment Act 1995, Part IV

Holman *et al.* (2014). 'Assessment of dust from demolition and construction', IAQM, London

National Parks and Access to the Countryside Act 1949.

Nature Conservation (Scotland) Act 2004.

Moorcroft and Barrowcliffe *et al.* (2017). 'Land-use Planning & Development Control: Planning for Air Quality'. V1.2. The Institute for Air Quality Management, London

Statutory Instrument 2012, No. 228. 'The Conservation (Natural Habitats &c.) Amendment (Scotland) Regulations'

Statutory Instrument 1994, No. 2716. 'The Conservation (Natural Habitats &c.) Regulations 1994'.

Statutory Instrument 2000, No. 97, 'The Air Quality (Scotland) Regulations 2000' HMSO, London.

Statutory Instrument 2002, No. 297, 'The Air Quality (Scotland) (Amendment) Regulations 2002'

Statutory Instrument 2010, No. 204, 'The Air Quality Standards (Scotland) Regulations 2010'.

Statutory Instrument 2016, No. 162, 'The Air Quality Standards (Scotland) Amendment Regulations 2016'

The Highways Agency (2007). 'Design Manual for Roads and Bridges, Volume 11, Section 3, Part I, HA 207/07 Air Quality'.

West Dunbartonshire Council (2018). '2018 Annual Progress Report (APR) for West Dunbartonshire Council.'

13 Noise & Vibration

13.1 Introduction

- 13.1.1 This chapter of the EIA Report provides an assessment of the likely noise and vibration effects from the proposed development on nearby sensitive receptors. The assessment is based on the characteristics of the site and surrounding area and the key parameters of the proposed development detailed in **Chapter 2 – Site and Surrounding Area** and **Chapter 3 – The Proposed Development** respectively.
- 13.1.2 This chapter has been prepared by Peter Brett Associates (PBA), now part of Stantec. In accordance with Regulation 5(5)(b) of the EIA Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this EIA Report is provided in **Appendix 1.1**.
- 13.1.3 The aims of this chapter are to:
- Identify the context in which the noise and vibration assessment has been undertaken;
 - Describe the assessment methodology;
 - Outline the relevant baseline conditions at the site and the surrounding area;
 - Consider how the implementation of the proposed remediation works would affect current baseline conditions, resulting in a likely future baseline scenario;
 - Identify the likely direct and indirect noise and vibration effects of the proposed development under the future baseline scenario;
 - Identify mitigation and enhancement measures required to address identified effects;
 - Assess likely residual effects associated with noise and vibration; and,
 - Assess likely cumulative noise and vibration effects from the proposed development in combination with other relevant cumulative developments.
- 13.1.4 This chapter is supported by the following figures and technical reports provided in **Appendices 13.1 - 13.5**:
- **Appendix 13.1: Figures;**
 - **Appendix 13.2: Technical Terminology and Guidance;**
 - **Appendix 13.3: Survey Equipment;**
 - **Appendix 13.4: Survey Results;** and
 - **Appendix 13.5: Calculations.**

13.2 Policy Context, Legislation, Guidance and Standards

Legislation

- 13.2.1 The overarching legislative framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Subject specific legislation of relevance to this assessment is:
- The Control of Pollution Act 1974 (CPA) – contractor requirements under Section 6130;

³⁰ This legislation sets out procedures for contractors to obtain 'Prior Consent' for construction works within agreed noise limits. An application for demolition and construction works is submitted as part of this application. As part of this, a method statement of the proposed works and the steps to be taken to minimise and mitigate noise to acceptable levels and time periods during the demolition and construction period has been produced. The statement would be secured through condition.

- Environmental Protection Act 1990 – noise and statutory nuisance complaints under Part III31; and,
- The Environmental Noise (Scotland) Regulations 2006.

Policy

13.2.2 The planning policy framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Planning policy considerations of specific relevance to this assessment are:

- **Adopted West Dunbartonshire Local Plan (2010)**, in particular policies:
 - GD1: Development Control; and,
 - GD 2(9): Carless, Old Kirkpatrick;
- **West Dunbartonshire LDP Proposed Plan 2015**, in particular:
 - ‘Changing Places’ Carless Redevelopment Strategy (Section 3.6).
- **West Dunbartonshire LDP2 Proposed Plan (2018)**, in particular proposed policies:
 - ENV8 – Air, Light and Noise Pollution; and,
 - ENV10 - Implementation of the SEA Environmental Report.
- **Scottish Planning Policy (SPP) (2014)**, in particular:
 - Principal Policy on Sustainability (paragraphs 24-35).
- **Scottish Government Planning Advice Note 1/2011: Planning and Noise (2011)**.

13.2.3 In accordance with sections 15 and 58 of the Marine and Coastal Access Act (2009), the marine licence application for the proposed marine works (i.e. the extent of the proposed development located below MHWS) must be determined in accordance with the ‘appropriate marine policy documents’, unless relevant considerations indicate otherwise. Appropriate marine policy documents of relevance to this assessment comprise:

- **UK Marine Policy Statement (2011)**;
- **Scotland’s National Marine Plan (2015)**, in particular policies:
 - GEN1 - General Planning Principle;
 - GEN 9 - Natural Heritage; and,
 - GEN 13 – Noise.

Guidance and Relevant Technical Standards

13.2.4 The following guidance and technical standards have informed this assessment in relation to the scope of analysis undertaken, the impact assessment methodology adopted and the design of proposed mitigation measures:

- Scottish Government Technical Advice Note (TAN) - Assessment of noise (2011);
- The Calculation of Road Traffic Noise (CRTN): 1988;
- Design Manual for Road and Bridges (2011) – Design Manual for Road and Bridges Volume 11 Section 3 Part 7 Traffic Noise and Vibration;

³¹ Under this legislation, local authorities have a duty to investigate noise complaints from premises (land and buildings) and vehicles, machinery or equipment in the street. This includes noise arising from construction sites. If a Local Authority’s Environmental Health Officer (EHO) is satisfied that the noise amounts to a statutory nuisance, then the authority must serve an abatement notice on the person responsible or in certain cases the owner or occupier of the property. The notice could require that the noise or nuisance must be stopped altogether or limited to certain times of the day.

- BS 7445: 2003 Description and Measurement of Environment Noise – Part 1: Guide to Quantities and Procedures;
- BS 5228:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites;
- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 2 Vibration (2014); and,
- BS 4142:2014 Methods for Rating and Assessing Industrial and Commercial Sound.

13.2.5 The relevant of each technical guidance publication for this assessment is detailed in **Appendix 13.2 - Technical Terminology and Guidance**.

13.3 Methodology

Overview

Assessment Scope

13.3.1 This EIA Report chapter presents an assessment of likely significant effects on noise and vibration from the construction and operational phases of the proposed development. The assessment has been prepared in accordance with the TCPA EIA Regulations.

13.3.2 The principal aspects considered within this assessment are:

- Noise and vibration due to construction activities within the site;
- Operational noise generated from the proposed development on existing noise-sensitive receptors; and,
- Operational noise due to the change in vehicular movements associated with the proposed development on existing noise-sensitive receptors.

13.3.3 This assessment considers potential noise and vibration effects on human receptors. Drawing on the noise impact levels predicted in this chapter, potential noise disturbance effects on ecological receptors are assessed separately within **Chapters 8 – Terrestrial Ecology** and **9 – Marine Ecology**.

Assessment Process

13.3.4 In undertaking the assessment presented in this ES Chapter, the following activities have been carried out:

- EIA Scoping and consultation (see below);
- A detailed daytime and night-time fully automated environmental sound survey was undertaken in order to establish existing environmental sound climate at suitable locations around the site representative of nearby receptors;
- Consideration of how the implementation of the proposed remediation works would affect current baseline conditions, resulting in a likely future baseline scenario;
- Noise and Vibration impact assessment has been carried out for the proposed development, comprising:
 - Identification of likely direct and indirect noise and vibration effects of the proposed development under the future baseline scenario;
 - Identification of mitigation and enhancement measures required to address identified effects; and
 - Assessment of likely residual noise and vibration effects.

Consultation

13.3.5 This assessment has been informed by an EIA Scoping Report (PBA, October 2017) and subsequent EIA Scoping Opinion issued by WDC (March 2018) in respect of the EIA for the proposed development. The EIA Scoping Opinion, which is provided in full in **Appendix 4.1**,

included a list of standard requirements for consideration in this chapter. In addition, the EIA Scoping Opinion confirmed that the assessment should include consideration of likely noise and vibration arising from night-shift fabrication activities and plant. This has duly been undertaken.

Study Area

- 13.3.6 The Study Area adopted in this assessment covers the area within which existing noise sensitive receptors that could be affected by the construction and operational noise and vibration from the site are located, together with existing road links that could be affected by changes in traffic flows (as assessed in **Chapter 11 – Transport and Access**).

Information Sources

Baseline Sound Monitoring Methodology

- 13.3.7 A fully automated baseline unattended environmental sound survey was undertaken for a duration of 24 hours at one location on site from approximately 13:00 hours on 27 June 2018 to approximately 13:00 hours on 28 June 2018, in order to establish the existing sound climate at the adjacent industrial premises (Logitech). This covered a full daytime and night-time period.
- 13.3.8 At the start and end of the survey period, the weather conditions were noted to be calm with a clear sky. Temperatures were noted to be around 25°C during the day. The weather conditions during the survey period are therefore deemed to be suitable.
- 13.3.9 The A-weighted (dBA) L_{90} , L_{eq} , and L_{max} sound pressure levels were measured over 15-minute intervals.
- 13.3.10 Attended environmental sound measurements were also undertaken during the same period at a location representative of the nearest residential properties.
- 13.3.11 **Table 13.1** describes the survey locations and **Figure 13.1** in **Appendix 13.1** presents the approximate locations of the sound survey positions.

Table 13.1 – Sound Measurement Locations

Survey Location	Description
LT	The microphone situated to the north of the site to the east of the adjacent industrial premises (Logitech) at 2.0m above ground level in free field conditions.
ST	The microphone situated to the north east of the site along the canal towpath at 1.5m above ground level in free field conditions.

- 13.3.12 Details of the instrumentation used to measure the environmental sound climate are presented in **Appendix 13.3**.
- 13.3.13 On-site calibration was undertaken before and after all measurements with no significant deviation (< 0.5 dB) being observed. The sound level meters and calibrators have valid laboratory calibration certificates, which are available upon request.
- 13.3.14 Manufacturer’s windshields were fitted over the microphone at all times during the survey periods.
- 13.3.15 The noise survey was completed in general accordance with the guidance in BS 7445: ‘Description and Measurement of Environmental Noise. Guide to Quantities and Procedures’

Approach to Assessment

Consideration of Relevant Receptors

- 13.3.16 Based on the information sources outlined above, the current and likely future baseline characteristics of site and the surrounding area has been characterised. This led to the identification of relevant sensitive receptors to consider within the assessment, as detailed within **Section 13.4 – Baseline Conditions**.
- 13.3.17 The assessment approach predicts the noise and vibration impact at existing noise and vibration sensitive receptors near the site and the dwellings that may be most affected by any increase in road traffic associated with the proposed development.
- 13.3.18 In this context, receptors are defined as those aspects of the environment which are sensitive to changes in the baseline sound and vibration climate, such as existing residential properties, schools, hospitals, etc. The sensitivity of a particular receptor depends upon the extent to which it is susceptible to such changes.
- 13.3.19 The approximate locations of the identified receptors are detailed in **Figure 13.1**.

Impact Assessment Methodology

Construction Impact - Noise

- 13.3.20 The noise levels generated by construction activities and experienced by any nearby sensitive receptors depend on a number of variables, the most significant of which are:
- the noise generated by plant or equipment used on-site, or on-site activities, generally expressed as sound power levels (L_W);
 - the periods of operation of the plant on the site, known as its 'on-time';
 - the distance between the noise source and the receptor; and
 - the attenuation provided by ground absorption and any intervening barriers.
- 13.3.21 Construction noise predictions have been undertaken, using the methodology outlined in BS 5228-1: 2009+A1:2014 Code of practice for noise and vibration control on construction and open sites: Part 1: Noise. This document predicts noise as an equivalent continuous A- weighted sound pressure level over a defined time period such as one hour ($L_{Aeq,1h}$).
- 13.3.22 BS 5228-1: 2009+A1:2014 contains a database of the noise emissions from individual items of equipment, activities and routines to predict noise from construction activities at identified receptors. The prediction method gives guidance on the effects of different types of ground, barrier attenuation and how to assess the impact of fixed and mobile plant.
- 13.3.23 The assessment of construction noise effects at residential properties has been undertaken according to the 'example method 1 – the ABC method' as defined in BS 5228-1: 2009+A1:2014, Annex E. **Table 13.2** below provides guidance in terms of appropriate threshold values for residential receptors, based on existing ambient noise levels.

Table 13.2 - BS 5228 Recommended Construction Noise Limits

Assessment Category and Threshold Value Period	Threshold Value in Decibels ($L_{Aeq,T}$) (dB)		
	Category A ^(A)	Category B ^(B)	Category C ^(C)
Night Time (23.00-07.00)	45	50	55
Evenings and Weekends ^(D)	55	60	65

Assessment Category and Threshold Value Period	Threshold Value in Decibels ($L_{Aeq,T}$) (dB)		
	Category A ^(A)	Category B ^(B)	Category C ^(C)
Daytime (07.00-19.00) and Saturdays (07.00-13.00)	65	70	75
<p>Note 1: A significant effect has been deemed to occur if the total $L_{Aeq,T}$ noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.</p> <p>Note 2: If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3 dB due to construction activity.</p> <p>Note 3: Applied to residential receptors only.</p> <p>A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.</p> <p>B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A values.</p> <p>C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.</p> <p>D) 19.00-23.00 weekdays, 13.00-23.00 Saturdays and 07.00-23.00 Sundays.</p>			

Construction Impact - Vibration

13.3.24 The effects of human response to whole body vibration in buildings are defined in BS 6472-1: 2008. This explains effects in terms of Vibration Dose Value (VDV). However, for human response to construction-related vibration, it is considered more appropriate to use the Peak Particle Velocity (PPV) measure, as suggested in BS 5228-2:2009+ A1:2014 Code of practice for noise and vibration control on construction and open sites (BSI, 2014). Part 2: Vibration.

13.3.25 The limit of human perception to vibration is between approximately 0.15 mm.s^{-1} and 0.3 mm.s^{-1} . The sensitivity of the human body also varies according to different frequencies of vibration, with perception generally possible between 1 Hz to 80 Hz.

Whole Body Vibration

13.3.26 **Table 13.3** below presents the guidance on the annoyance effects of vibration as provided in BS 5228 2:2009+A1:2014 Annex B.

13.3.27 The onset of significant effects (the LOAEL) is classified as 1 mm.s^{-1} PPV, the level at which construction vibration can be tolerated with prior warning.

Table 13.3 - Guidance on Effects of Vibration Levels

Vibration Level PPV mm.s^{-1}	Description of Effects
<0.3	Vibration is unlikely to be perceptible in even the most sensitive situations for most vibration frequencies associated with construction
0.3 to 1	Increasing likelihood of perceptible vibration in residential environments
1 to 10	Increasing likelihood of complaint in residential environments, but can be tolerated at the lower end of the scale if prior warning and explanation has been given to residents

Vibration Level PPV mm.s ⁻¹	Description of Effects
>10	Vibration is likely to be intolerable for any more than a very brief exposure to a level of 10 mm.s ⁻¹

Building Damage

13.3.28 BS 7385-2:1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from re-radiated vibration provides guidance on vibration levels likely to result in cosmetic damage, and is referenced in BS 5228-2:2009+A1:2014. Guide values for transient vibration, above which cosmetic damage could occur, are suggested in **Table 13.4**.

Table 13.4 - Guide on Vibration Levels Likely to Result in Cosmetic Damage

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
	4 Hz to 15 Hz	15 Hz and Above
Reinforced or framed structures	50 mm.s ⁻¹ at 4 Hz and above	
Industrial and heavy commercial buildings	15 mm.s ⁻¹ at 4 Hz increasing to 20 mm.s ⁻¹ at 15 Hz	20 mm.s ⁻¹ at 15 Hz increasing to 50 mm.s ⁻¹ at 40 Hz and above
NOTE 1: Values referred to are at the base of the building.		
NOTE 2: For un-reinforced or light framed structures and residential or light commercial buildings, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.		

Sensitivity of Building Content

13.3.29 The site is bounded to the north west by industrial premises owned and operated by Logitech Ltd, a high precision materials processing & surface finishing technology manufacturer. Discussions held between the Applicant and Logitech Ltd have established that engineering equipment within the premises are sensitive to potential vibration impacts.

13.3.30 Due to the proximity of the Logitech building, an assessment of the vulnerability of contents has also been undertaken.

13.3.31 Where there is uncertainty concerning the level of transmitted vibration and its acceptability to the particular environment, it is advisable to investigate the actual conditions and requirements in detail. Where case-specific information is not available, or if otherwise appropriate, reference may be made to information from other sources, such as previous experience or published information. BS5228 Part 2 references the RMS vibration velocity criteria of a variety of equipment, taken from reference. **Table 13.5** illustrates these criteria.

Table 13.5 - Vulnerability of Contents of Buildings, Vibration Criteria

Facility, Equipment or Use	RMS Vibration Velocity, in µm/s
Microelectronics manufacturing equipment – Class A: Inspection, probe test and other manufacturing support equipment.	50

Facility, Equipment or Use	RMS Vibration Velocity, in $\mu\text{m/s}$
Microelectronics manufacturing equipment – Class B: Aligners, steppers and other critical equipment for photolithography with line width of 3 μm or more.	25
Microelectronics manufacturing equipment – Class C: Aligners, steppers and other critical equipment for photolithography with line width of 1 μm or more.	12
Microelectronics manufacturing equipment – Class D: Aligners, steppers and other critical equipment for photolithography with line width of 0.5 μm ; includes electron-beam systems.	6
Microelectronics manufacturing equipment – Class E: Aligners, steppers and other critical equipment for photolithography with line width of 0.25 μm ; includes electron-beam systems; un-isolated laser and optical research systems.	3

13.3.32 For the purpose of this chapter we have assumed that the operations at Logitech are Class C. A criterion of 12 $\mu\text{m/s}$ has therefore been used in the assessment.

Noise from Operations and Plant on Site

13.3.33 A site visit was undertaken on Wednesday 27 June 2018 at the Applicant’s (then) existing industrial premises in Renfew to identify source sound levels associated with typical operations on site.

13.3.34 The measurements undertaken at the existing facility form the basis of the operational noise assessment carried out for the proposed development.

Impact of the Development (Transportation) on the Surrounding Area

13.3.35 The impact of the Application Proposals on the noise climate in the surrounding areas is based on the change in noise levels at noise sensitive receptors due to the increase in the volume of road traffic generated by the proposed development.

13.3.36 Table 3.1 of DMRB sets out the magnitude of impacts for changes in noise levels. These criteria are given in **Table 13.6** and are contextualised to give the Magnitude of Effect.

Table 13.6 - Magnitudes of Impacts and Effects for Changes in Noise Levels

Change in Noise Level $L_{A10,18h}$, dB	DMRB Magnitude of Impact	Magnitude of Effect
0	No Change	No Effect
0.1 – 0.9	Negligible	Negligible
1 – 2.9	Minor	Small
3 – 4.9	Moderate	Medium
5+	Major	Large

Establishment of Effect Significance

13.3.37 **Table 13.7** below defines the sensitivity of the receptors.

Table 13.7 - Summary of Receptor Sensitivity

Sensitivity	Description	Examples of Noise Sensitive Receptors
High	Receptors where people or operations are particularly susceptible to noise	<ul style="list-style-type: none"> Residential, including private gardens where appropriate. Quiet outdoor areas used for recreation Conference facilities Theatres/Auditoria/Studios Schools during the daytime Hospitals/residential care homes Places of worship
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance	<ul style="list-style-type: none"> Offices Bars/Cafes/Restaurants where external noise may be intrusive. Sports grounds when spectator noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, golf, bowls)
Low	Receptors where distraction or disturbance from noise is minimal	<ul style="list-style-type: none"> Buildings not occupied during working hours Factories and working environments with existing high noise levels Sports grounds when spectator noise is a normal part of the event Night Clubs

13.3.38 For the purpose of this chapter, all nearby dwellings have been defined as high sensitivity receptors.

13.3.39 The adjacent Logitech site, to the northwest of the proposed site, has been defined as a low sensitivity for noise but a high sensitivity for vibration.

13.3.40 Table 13.8 below sets out how the sensitivity of the receptors and the magnitude of effect have been combined to determine the significance criteria. The criteria range from negligible to substantial.

Table 13.8 - EIA Effect Levels and Significance Matrix – Noise and Vibration

		Sensitivity			
		Negligible	Low	Medium	High
Magnitude	Negligible	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Negligible	Minor	Moderate
	Medium	Negligible	Minor	Moderate	Major
	Large	Minor	Moderate	Major	Severe

13.3.41 An increase in noise level is described as adverse and a decrease in noise level as beneficial. An adverse effect of Moderate or above is considered significant in term of TCPA EIA Regulations.

Approach to Cumulative Impact Assessment

Construction

13.3.42 The relevant cumulative developments listed in **Section 2.4** were reviewed to identify potential interactions with the construction and/or operation of the proposed development which could result in any potential cumulative noise or vibration effects. However, significant cumulative effects are not likely to occur as each relevant development is anticipated to have a Construction Environmental Management Plan (CEMP) in place to minimise construction noise and vibration effects (alone or in combination) to negligible levels.

Operation

13.3.43 As stated in Chapter 11 – Transport and Access, the nature and location of the relevant cumulative developments mean that none are likely to generate high footfall or result in significant cumulative transport effects in combination with the proposed development. In addition, it was agreed with WDC Roads Department through TA Scoping that no future background traffic growth is likely. No traffic growth was therefore been factored into the expected future baseline traffic flow scenario (**Section 11.5**) and separate assessments of likely significant cumulative traffic and associated noise effects are not required.

Assumptions and Limitations

13.3.44 Baseline Sound Survey

13.3.45 The site engineer noticed nothing unusual in terms of the noise climate at the times of the attended surveys. This chapter refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections.

13.3.46 Construction Noise Assessment

13.3.47 BS 5228:2009 Annex E (Informative) states that noise predictions should be undertaken to determine eligibility for noise insulation or temporary re-housing. However, the informative also states that these assessments should be undertaken when a contractor has been appointed and detailed method statements on the construction programme and plant to be used are available.

13.3.48 The assessment of likely construction noise effects has been undertaken based on the design of the proposed development shown on the **submitted planning and marine licence application drawings**. Based on a review of these plans, the assessment considers the construction (and subsequent operation) of an engineering fabrication shed located 140 m from the nearest residential noise sensitive receptor and 110 m from the Logitech facilities.

13.3.49 Although a detailed construction methodology is yet to be determined, it is reasonable to assume for the purposes of this chapter, that the main construction phases are likely to include site levelling/clearance, ground excavation, concreting and building construction. The construction noise and vibration assessment also includes the construction of the new carless jetty along the south boundary of site. The internal building construction phase, and the servicing and fitting out of new buildings, is normally not a significant source of noise or vibration for local receptors.

13.3.50 As a detailed construction methodology is yet to be determined, the assessment of construction noise considers a worst-case scenario whereby noise generating construction activities would occur without any mitigation measures in place, such as screening or operational restrictions. At this stage, it is not possible to confirm precisely where construction plant will operate within the site and for how long during the working day. However reasonable assumptions have been made to inform the assessment of construction noise:

- Likely construction method and activities have been identified based on the submitted **planning and marine licence application drawings** and the **Proposed Marine Works - Indicative Construction Sequence Document** (Arch Henderson Ltd, February 2019);
- In accordance with the guidance set out in BS 5288, noise levels have been calculated for a worst-case scenario over 1-hour period which assumes that construction will operate at a location closest to each identified noise sensitive receptor in the absence of mitigation. In practice, construction noise levels would tend to be lower due to greater separation

distances and screening effects, and are very unlikely to operate over the entire 10-12 hour working day due to periods of plant inactivity;

- The main construction phases are likely to include site levelling/clearance, ground excavation/drainage creation, concreting, building construction and construction of internal haul roads; and,
- The building construction phase, and the servicing and fitting out of new buildings, is normally not a significant source of noise or vibration for nearby noise sensitive receptors.

13.3.51 Details of typical construction plant noise levels at a reference distance of 10 m are detailed in BS 5228 Part 1. The plant and associated noise levels which have been considered in the assessment are provided in **Table 13.9**.

Table 13.9 - Typical Construction Plant Noise Levels

Plant	Typical dB L _{Aeq} Sound Pressure Level at 10 m
Earth moving	85
Supply vehicles	80
Impact piling	89
Truck concrete mixer	80
Poker vibrators	84
Crane	74
Vibratory roller	76
Asphalt spreader	80
Wheeled loader	76
Compressors	74
Welding Generators	42

Operational Phase Noise Assessment

13.3.52 Based on a review of the submitted **planning and marine licence application drawings**, the assessment of operational noise and vibration effects from the operation of plant and operations on site assumes:

- The building envelope of the proposed building shed to comprise of:
 - A lightweight steel framed structure building, complete with single skin, lightweight cladding with a typical sound insulation performance of R_w 24 dB;
 - A lightweight single-skin steel cladding roof with a typical sound insulation performance of R_w 24 dB; and
 - Roller shutters with a typical sound insulation performance R_w of 16 dB.
- The following operational parameters:
 - There will be a maximum of 2 lorries per day; and
 - The proposed development will be operational during both the daytime and night-time.

13.3.53 Based on the site visit to the existing facility and the building plant and operational activity assumptions defined in Section 13.3, **Table 13.10** below presents the measured noise levels

and the on-time percentage during a typical day for the operational activities likely to take place inside the proposed fabrication shed.

Table 13.10 - Operational Activities during Typical Day

Operational Activity	Measured Noise Levels at 1 m, SEL in dB	On-time Percentage during a Typical Working day
Hand Held Tools	121	40
Fork Lift Truck	96	20
Overhead Crane	99	40
Welding	94	90
Grinding	110	10

13.3.54 The operational activities presented in **Table 13.10** above have been assumed to happen inside the construction shed, with the roller shutter doors closed.

Proposed Delivery Yard Operations

13.3.55 A single delivery/pick-up movement is considered to comprise one HGV arriving, manoeuvring into a loading dock (utilising reversing alarm), and then leaving the site.

13.3.56 A database of typical noise levels associated with lorry activities is set out in **Table 13.11** below. This information has been used in the operational phase assessment presented in **Section 13.7**.

Table 13.11 - Typical Source Noise Levels Associated with the Delivery Operations, free-field

Delivery Yard Operation	Measurement Distance, m	L _{AE} , dB	L _{AFmax} , dB
HGV arrival and park	10	81	71
HGV reversing alarm	10	64	68
HGV pull away	10	76	70
HGV air brake	10	77	81
HGV unloading	10	89	77

13.3.57 Each vehicle movement is assumed to give rise to each of the noise generating events set out in **Table 13.11**.

Calculation Procedure

13.3.58 The operational phase assessment was undertaken over a 1-hour time period during the daytime and a 15-minute time period during the night-time in line with BS 4142:2014 methodology.

13.3.59 The delivery events presented in **Table 13.11** have been assumed to happen twice in the one-hour assessment period, outside the construction shed.

13.3.60 The specific sound level of the operations has been calculated by considering each activity as an individual sound event and then combining them to obtain the specific sound level associated with operational activities over a one-hour period.

13.3.61 It should be noted that the BS4142 methodology is not appropriate for assessing the noise impact on non-residential receptors. Because the Logitech facility has been defined as a low sensitivity for noise, no further assessment has been deemed necessary.

13.4 Current Baseline Conditions

The Site

13.4.1 As detailed in **Chapter 3 – The Site and Surrounding Area**, the site is bound by the Forth and Clyde canal to the north east, the River Clyde to the south west and existing industrial premises to the north west. The wider Carless landholding (land within the control of the Applicant) is situated to the south east of the site.

The Surrounding Area

13.4.2 The A814 Dumbarton Road is situated approximately 65 m to the north east of the site whilst the Erskine Bridge (A898) is situated approximately 470 m to the north west of the site.

13.4.3 The nearest existing residential properties are situated approximately 120m north east of the site along Admiralty Gardens/Admiralty Grove.

13.4.4 Set within an adjacent industrial area to the north west, Logitech buildings are situated approximately 25 m northwest of the site boundary.

Baseline Sound Survey

13.4.5 A summary of the baseline sound survey result are presented in **Table 13.12** and **13.13**. Time history graph detailing the full results of the unmanned sound survey is contained in **Appendix 13.4**.

Table 13.12 - Summary of Unmanned Baseline Sound Survey Result

Location	Period, T	$L_{Aeq,T}$ dB	Typical* L_{AFmax} dB	Typical $L_{A90,15mins}$ dB
LT1	Daytime (07:00 – 23:00 hours)	50	72	46
	Night-time (23:00 – 07:00 hours)	45	60	39

* Based on the 10th highest recorded L_{AMax} sound level during the time period.

Table 13.13 - Summary of Manned Baseline Sound Survey Result

Date	Time	Sound Pressure Level (dB)		
		$L_{Amax,15min}$	$L_{Aeq,15min}$	$L_{A90,15min}$
27-Jun-18	13:00	71	55	44
	13:15	61	51	44
	13:30	62	52	44
	13:45	65	51	44

Date	Time	Sound Pressure Level (dB)		
		L _{Amax,15min}	L _{Aeq,15min}	L _{A90,15min}
	14:00	68	54	44
	14:15	64	51	42
	14:30	66	51	42
	14:45	67	52	46
28-Jun-18	00:00	55	44	37
	00:15	67	54	41
	00:30	67	50	37
	00:45	54	40	36
	01:00	54	41	35
	01:15	57	43	35
	01:30	60	40	34
	01:45	54	40	34
	10:00	65	52	44
	10:15	75	52	44
	10:30	68	51	44
	10:45	66	52	45
	11:00	65	51	43
	11:15	68	52	44
	11:30	66	53	47
	11:45	67	52	46

13.5 Baseline Evolution and Expected Future Baseline

Current Baseline Evolution

- 13.5.1 The TCPA EIA Regulations require that the EIA Report must describe the likely evolution of the baseline scenario in the absence of the proposed development. In the absence of any development activities current baseline conditions, including extensive hydrocarbon contamination of soils and groundwater, would be likely to remain relatively unchanged, except for natural growth of existing vegetation within the site.
- 13.5.2 For the purposes of this EIA, the likely evolution of the baseline is predicated upon the approval and implementation of proposed remediation works on the terrestrial part of the site before the construction of the proposed development. Prior remediation will be needed to:
- Reduce to an acceptable level the risk to human health and environmental receptors both on and off the site from hydrocarbon and other contamination in soil; and,

Receptor	Sensitivity	Approximate Distance to Site Boundary (in m)	Development Phase where effect(s) considered likely
	High (Vibration effects)		

13.6 Embedded Mitigation

13.6.1 As detailed in **Chapter 3 – The Proposed Development**, a number of design features and embedded mitigation measures have been incorporated into the design and construction of the proposed development to avoid, prevent or minimise significant adverse environmental effects and to enhance beneficial effects. Embedded mitigation measures of relevance to this assessment are:

Construction Phase

- Development and implementation of a Construction Environmental Management Plan (CEMP) including constituent Construction Traffic Management Plan (CTMP) to minimise construction phase impacts on the surrounding road network and associated noise impacts. The CEMP and CTMP will include measures relating to the following as standard: construction traffic routing, site access/deliveries, parking, contractor management, parking, fuels and materials storage, and standard noise suppression techniques. The CTMP will be developed in accordance with the submitted Transport Assessment (**Appendix 7.2**), which includes a section on the principles of managing construction traffic.

Operational Phase

- Travel Plan to promote sustainable travel choices by staff and visitors to the site. This will reduce the number of single-occupancy car journeys made to and from the site.

13.6.2 If required, further mitigation and enhancement measures identified through the EIA process are detailed in **Section 13.8**.

13.7 Assessment of Likely Effects

Construction Phase

Construction Noise

13.7.1 Construction noise has the potential to cause an adverse impact at existing and future noise sensitive receptors.

13.7.2 As a detailed construction methodology is yet to be determined, the assessment of construction noise and vibration considers a worst-case scenario, where each activity occurs at a point on the site boundary closest to the receptor, for the full duration of the assessment period and without any mitigation measures in place, such as screening or operational restrictions. Based on the construction activity assumptions defined in **Section 13.3**, **Table 13.15** below details the results of the assessment for typical construction activities, at different distances from the site boundary.

Table 13.15 - Predicted Indicative Construction Noise Levels

Activity	Predicted Indicative Construction Noise Levels (dB L _{Aeq,1h}) at Distance (m) from Construction Phase Boundary				
	20	50	100	200	500
Earthmoving	79	71	65	59	53
Concreting	85	77	71	65	59

Activity	Predicted Indicative Construction Noise Levels (dB L _{Aeq,1h}) at Distance (m) from Construction Phase Boundary				
	20	50	100	200	500
Road Pavement	74	66	60	54	48
New Jetty Construction	84	76	70	64	56

13.7.3 **Table 13.16** below presents the revised predicted construction levels assessed against significant effects.

13.7.4 In order to define the noise level criteria in accordance with the ABC method of BS 5228, the measured daytime ambient noise levels have been analysed.

13.7.5 Ambient noise levels at noise sensitive receptors would be around 50 dB L_{Aeq,T} (see **Table 13.4**). Therefore, category A (see **Table 13.2**) would be representative.

Table 13.16 - Predicted Construction Levels Assessed Against Significant Effects

Activity	Predicted Indicative Construction Noise Effects at Distance (m) from Construction Phase Boundary				
	20	50	100	200	500
Earthmoving	Major	Major	Minor	Minor	Minor
Concreting	Major	Major	Major	Minor	Minor
Road Pavement	Major	Moderate	Minor	Minor	Negligible
New Jetty Construction	Major	Major	Moderate	Minor	Minor

13.7.6 **Table 13.16** above indicates that, in the absence of any further mitigation, the construction phase of the proposed development is likely to generate up to Moderate Adverse noise effects on identified residential noise sensitive receptors and up to Major Adverse effects on the adjacent Logitech industrial premises.

Construction Vibration

13.7.7 Ground borne vibration is often a cause for concern to occupants of buildings, particularly in relation to construction. Sources of vibration may include piling activities. Any construction phases that includes driven piling should be considered to be the most likely to produce perceptible levels of vibration and therefore the most likely to cause concern to nearby residents. As detailed in **Chapters 6 – Ground Conditions and 7 – Marine Geomorphology**, existing ground conditions within the site mean that piling will be required for both the terrestrial elements of the proposed development (including to support the proposed fabrication shed) and the proposed marine works (including to support the proposed heavy lift quay). Further details regarding proposed terrestrial and marine piling works are outlined in **Appendix 6.4 – Geotechnical Ground Investigation Report** (PBA, 2019) and the submitted **Proposed Marine Works: Construction Sequence Document** (Arch Henderson, 2019) respectively.

13.7.8 Vibration transmitted from construction activities through the ground cannot be reliably calculated. Many factors such as rock/soil type, water content, solid damping, etc., greatly influence the way in which vibration travels through the ground.

Residential Receptors along Dumbarton Road

13.7.9 Due to the distance between the site and the nearest residential vibration sensitive receptors, the impact is likely to be negligible.

Logitech Facility

13.7.10 A preliminary assessment has been undertaken to consider the likely vibration impact of the construction phase of the proposed development upon the Logitech facilities. Calculations were undertaken in accordance with Table B.3 of BS5228-2:2009+A1:2014 and are presented in **Appendix 13.5**. These calculations indicate that, in the absence of any further mitigation, vibration levels are likely to exceed the proposed criteria at the Logitech facility. There is therefore potential for a Major Adverse vibration effect to occur on this receptor.

Operational Phase

Noise from Plant and Operations on Site

13.7.11 Based on the site visit to the existing facility and the building plant and operational activity assumptions defined in **Section 13.3**, **Table 13.17** below presents the measured noise levels and the on-time percentage during a typical day for the operational activities likely to take place inside the proposed fabrication shed.

Table 13.17 - Operational Activities during Typical Day

Operational Activity	Measured Noise Levels at 1 m, SEL in dB	On-time Percentage during a Typical Working day
Hand Held Tools	121	40
Fork Lift Truck	96	20
Overhead Crane	99	40
Welding	94	90
Grinding	110	10

Indicative Assessment

13.7.12 Based on the site visit to the existing facility and the building plant and operational activity assumptions defined in **Section 13.3**, **Table 13.18** below presents the results of the BS4142 assessment.

Table 13.18 - BS4142 Assessment

Description	Daytime Assessment	Night-time Assessment
	Dwellings along Dumbarton Road	Dwellings along Dumbarton Road
Calculated Rating Level at Receptor (dB L _{Aeq,1h})	42	42
Background Sound Level (dB L _{A90,T})	48	39
Difference between Rating Level and Background Sound Level (dB)	-6	+3

Description	Daytime Assessment	Night-time Assessment
	Dwellings along Dumbarton Road	Dwellings along Dumbarton Road
Assessment of Impact	Indication of a low impact, depending on the context	Indication of a less than adverse impact, depending on the context

Context

13.7.13 The above assessment details the results of the numerical assessment of sound levels at the nearest noise sensitive receptor. It is important to note that the numerical assessment of impact is influenced by the context of the proposals including the surrounding environment and the operating characteristics.

13.7.14 It is highlighted that the calculated absolute sound levels due to the operation of the proposed development are relatively low, with conventional glazing and building fabric likely to provide sufficient attenuation so as to achieve desirable internal noise levels (with reference to BS8233). Absolute noise levels in nearby external amenity areas fall below BS8233 and WHO guidance with respect to ‘serious annoyance’.

Uncertainty

13.7.15 Care has been taken to reduce uncertainty as far as reasonably possible. However, it should be recognised that in any environmental sound survey and assessment process uncertainty exists.

13.7.16 Uncertainty in measured background sound levels can occur due to variation in temporary/non representative meteorological conditions. In this instance all possible steps were taken to minimise the risk of meteorological conditions affecting the survey results. However, it should be recognised that there is a degree of uncertainty inherent in the baseline environmental sound data.

Summary

13.7.17 The effect that the proposed development will have on the existing background noise levels has been calculated in general accordance with BS4142:2014. The noise impacts at the nearest sensitive receptors have been calculated by comparing the existing background sound levels, with the relevant calculated future rating level.

13.7.18 Considering the preliminary results of the assessment and the context detailed above, the proposed use of the site should be considered acceptable in relation to potential noise effects.

Road Traffic Noise Assessment

13.7.19 The road traffic noise assessment considers likely changes in ambient noise levels as a result of changes in traffic flows between the potential future traffic flows with and without the proposed development. The assessment is underpinned by 18-hour Annual Average Weekly Traffic (AAWT) information generated by PBA in tandem with the preparation of the Transport Assessment provided in **Appendix 11.2**.

13.7.20 Table 13.19 presents the predicted change in noise levels that are likely to occur based on road traffic flow predictions.

Table 13.19 - Predicted Change in Noise Levels

Road Link	Predicted Changes in Noise Levels, in dB
Dumbarton Road (N)	< 1
Barclay Street	< 1
Dumbarton Road (S)	< 1

Erskine Ferry Road	< 1
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13.7.21 With the proposed development in place, all of the existing noise sensitive receptors within the Study Area are likely to experience a change in noise levels of less than 1 dB. This is considered to be a negligible effect.

13.8 Further Mitigation and Enhancement

Construction Phase

Construction Noise

- 13.8.1 The assessment provided in **Section 13.7** indicates that in the absence of any further mitigation, the construction phase of the proposed development is likely to generate up to Moderate Adverse noise effects on identified residential noise sensitive receptors and up to Major Adverse effects on the adjacent Logitech industrial premises.
- 13.8.2 Further mitigation is therefore proposed to minimise the avoidance of likely significant adverse effects, comprising careful phasing of the construction works as well as controlling the operation time and duration of each activity to reduce the noise impact at the receptor. For example, restricting works from a particular activity to 2 hours out of a 10-hour day would typically reduce overall 10-hour noise levels from that activity by 7 dB. Moreover, unlike the ‘worse case’ basis adopted in the assessment presented in Section 13.7, in practice the main construction activities will tend to take place towards the central area of the site, away from the site boundary. This will further mitigate construction noise at the nearest noise sensitive receptors, reducing the noise impact considerably.
- 13.8.3 The following advice is based on the guidance provided in BS5228-1:2009+A1:2014 and should be applied to minimise the noise breakout from the construction activities affecting noise sensitive receptors:
- Ensuring the use of quiet working methods, the most suitable plant and reasonable hours of working for noisy operations, where reasonably practicable;
 - Locating noisy plant and equipment as far away from dwellings as reasonably possible, and where practical, carry out loading and unloading in these areas;
 - Screening plant to reduce noise which cannot be reduced by increasing the distance between the source and the receiver (i.e. by installing noisy plant and equipment behind large site buildings);
 - Shutting down any machines that work intermittently or throttling them back to a minimum;
 - Orientating plant that is known to emit noise strongly in one direction so that the noise is directed away from houses, where possible;
 - Closing acoustic covers to engines when they are in use or idling;
 - Lowering materials slowly, whenever practicable, and not dropping them; and,
 - Use of temporary acoustic barriers, where appropriate, and other noise containment measures, such as screens, sheeting and acoustic hoardings at the construction site boundary to minimise noise breakout and reduce noise levels at the potentially affected receptors.
- 13.8.4 Further assessment of construction noise mitigation should be undertaken when a principal contractor has been appointed and detailed method statements, the construction programme and descriptions of the proposed plant are available.

Construction Vibration

- 13.8.5 The main source of vibration typically associated with the construction process is piling. The use of alternative methods such as continuous flight auger injected piles, auger bored piles should be considered, depending on the ground conditions to be encountered. Preliminary

calculations show that, in the absence of further mitigation, a potential significant effect is likely to occur at the Logitech facilities without mitigation.

13.8.6 As Logitech Ltd may undertake precision manufacturing in their facility, it is expected that vibration insulation mitigation will already be in place to reduce the potential impact of vibrations on equipment and processes. This is likely to reduce the likely impacts of vibration from the construction of the proposed development to an acceptable level. However, to further help minimise the level of vibration, the following measures should be adopted where practicable:

- Locating stationary vibrating equipment away from noise sensitive areas;
- Considering the use of most suitable plant;
- Plant/methods of work causing significant levels of vibration should be replaced by less intrusive plant/methods, where reasonably practicable;
- If necessary, isolate stationary vibrating equipment using resilient mountings, particularly if operating on connecting structures;
- If necessary, cut a structure to separate site work from sensitive premises; and,
- Utilisation of low-vibration piling method.

Operational Phase

13.8.7 As likely operational effects have all been assessed as negligible and acceptable, no further operational phase mitigation measures are specifically required to ensure the avoidance of likely significant adverse effects.

13.9 Residual Effects

13.9.1 Taking account of proposed mitigation and enhancement measures, the likely residual effects from the construction and operation of the proposed development are identified in **Table 13.20** below.

Table 13.20 - Summary of Likely Residual Effects

Potential Effect	Duration	Impacted Receptor(s)	Receptor Sensitivity / Importance	Residual Effect Level	Residual EIA Significance	Rationale
Construction Phase						
Construction Noise	Temporary	Existing Receptors – Dwellings along Dumbarton Road	High	Up to Minor	Negligible	Implementation of relevant guidance provided in BS5228-1:2009+A1:2014
Construction Noise	Temporary	Existing Receptors – Logitech Facilities	Low	Negligible	Negligible	
Construction Vibration	Temporary	Existing Receptors - Logitech Facilities	High	Negligible	Negligible	Consideration of likely existing vibration insulation provision and adoption of vibration minimisation techniques
Operational Phase						
Change in Noise Levels due to the Increase in Road Traffic Noise	Permanent	All Existing Receptors	High	Negligible	Negligible	As assessed in Section 13.7
Operation and Plant Noise	Permanent	All Existing Receptors	High	Negligible	Negligible	

13.10 Monitoring

13.10.1 In the absence of any likely residual significant air quality effects, no monitoring of likely residual effects is considered to be proportionate or required.

13.11 Cumulative Effects

13.11.1 For the reasons stated in **Section 13.3** it is not necessary to provide a separate cumulative impact assessment in respect of likely noise and vibration effects.

13.12 Summary

13.12.1 An assessment has been undertaken of the likely effects of the construction, and operational phases of the Proposed Development on the sound and vibration climate at noise sensitive receptors around the Site.

13.12.2 An environmental sound survey was conducted on the 27th June to the 28th June 2018.

13.12.3 Noise arising from construction of the proposed development was assessed to determine the impact on existing receptors. Construction noise from the Proposed Development is anticipated to have a negligible effect on existing receptors in the area around the Site, with mitigation in place. Construction vibration effect is anticipated to be not significant on the Logitech facilities, with mitigation in place.

13.12.4 Traffic flows from the proposed development have been assessed to determine the impact on the existing road network and the potential increase of road traffic noise on existing receptors. The level of impact that traffic noise generated by the proposed development would have on existing receptors is deemed to be negligible.

13.12.5 An assessment in general accordance with BS4142:2014 has been undertaken to determine the likely impact associated with the operation and plant noise from the Proposed Development.

13.12.6 The assessment demonstrates that noise associated with the operation of the Proposed Development is unlikely to significantly affect nearby noise sensitive receptors.

13.13 References

Department of the Environment (1974); Control of pollution act 1974: implementation of part III – noise. London: HMSO.

Department of the Environment (1990); Environmental Protection Act 1990. London: HMSO.

West Dunbartonshire Council (2010); Adopted West Dunbartonshire Local Plan

Scottish Government (2014); Scottish Planning Policy. Edinburgh: SG.

The Highway Agency (2011); Design Manual for Roads and Bridges Volume 11 Environmental Assessment Section 3 Environmental Assessment Techniques Part 7 Noise and vibration. London: HMSO.

British Standards Institution (2003); BS 7445:2003 Description and Measurement of Environment Noise – Part 1: Guide to Quantities and Procedures. London: BSI.

British Standards Institution (2014); BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open Sites Part 1 Noise. London: BSI.

British Standards Institution (2014); BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open Sites Part 2 Vibration. London: BSI.

British Standards Institution (2008); BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings Part 1 Vibration sources other than blasting. London: BSI.

British Standards Institution (2014); BS 4142:2014 Methods for rating and assessing industrial and commercial sound. London: BSI.

Department of Transport Welsh Office (1988); Calculation of Road Traffic Noise. London: HMSO.

14 Landscape & Visual

14.1 Introduction

- 14.1.1 This chapter of the EIA Report provides an assessment of the likely significant effects from the proposed development on landscape and visual amenity. The assessment is based on the characteristics of the site and surrounding area and the key parameters of the proposed development detailed in **Chapter 2 – Site and Surrounding Area** and **Chapter 3 – The Proposed Development** respectively.
- 14.1.2 This chapter has been prepared by Chartered Landscape Architects (CMLA) at LUC (Land Use Consultants). In accordance with Regulation 5(5)(b) of the TCPA EIA Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this EIA Report is provided in **Appendix 1.1**
- 14.1.3 The aims of this chapter are to:
- Identify the relevant context in which the landscape and visual impact assessment (LVIA) has been undertaken;
 - Describe the methods used to undertake the assessment;
 - Outline the relevant baseline conditions currently existing at the site, the immediate surroundings and the assessment Study Area;
 - Consider how the implementation of the proposed remediation works would affect current baseline conditions, resulting in a likely future baseline scenario;
 - Identify the likely direct and indirect effects of the proposed development upon landscape and visual receptors under the likely future baseline scenario;
 - Identify mitigation and enhancement measures, where required, to address likely effects;
 - Assess likely residual effects; and,
 - Assess likely cumulative effects on landscape and visual receptors arising from the proposed development in combination with other similar developments.
- 14.1.4 This chapter is supported by the following figures and technical reports provided in **Appendices 14.1 - 14.4**:
- **Appendix 14.1 - Figures**;
 - **Appendix 14.2 – ZTV and LVIA Assessment Methodology**;
 - **Appendix 14.3 - Visualisation Methodology**; and,
 - **Appendix 14.4 - Viewpoint Selection and Consultation**.

14.2 Policy Context, Legislation, Guidance and Standards

Legislation

- 14.2.1 The overarching legislative framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Over and above this there are no statutory provisions of specific relevance to this assessment.

Policy

- 14.2.2 The planning policy framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. The adopted statutory Development Plan applicable to the site comprises the approved Clydeplan Strategic Development Plan (2017) and the adopted West Dunbartonshire Local Plan (2010). However, the adopted Local Plan is only of limited relevance as it pre-dates current national and regional planning policies, with the

more recent West Dunbartonshire LDP Proposed Plan (2015) and West Dunbartonshire LDP2 Proposed Plan (2018) providing up to date and relevant planning policies.

14.2.3 Planning policy considerations of specific relevance to this assessment are:

- Clydeplan SDP (2017), in particular Policy 1: Placemaking;
- **Adopted West Dunbartonshire Local Plan (2010)**, in particular policies:
 - E9 - Landscape Character; and,
 - R4(A) - Forth and Clyde Canal.
- **West Dunbartonshire LDP Proposed Plan 2015**, in particular proposed policies:
 - DS1 - Successful Places and Sustainable Design;
 - GN4 - Landscape Character (and the associated Kilpatrick Hills Local Landscape Area Statement of Importance Document); and,
 - GN7 – Forth and Clyde Canal;
- **West Dunbartonshire LDP2 Proposed Plan (2018)**, in particular proposed policies:
 - CP1 – Creating Places;
 - FCC1 – Forth & Clyde Canal; and,
 - ENV2 - Landscape Character.
- **Scottish Planning Policy (2014)** including relevant provisions outlined in Table 5.2 in **Chapter 5**, in particular:
 - Principal Policy on Sustainability (paragraphs 24-35);
 - Principal Policy on Placemaking (paragraphs 36-57);
 - Valuing the Historic Environment Subject Policy (Paragraphs 135 – 151); and
 - Valuing the Natural Environment Subject Policy (Paragraphs 193 - 233).
- **Creating Places - A policy statement on architecture and place for Scotland (2013)**

14.2.4 In accordance with sections 15 and 58 of the Marine and Coastal Access Act (2009), the marine licence application for the extent of the proposed development located below MHWS must be determined in accordance with the appropriate marine policy documents, unless relevant considerations indicate otherwise. As detailed in **Chapter 5 – Legislative and Policy Context**, the relevant marine policy documents and constituent comprise:

- UK Marine Policy Statement (2011);
- Scotland's National Marine Plan (2015), in particular policies:
 - GEN1 - General Planning Principle;
 - GEN 7- Landscape/seascape;
 - GEN19- Sound Evidence; and
 - GEN21- Cumulative Impacts.

Guidance and Relevant Technical Standards

14.2.5 The following guidance and technical standards have informed and been applied in undertaking this assessment:

- Landscape Institute and the Institute of Environmental Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3);
- Scottish Natural Heritage (SNH) (2018) A Handbook on Environmental Impact Assessment, Appendix 2: Landscape and Visual Impact Assessment, Version 5;

- Landscape Institute Advice Note 01/11 Photography and photomontage in landscape and visual impact assessment;
- SNH (2012) Assessing the Cumulative Impacts of Onshore Wind Energy Developments³²; and,
- Landscape Institute (2017) Technical Guidance Note 02/17 Visual representation of development proposals.

14.3 Methodology

Overview

Assessment Scope

- 14.3.1 The approach to assessment and methodology used is described in **Appendix 14.2**. An overview of the process can be found in Figure 3.5 of GLVIA3 (Page 39).
- 14.3.2 This chapter presents an assessment of likely significant effects on landscape and visual amenity from the proposed development. The assessment presented in this chapter has been prepared in accordance with the TCPA EIA Regulations.
- 14.3.3 The principal aspects considered within this assessment are likely landscape and visual effects during construction and subsequent operation of the proposed development, namely:
- Effects on the physical landscape of the site;
 - Effects on landscape character³³ beyond the site boundary;
 - Effects on receptors at representative viewpoints; and
 - Effects on receptors within settlements and using recreational and transport routes in the Study Area.
- 14.3.4 In accordance with the Carless Marine Fabrication Complex EIA Scoping Report and subsequent EIA Scoping Opinion provided in **Appendix 4.1**, and on the basis of the desk based and survey work undertaken, the professional judgement of the assessment team, experience from other relevant projects, the requirements of relevant policy and guidance, and outcomes from consultation (see **Appendix 14.4**), the following effects have been scoped out of detailed consideration within the assessment:
- Effects on visual receptors beyond a 2km radius from the site, where it is judged that significant effects on views and visual amenity are unlikely to occur;
 - Effects on landscape character beyond a 2km radius from the site, where it is judged that significant effects on landscape character are unlikely to occur;
 - Effects on nationally or locally designated landscapes. The closest nationally designated landscape is the Loch Lomond and The Trossachs National Park at approximately 10km to the north-west, whilst the Kilpatrick Braes Local Landscape Area is located approximately 2km to the north-west at its closest point;
 - Effects on landscape and visual receptors that have minimal or no theoretical visibility (as predicted by the ZTV) and which are therefore unlikely to experience significant effects;
 - Cumulative effects in relation to receptors beyond a 2km radius from the site; and,

³² The SNH guidance is specifically focussed on the assessment of cumulative effects of onshore wind energy development. However, in the absence of suitable alternatives, this guidance is recognised as industry standard and is regularly referred to in relation to others forms of development.

³³ In the context of an LVIA, the term 'landscape' can be used to describe rural landscapes, marine and coastal landscapes and the landscapes of villages, towns and cities (townscapes). In this instance the study area consists of both rural and urban landscapes, therefore the term 'townscape' is used to describe parts of the study area of more urban character where appropriate in the LVIA. This is in line with guidance provided at Paragraphs 2.5 and 2.6 of GLVIA3.

- Visual effects during the construction phase, and cumulative landscape and visual effects during the construction phase.

Assessment Process

14.3.5 In undertaking this assessment, the following activities have been carried out:

- EIA Scoping, followed by further consultation (detailed in **Appendix 14.4**);
- Preparation of a zone of theoretical visibility (ZTV) (see **Figure 14.2**) to establish the extent from which the proposed development may be visible across the Study Area;
- A Study Area of 2km radius from the site was defined to underpin this assessment, based on ZTV analysis, professional judgement and consultation responses;
- The site and surrounding Study Area were analysed in terms of baseline landscape character and overall sensitivity;
- Representative viewpoints were selected and agreed with relevant consultees. These viewpoints encompass the range of views and types of viewer likely to be affected by the proposed development (detailed in **Appendix 14.4**); and,
- Likely significant effects on landscape and visual receptors were identified, taking account of embedded design features within the proposed development and all proposed mitigation and enhancement measures.

Consultation

14.3.6 This assessment has been informed by an EIA Scoping Report (PBA, October 2017) and subsequent EIA Scoping Opinion issued by WDC (March 2018) in respect of the EIA for the proposed development. Chapter 15 of the EIA Scoping Report was prepared by LUC to set out the proposed scope of assessment to assess likely significant landscape and visual effects from the proposed development.

14.3.7 The EIA Scoping Opinion, provided in full in **Appendix 4.1**, supported the proposed assessment scope as detailed in the EIA Scoping Report and included a list of standard requirements for consideration in this assessment, including comments in relation to the LVIA from WDC and SNH. In particular, the following should be noted:

- The EIA Scoping Opinion recommended that the LVIA should be undertaken in accordance with GLVIA3;
- The EIA Scoping Opinion confirmed that the assessment of impacts on landscape and visual receptors unlikely to be affected by the proposed development should be scoped out; and,
- The EIA Scoping Opinion confirmed that the assessment of potential effects on nationally or locally designated landscapes should be scoped out of the LVIA.

14.3.8 This assessment duly takes account of and is based on the EIA Scoping Opinion. A further recommendation of the EIA Scoping Opinion was that the LVIA should take account of both landscape capacity and sensitivity. It is not the purpose of the assessment to identify or recommend a capacity for development of the type proposed within the Study Area. However, the assessment does consider landscape value and susceptibility in determining landscape sensitivity to the type and scale of development proposed for the site, in accordance with GLVIA3.

14.3.9 Further to the receipt of the EIA Scoping Opinion (WDC, March 2018), the following subject specific consultation activities have also been undertaken:

- A ZTV was generated based on the final extents and design of the MFC³⁴ at ‘design freeze’ in October 2018. LUC then consulted WDC and SNH in relation to the extent of the Study Area and the selection of viewpoints to be included in the assessment. The process for

³⁴ The ZTV was generated to illustrate potential visibility of the fabrication shed element of the proposed development only, as the element with the largest massing.

generating the ZTV is described further in **Appendix 14.3** and detail of consultation undertaken is provided in **Appendix 14.4**.

Study Area

14.3.10 As proposed within the EIA Scoping Report, a 2km Study Area has been adopted for this assessment and is shown on **Figure 14.1**. The ZTV generated (shown on **Figure 14.2**) was used to inform consultation with WDC and SNH, in order to confirm this Study Area.

Information Sources

Desk Top Study

14.3.11 The following information sources have been reviewed and analysed to inform the collation of baseline information and assessment process:

- Ordnance Survey (OS) Maps;
- Aerial photography and historic mapping;
- OS Terrain@ 5 mid-resolution height data (DTM) (5m grid spacing, 2.5metres RMSE);
- Documents submitted in support of planning application DC18/245 in respect of the proposed remediation works, the implementation of which forms the future baseline scenario for the purposes of this EIA;
- Land Use Consultants, SNH Report No. 116: Glasgow and the Clyde Valley landscape assessment (SNH, 1999); and,
- Relevant planning policies and guidance as listed in **Section 14.2**.

Fieldwork

14.3.12 A series of visits to the site and selected viewpoints within the Study Area were undertaken between August 2017 and November 2018 to verify and supplement the findings of the desktop study and to capture viewpoint photography.

Approach to Assessment

Consideration of Relevant Receptors

14.3.13 Based on the information sources outlined above, the current baseline characteristics of the site and the surrounding area were identified. This led to the identification of relevant landscape and visual receptors to be considered within the assessment, as detailed within **Section 14.4 – Current Baseline Conditions**. Taking account of the proposed remediation works, the sensitivity of identified receptors under the Future Baseline scenario was then determined, as presented in **Table 14.2**.

Impact Assessment Methodology

14.3.14 Likely landscape and/or visual effects from the proposed development on identified receptors were identified and assessed as Negligible, Minor, Moderate or Major. The factors considered and the methodology applied to determine this likely level of effect are detailed in full within **Appendices 14.2** and **14.3**. In overall terms, the level of likely landscape and visual effects has been assessed with reference to the future baseline sensitivity of identified receptors and considering the potential magnitude of landscape or visual change³⁵. Likely effects assessed as Moderate or Major are considered significant in the context of the TCPA EIA Regulations.

³⁵ Magnitude of change is determined by considering a combination judgements in relation to of the size or scale, geographical extent, duration and reversibility of the change. For all receptors, the duration of effect is considered to be long-term (i.e. in excess of 10 years) and reversible. However, judgements in relation to size or scale and geographical extent vary for each receptor.

Approach to Cumulative Impact Assessment

14.3.15 This assessment has considered the potential for significant cumulative landscape and visual effects to occur from the construction or operation of the proposed development in combination with other relevant developments, as detailed in **Section 2.4**. Having reviewed the information accompanying the planning applications and permissions for these relevant cumulative developments – primarily in relation to intervening distance and scale of development – it is judged that there is no potential for significant cumulative landscape and visual effects to arise in combination with the proposed development. In light of this, detailed assessment of cumulative landscape and visual effects has not been undertaken.

Assumptions and Limitations

14.3.16 No substantial information gaps have been identified during the preparation of baseline information or undertaking of the assessment, and it is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant environmental effects on landscape, views and visual amenity.

14.3.17 The direction of landscape and visual effects (beneficial, adverse or neutral) is determined in relation to the degree to which the proposal fits with the existing character of the landscape or view and the contribution that the proposed development makes, even if it is in contrast to the existing character of the landscape or view (see **Appendix 14.2**). With regard to large-scale built development like the type proposed, whilst there is a broad spectrum of response from the strongly positive to the strongly negative, an assessment is required to take an objective approach. Therefore, to cover the 'maximum case effect' situation, potential landscape and visual effects have been assumed to be adverse (negative), and have been determined as such within the assessment unless otherwise stated.

14.4 Current Baseline Conditions

14.4.1 This section describes the historic and current landscape of the site, including its sensitivity as a landscape receptor, and gives a general description of the surrounding area. Following this (**Paragraphs 14.4.8 to 14.4.11**), the baseline of the other landscape receptors – defined as of landscape character areas – is described along with judgement of their sensitivity to the proposed development.

14.4.2 The final topic of this section is the visual baseline which sets out the different visual receptor types included in the assessment (**Paragraph 14.4.38**), describes the individual receptors and receptor groups in detail and provides a judgement of their sensitivity (**Paragraphs 14.4.40 to 14.4.76**). There is also a description of the representative viewpoints which have been used to inform the assessment.

14.4.3 The site boundary, the location of the proposed fabrication shed and Study Area for the LVIA are shown on **Figure 14.1**. A ZTV, indicating the potential visibility of the proposed fabrication shed is presented on **Figure 14.2** (with viewpoint locations and recreational routes) and on **Figure 14.3** (with landscape receptors).

The Site

14.4.4 The site forms the western area of the wider Carless landholding and is part of the former Carless Oil Terminal in Old Kilpatrick, West Dunbartonshire. It is located adjacent to the north bank of the River Clyde, upstream and east of the Erskine Bridge. A former railway corridor borders the site to the north. To the west there are existing industrial premises and to the east is a further area of derelict land within the wider Carless landholding which is associated with the former oil terminal.

14.4.5 The past industrial use of the site ceased in 1992. Decommissioning and surface structure demolition works were then undertaken although jetties extending into the River Clyde, remnants of oil storage structures, and areas of reinforced concrete hardstanding and extensive made ground remain. There are areas of semi-mature woodland which have established across parts of the brownfield site.

14.4.6 There are indicators across the site of recent industrial heritage which the area between the River Clyde and the Forth and Clyde Canal, and the wider Clyde Basin is associated. In its current condition, vegetation which has colonised the site contributes to a more natural and

greener appearance than might be expected of this once industrial area. However, the lack of ongoing management is evident; there are also issues with informal access and the potential for anti-social activity to take place. Overall and in its current state, the value of the site as a landscape receptor is therefore considered to be **medium**.

- 14.4.7 The remnants of industrial development across the site and the nature of the pioneer woodland and scrub vegetation across the site, is such that it is considered to be of **low** susceptibility to the change of the type proposed. Taking account of the judgements of value and susceptibility, overall the sensitivity of the site as a landscape receptor is considered to be **Medium**.

The Surrounding Area

- 14.4.8 Figure 14.1 illustrates the site boundary, location of the proposed Fabrication Shed and the extent of the Study Area which extends 2km from the site boundary and includes parts of West Dunbartonshire and Renfrewshire.
- 14.4.9 The site occupies part of a linear belt of land between the River Clyde and the Forth and Clyde Canal which is characterised by ongoing and previous industrial use: south-east of the site is an area of bonded warehouse storage and there are operational industrial premises north-west of the site. Several other parcels of land nearby are either derelict or partially restored from their prior industrial use, including the wider Carless landholding.
- 14.4.10 North of the Forth and Clyde Canal is the A814 (Dumbarton Road) and the residential area of Mountblow, part of the Clydebank conurbation. The North Clyde Line railway also passes through the settlement while the A82 (Great Western Road) marks its northern edge. Beyond the urban area, south-facing slopes rise toward the foot of the Kilpatrick Hills to the north and, north of Craigleith Farm, reach a height of approximately 250m AOD at the edge of the Study Area. Wide ranging views across the Clyde Basin are possible from these elevated slopes.
- 14.4.11 Land south of the River Clyde lies within the Renfrewshire Council local authority area and, within the Study Area, includes the settlement of Erskine. Adjacent to the southern banks of the Clyde are various leisure and recreation sites including Mar Hall Hotel and grounds, Boden Boo Woodland and the Erskine Bridge Hotel and grounds. The Erskine Bridge supports the A898, connecting the A82 with the M898 and the A726 (Erskine to Strathaven road). This southern side of the Clyde floodplain is gently undulating with highpoints at Boden Boo (41m AOD) and Craigend Hill (56m AOD).

Landscape Baseline

- 14.4.12 The site is located within the area covered by the Glasgow and Clyde Valley landscape assessment (SNH, 1999) and is classified as Urban in character (as shown on **Figure 14.3**). The proposed development therefore has the potential to result in direct effects upon this Urban character area. Although no description or characteristics of this area are provided in the published assessment, landscape architects undertaking the LVIA have noted the key characteristics and issues within the Study Area which are described below, taking account of the corridor of the River Clyde and the wider basin which has been influenced by heavy industry, and specifically marine fabrication/ship building for over a century.

Urban Character Area

- 14.4.13 The **Urban** character area within the Study Area includes the settlements of Old Kilpatrick, Duntocher, Mountblow and parts of the wider Clydebank conurbation. In addition to residential development, there are notable areas of open amenity space and recreational routes throughout. There are also busy transportation routes and areas of industrial and commercial development which is particularly evident between the Forth and Clyde Canal and the River Clyde.
- 14.4.14 Development within the Urban character area has taken place in various phases and there is little unity in terms of the built form found across the area. This includes Victorian tenements, detached bungalows and 20th century tower blocks (some of which are approximately 40m in height), with industrial and manufacturing development establishing and re-establishing along the Clyde corridor throughout this period due mainly to the proximity to the river and other arterial transport infrastructure. The landscape is busy, influenced by several large roads and the North Clyde Line railway running east-west parallel with the River Clyde, with crossing points across connecting settlements north and south of the river, and the wider Greater Glasgow and surrounding areas.

- 14.4.15 Several vacant post-industrial sites exist along the Clyde corridor within the Study Area, and whilst areas of planted and self-generating vegetation generally soften the form and texture of the landscape in some locations, there are areas where lack of management has led to an unkempt appearance and there is evidence of antisocial behaviour taking place.
- 14.4.16 No national or local designated landscapes cover the area identified in the Urban character area, however there are two Conservation Areas (Mount Pleasant Drive and Luset Road) which are within the Study Area and are located to the north of the Erskine Bridge. These define a discrete proportion of the Urban character area within West Dunbartonshire and are framed between the A82 to the north and the A814 and A898 to the west and south, and are dissected by the North Clyde Line railway. These small areas are predominantly defined by residential dwellings and do not represent the character of the wider landscape or townscape found within the character area.
- 14.4.17 There is little evidence of a coherent or attractive townscape across the Urban character area but there are important cultural associations, particularly in the form of industry associated with the River Clyde, and the area provides recreational opportunities both along and away from the corridor of the river and the canal. The area is therefore considered to be of **medium** value.
- 14.4.18 The scale, pattern and history of industrial development in the character area, particularly in the vicinity of the site, are such that it is considered to be of **low** susceptibility to the change of the type proposed. Taking account of the judgements of value and susceptibility, overall the sensitivity of this receptor is considered to be **Low**.
- 14.4.19 Based on the ZTV (shown on **Figure 14.3**) it is judged that the proposed development has potential to result in indirect effects upon the following landscape character types (LCTs) located to the north and south of the Clyde, within the 2km Study Area:
- Rugged Moorland Hills LCT (STC20);
 - Floodplain LCT³⁶ (STC2);
 - Rugged Upland Farmland LCT (STC6);
 - Raised Beach LCT (STC1) h; and,
 - Rolling Farmland LCT (LLT19).

Rugged Moorland Hills LCT - 20b Kilpatrick Hills

- 14.4.20 The **Rugged Moorland Hills LCT** is found in three areas in the published character assessment (SNH, 1999) and one of these areas is within the Study Area: 20b Kilpatrick Hills of West Dunbartonshire. This area is north of the site and extends from the A82 Great Wester Road beyond the boundary of the Study Area. Features and qualities of this landscape were described as its “*distinctive upland character*”, the “*sense of apparent naturalness and remoteness which contrasts strongly with the farmed and developed lowland areas*” and the “*presence of archaeological sites*”. Key landscape sensitivities of relevance here include development pressures around the fringes of the hills, visual prominence of tall structures when seen from the hills and the valued recreational resource they provide.
- 14.4.21 While the hills are a distinctive landform and clearly rural in terms of land use, it was noted during site survey that these south-facing slopes, on the fringe of the LCT, are strongly influenced by the developed landscape of the Clyde Basin below. There is a sense of space and openness here and a visual connection with other less developed and upland areas such as the Gleniffer Braes and Clyde Muirshiel Regional Park to the south of the River Clyde; however, noise, movement and built form (e.g. residential areas, transport infrastructure, electrical infrastructure and industrial areas) are clearly evident, indicating that this is a transitional landscape between the lowland conurbation and more remote areas to the north.
- 14.4.22 A local landscape designation covers upland areas of this LCT, the Kilpatrick Hills Local Landscape Area (LLA). A small part of this extends into the Study Area but it is focussed on more remote hills to the north. There is recreational access here but, while there are open views

³⁶ Also referred to as Alluvial Plain within the landscape character assessment

available, scenic quality is affected by nearby residential and industrial development, as well as road and rail infrastructure. The area is therefore considered to be of **medium** value.

- 14.4.23 Given the scale of the landscape and the existing influence of industrial development and infrastructure, it is considered to be of **medium** susceptibility to change of the type proposed. Taking account of the judgements of value and susceptibility, overall the sensitivity of this receptor is considered to be **Medium**.

Floodplain LCT

- 14.4.24 The **Floodplain LCT** occurs in one area of the published character assessment (SNH, 1999). Within the Study Area this is limited to a narrow strip of shoreline adjacent to the south bank of the River Clyde in Renfrewshire, opposite the site and extending to the south-east along the river. In this area there is an *“open character though woodland blocks and remnant field boundary trees create containment”* and the landscape is described as having a *“distinctive, low-lying form”*, being subject to *“urban influences in some areas”* but otherwise featuring *“lush pastures, arable fields and a number of surviving mosses”*. Key landscape sensitivities of relevance here include the influence of nearby urban and industrial areas, as well as roads and railway, pressure for further development and the importance of maintaining nature conservation interest.

- 14.4.25 During site survey it was determined that this LCT generally displays the characteristics documented within the published description but that it is also influenced by specific local factors. There is a sense of openness, generally associated with proximity to the River Clyde, contrasted by several belts and blocks of woodland which contain some views along the river and to the wider landscape of the Clyde basin. Recent development has resulted in the settlement of Erskine, largely part of a neighbouring LCT, extending into this landscape.

- 14.4.26 The River Clyde and Kilpatrick Hills contribute positively to the scenic quality and setting of this LCT. There is provision for recreational access within the character area, along with evidence of cultural associations with industry and the river, and areas of ecological protection. Overall, the value of this landscape is judged to be **medium**.

- 14.4.27 Given the perception and pattern of existing industrial development and infrastructure, it is considered to be of **low** susceptibility to change of the type proposed. Taking account of the judgements of value and susceptibility, overall the sensitivity of this receptor is considered to be **Low**.

The Rugged Upland Farmland LCT - 6a Kilmacolm

- 14.4.28 The **Rugged Upland Farmland LCT** occurs in three areas within the published character assessment (SNH, 1999) and one of these – 6a Kilmacolm – is within the Study Area cover a part of Renfrewshire to the south of the River Clyde. This is a large landscape character unit and only a small proportion of it is located within the Study Area, located south and west of the site, beyond the two foreshore character types. This landscape is described as a *“rugged landform”* with a *“dominance of pastoral farming”* and *“tree cover often emphasising landform”*. Relevant sensitivities for this landscape include the impact of urban related infrastructure. However, this part of the LCT differs from the general character description in that it is primarily an urban area, covering part of the settlement of Erskine and nearby industrial area north-west of the A898.

- 14.4.29 Site survey identified a predominantly urban character here as a result of the planned new town settlement of Erskine. Fringes of the settlement are influenced by busy roads such as the A898, A726 and A8. Areas of open space tend to be managed amenity areas within Erskine although there is an area of pastoral farmland west of the A898.

- 14.4.30 There is no noted cultural association, rarity or conservation interest associated with this part of the Rugged Upland Farmland LCT. While there is some provision for recreation and scenic quality in parts, the value of the landscape is considered to be **medium**.

- 14.4.31 Given the pattern of development and perceptual qualities of the area it is considered to be of **medium** susceptibility to change of the type proposed. Taking account of the judgements of value and susceptibility, overall the sensitivity of this receptor is considered to be **Medium**.

Raised Beach LCT - 1b Inner Firth

- 14.4.32 There are two areas of the **Raised Beach LCT** in the published character assessment (SNH, 1999) and one of these is within the Study Area: 1b Inner Firth. This is located north-east of the Floodplain LCT, adjacent to the south bank of the River Clyde. Described features and qualities of this area are a *“narrow platform, representing the former beach, with estuarine mudflats”*, presence of *“defensive sites, castles, historic houses and designed landscapes”* and the *“prominence of horizontal landscape elements”*. Key landscape issues of relevance here include the poor quality transition between countryside and urban areas, dominance of transport corridors, difficulties of integrating industrial facilities in the coastal landscape and recreational importance.
- 14.4.33 Whilst visiting the Study Area, it was noted that the area matches well with the published description given the influence of the river to the north and Mar Hall and surrounding parkland golf course to the south. However, proximity to the Erskine Bridge results in modern infrastructure also having a strong influence on the area.
- 14.4.34 The River Clyde, Kilpatrick Hills and grounds of Mar Hall make positive contributions to the scenic quality of the area. There is also recreational access and clear connections with the cultural associations of the area, including views to the Antonine Wall to the north of the river, and the distinguishable landmark of Dumbarton Castle in views west along the river. Overall, the value of the landscape is judged to be **medium**.
- 14.4.35 Given the perception and pattern of existing industrial development and infrastructure, it is considered to be of **medium** susceptibility to change of the type proposed. Taking account of the judgements of value and susceptibility, overall the sensitivity of this receptor is considered to be **Medium**.

Rolling Farmland LCT

- 14.4.36 The **Rolling Farmland LCT** comprises a small proportion of the overall Study Area and is located close to the north-western boundary of the Study Area. Given the limited extent of the LCT within the Study Area and the intervening distance, a detailed assessment of potential effects has not been undertaken for this landscape receptor.

Visual Baseline

- 14.4.37 The LVIA methodology (detailed in **Appendix 14.2**) considers both the susceptibility of receptors (people) and the value of the view to determine sensitivity. Within the Study Area, there are various potential visual receptors including residents, employees, those travelling for business or recreational reasons and those engaged in tourism or recreation. Residents are judged to be of a higher susceptibility to change than employees at their place of work, and tourists are judged to be of a higher susceptibility to change than business travellers. Given that these different receptor types are found in the same locations within the Study Area, the assessment focusses on those of higher susceptibility and is limited to residents, those engaged in outdoor recreation and road users.
- 14.4.38 In accordance with **Chapter 15** of the EIA Scoping Report and the subsequent EIA Scoping Opinion, visual receptors of potential relevance to this assessment include:
- Local residents, mainly located within residential areas within the most immediate context of the site;
 - Recreational users, including people using cycle and walking routes, as well as users of nearby waterways (e.g. River Clyde and Forth and Clyde Canal); and,
 - People travelling through the landscape on roads and waterways.
- 14.4.39 Having considered the Study Area and identified potential visual receptors, a selection of representative viewpoints has been identified and used to inform the assessment of potential effects. At **Paragraphs 14.4.77 to 14.4.78**, this section sets out the viewpoints that are used to represent and assess the visual effects of the proposed development. The assessment viewpoints do not represent an exhaustive list of locations from which the proposed development would be visible.

Residential Receptors

- 14.4.40 The ZTV shown on **Figure 14.2** indicates that residential areas potentially affected by visibility of the proposed development include Mountblow, Old Kilpatrick, Parkhall, Duntocher and

Erskine. However, although the ZTV takes account of built form (as detailed in **Appendix 14.3**) it does not consider the screening effects of vegetation and smaller structures.

- 14.4.41 During desktop analysis and site survey, it was determined that intervening tree belts and woodland blocks would be likely to substantially reduce potential visibility from Duntocher. From Parkhall, the combination of intervening vegetation and existing tall buildings in views from this area is such that visibility of the proposed development is likely to be reduced substantially, and significant visual effects are considered unlikely to occur. Effects on views from these two residential areas are therefore not considered further within the assessment.
- 14.4.42 The underlying topography at **Mountblow** rises from the Forth and Clyde Canal towards the A82. There have been several phases of residential development within this area, which now consists of a range of different property types and scales across the wider settlement. This includes three storey tenements, two storey terraces, semi-detached and detached two storey houses, and bungalows. The baseline photographs for Viewpoints 1 and 2 (**Figure 14.4** and **14.5**) illustrate the variance in elevation and openness of view available from different locations within the settlement, and from where many views from within the interior of the settlement are contained by the presence of intervening built form and trees/vegetation.
- 14.4.43 Short-range views available from properties in Mountblow, partly screened and filtered by roadside and garden vegetation, include neighbouring properties, open amenity space and the public road network. There are also properties and areas of open space which afford medium to long range views to the distinctive skyline of the Kilpatrick Hills to the north, north-west, and low-lying areas adjacent to the River Clyde and the Forth and Clyde Canal to the south. These views are often punctuated by large man-made structures including steel lattice towers (supporting overhead electricity transmission lines), the Erskine Bridge and residential tower blocks in the Dalmuir area. Open amenity spaces generally include mature trees, whilst the woodland found along the Forth and Clyde Canal forms an attractive edge to the settlement on the south side of the A814.
- 14.4.44 Residential receptors within this part of the Study Area are judged to be of **high** susceptibility to changes in their views and visual amenity. Considering views from the settlement/residential area as a whole, the value of the existing views available to residential receptors is judged to be **medium**. In combination, the judgements of value and susceptibility have been considered to determine sensitivity to the proposed development of **Medium** for residents of Mountblow.
- 14.4.45 In Old Kilpatrick, the landform rises from the Forth and Clyde Canal toward the A82. There are historic buildings within the settlement, including within the two small Conservation Areas of Mount Pleasant Drive and Lusset Road, but subsequent development has occurred in several phases. Residential properties include three storey tenements and larger blocks of flats, two storey detached and semi-detached houses and bungalows.
- 14.4.46 The Erskine Bridge is noticeable in views from many properties and from open spaces within the settlement. To the north there are also views of the Kilpatrick Hills, which form the skyline in this direction. Short-range views available, albeit partly screened and filtered by roadside and garden vegetation, include neighbouring properties, open amenity space and access roads. The Forth and Clyde Canal, with adjacent tree lines, forms an attractive edge to the settlement and there are occasional views across the River Clyde toward Mar Hall and surrounding grounds.
- 14.4.47 Residential receptors within this part of the Study Area are judged to be of **high** susceptibility to changes in their views and visual amenity. Considering views from the settlement/residential area as a whole, the value of the existing views available to residential receptors is judged to be medium. In combination, the judgements of value and susceptibility have been considered to determine sensitivity to the proposed development of **Medium** for residents of Old Kilpatrick.
- 14.4.48 Within Erskine, although it is generally low-lying, there are hills and embankments which influence views. The majority of the settlement has been planned and developed since the late 20th century and there is a mix of property types including semi-detached and terraced two storey houses and blocks of flats. Although there are areas of open amenity space within the settlement, medium- and long-range views are generally limited to elevated areas or from taller buildings.
- 14.4.49 Short-range views are often part-screened and filtered by roadside and garden vegetation; they generally include neighbouring properties, open amenity space, parking areas and access roads. There are properties and areas of open space with filtered, medium- to long-range views

to the skyline of the Kilpatrick Hills. These views often feature large, man-made structures including steel lattice towers (supporting overhead electrical transmission lines), the Erskine Bridge and residential tower blocks to the north-east.

- 14.4.50 Residential receptors within this part of the Study Area are judged to be of **high** susceptibility to changes in their views and visual amenity. Considering views from the settlement/residential area as a whole, the value of the existing views available to residential receptors is judged to be **medium**. In combination, the judgements of value and susceptibility have been considered to determine sensitivity to the proposed development of **Medium** for residents of Erskine.

Recreational Receptors

- 14.4.51 The site is secured by perimeter fencing and does not currently support any public access, in part owing to its contaminated and derelict state. However, there are opportunities for walkers, cyclists and others accessing outdoor space for recreational purposes throughout the Study Area. The ZTV shown on **Figure 14.2** indicates potential visibility of the proposed development from sections of the National Cycle Network (NCN) Route 7 (which follows the route of the Forth and Clyde Canal here), at Core Paths in Renfrewshire and West Dunbartonshire and at sites such as Boden Boo plantation where recreational and visitor facilities are promoted.
- 14.4.52 There are golf courses within the Study Area at Mar Hall and at Clydebank Overtoun. While the ZTV shown on **Figure 14.2** indicates potential visibility from these, the consideration of core paths and other recreational sites in these areas are sufficient to understand potential visual effects upon receptors at these locations.
- 14.4.53 The **Forth and Clyde Canal** is north of the site and crosses the Study Area on a north-west to south-east alignment. The canal itself is a waterway used for recreational transport and the towpath is used as a walkway and cycle route, forming part of NCN Route 7. The Forth and Clyde Canal is also designed as a Scheduled Monument owing to its historical importance. Viewpoint 3 (**Figure 14.6**) illustrates the baseline view from a particularly open section of this recreational route. In this area, visitors to the Forth and Clyde Canal experience views channelled along the canal but there are also views available above the treeline to the Kilpatrick Hills to the north, and the Erskine Bridge and steel lattice towers to the south (supporting overhead electrical transmission lines). To either side of the canal, the views to edges of residential developments (e.g. Mountblow, Dalmuir and Old Kilpatrick), and existing industrial areas and derelict land are generally filtered by trees, although there are small gaps in places which frame views to the surrounding area.
- 14.4.54 Considering the above, recreational receptors using the Forth and Clyde Canal and adjacent NCN Route 7 are considered to be of **medium** susceptibility to changes in views and visual amenity. The value of views available from this recreational route as a whole is judged to be **medium**. In combination, the judgements of value and susceptibility have been considered to determine sensitivity to the proposed development of **Medium** for users of the Forth and Clyde Canal and the adjacent NCN Route 7.
- 14.4.55 In West Dunbartonshire and Renfrewshire, the ZTV suggests potential visibility of the proposed development from several Core Paths; the closes of these is RC Core Path E1/1 and E1/5 which, at its closest point, is approximately 300m south-west of the site. Desktop analysis and site survey has shown that the potential for significant visual effects is limited to those described below.

WDC Core Path 87

- 14.4.56 WDC **Core Path 87** extends from close to the A82 / A898 junction north-west beyond the edge of the Study Area. Within the Study Area, the elevation of the path ranges from approximately 35m AOD to approximately 140m AOD. The intervening infrastructure of the A82 and Erskine Bridge and woodland along the lower sections of the path contain views towards the site, although the path generally affords open views from more elevated sections where it crosses the south-facing slopes of the Kilpatrick Hills. The baseline photograph for Viewpoint 6 (**Figure 14.9**) illustrates the available, and often filtered, views towards the proposed development from some short sections of this route.
- 14.4.57 Long-range views are available from the upper reaches of WDC Core Path 87, including open views across the Clyde Basin to the Greater Glasgow conurbation, Clydebank, and elevated areas to the south of the River Clyde such as at Gleniffer Braes and Clyde Muirshiel. The

foreground of views however are occupied by the Erskine Bridge and other transport infrastructure, residential development, industrial areas and steel lattice towers (supporting overhead electricity transmission lines).

- 14.4.58 Considering the above, recreational receptors using Core Path 87 are considered to be of **medium** susceptibility to changes in views and visual amenity. The offers open panoramic views across the Clyde Basin and beyond from its more elevated sections, and overall the value of views available from this recreational route is judged to be **high**. In combination, the judgements of value and susceptibility have been considered to determine sensitivity to the proposed development of **Medium** for users of Core Path 87.

WDC Core Paths 123 and 124 and RC Core Path E1/2

- 14.4.59 Core paths between West Dunbartonshire and Renfrewshire cross the Erskine Bridge, providing recreational access across the River Clyde: **WDC Core Paths 123 and 124** and **Renfrewshire Council (RC) Core Path E1/2**. The crossing is approximately 45m above water level. During site survey it was determined that protective guardrails fixed to the bridge parapet result in views being channelled along the length of the bridge rather than encouraging views out. However, there are long-range views available across the Clyde Basin to the Greater Glasgow conurbation, Clydebanks to the east, and Dumbarton to the west. Views to elevated areas to the south of the River Clyde such as at Gleniffer Braes and Clyde Muirshiel are available from sections of the core path where open views exist. Transport infrastructure, residential development, industrial areas and steel lattice towers (supporting overhead electricity transmission lines) adjacent to the River Clyde form the foreground and key features in short-range views from these core paths.

- 14.4.60 Considering the above, recreational receptors using Core Paths 123 and 124, and E1/2 are considered to be of **medium** susceptibility to changes in their views and visual amenity. The value of views available from this recreational route as a whole is judged to be **medium**. In combination, the judgements of value and susceptibility have been considered to determine sensitivity to the proposed development of medium for users of Core Paths 123 and 124, and E1/2.

RC Core Paths E1/1 and E1/5

- 14.4.61 In Renfrewshire, **RC Core Paths E1/1 and E1/5** provide recreational access along the south bank of the River Clyde and follow the line of the river beyond the extent of the Study Area. Viewpoints 4 and 5 (**Figures 14.7 and 14.8**) illustrate the baseline views available from sections of these routes. Users of the routes experience views along and across the River Clyde. The north bank features extensive areas of semi-mature woodland and there are industrial sites and the settlement edges of Mountblow and Old Kilpatrick visible beyond, partly filtered and screened by trees. The Erskine Bridge and steel lattice towers (supporting overhead electricity transmission lines) are visible and prominent crossing the river with the skyline beyond formed by the Kilpatrick Hills. Views to the south, towards Erskine, are largely restricted by bankside vegetation.

- 14.4.62 Recreational receptors using Core Paths E1/1 and E1/5 are considered to be of **medium** susceptibility to changes in views and visual amenity. The value of views available from this recreational route as a whole is judged to be **medium**. In combination, the judgements of value and susceptibility have been considered to determine sensitivity to the proposed development of **Medium** for users of Core Paths E1/1 and E1/5.

- 14.4.63 The **Saltings Local Nature Reserve (LNR)** is a riverside area located north-west of the site, running westwards from Erskine Ferry Road under the Erskine Bridge. There are interpretation panels relating to the area which are promoted by WDC. Several Core Paths provide access to the reserve, however, because users of these are doing so in order to visit the Saltings LNR, these are not assessed individually. Mature trees form the perimeter to the reserve, surrounding an open area of salt marsh. There are framed views available between trees to the River Clyde and the landscape surrounding Mar Hall beyond and, above the treeline, the Erskine Bridge is dominant.

- 14.4.64 Recreational receptors visiting the Saltings LNR are considered to be of **medium** susceptibility to changes in their views and visual amenity. The value of views available from this area is judged to be **medium**. In combination, the judgements of value and susceptibility have been

considered to determine sensitivity to the proposed development of **Medium** for visitors to the Saltings LNR.

- 14.4.65 On the south bank of the River Clyde, adjacent to the Erskine Bridge, is **Boden Boo**. This is an area of woodland with a network of informal recreational trails, car parking and a picnic area which is promoted by Forestry Commission Scotland. While the majority of the area is enclosed by woodland, there are medium- to long-range views out available from open ground such as Erskine Beach and north-facing slopes. Viewpoint 5 (**Figure 14.8**) illustrates the baseline view from Erskine Beach and shows the River Clyde, business and industrial units adjacent to the north bank of the river. Views of these units are filtered and part-screened by vegetation and backed by the elevated settlement edge of Mountblow and the wider Clydebank conurbation. The Erskine Bridge is seen against the skyline against the Kilpatrick Hills. A number of steel lattice towers (supporting overhead electricity transmission lines) are seen against the skyline.
- 14.4.66 Recreational receptors visiting this area are considered to be of **medium** susceptibility to changes in views and visual amenity. The value of views available from this area is judged to be **medium**. In combination, the judgements of value and susceptibility have been considered to determine sensitivity to the proposed development of **Medium** for visitors to woodland at Boden Boo.

Road and Waterway User Receptors

- 14.4.67 In addition to recreational routes and transport access within settlements, the ZTV indicates potential visibility of the proposed development from several roads and from the River Clyde.
- 14.4.68 North of the site, between the Forth and Clyde Canal and Mountblow, is the **A814 (Dumbarton Road)**. This road passes through Old Kilpatrick and Dalmuir and extends beyond the Study Area boundary to the north-west and the south-east. Passing through suburban residential areas, town centres and adjacent to lengths of canal and railway, views experienced by road users at different locations are variable. The available length of view, direction of focal points and the types of built form and greenspace visible change throughout but are, for the general road user, considered to be unremarkable.
- 14.4.69 Road users of the A814 are considered to be of **low** susceptibility to changes in their views and visual amenity. Views experienced by road users from this road route are considered to be of **low** value. In combination, the judgements of value and susceptibility have been considered to determine sensitivity to the proposed development of **Low** for users of the A814.
- 14.4.70 Located north of the settlement of Mountblow, the **A82 Great Western Road** is a stretch of dual carriageway which passes to the north of Old Kilpatrick and south of Duntocher. It extends beyond the Study Area boundary to the north-west and the east. The road corridor is wide and, although bordered by stretches of hedgerow and roadside trees, there are open views along the route and to either side of it. Features visible include farmsteads and pasture, the Kilpatrick Hills, residential areas, the Auchentoshan Distillery, the Erskine Bridge and steel lattice towers (supporting overhead electrical transmission lines). Although attractive in places, views from this road are considered to be unremarkable for the general road user.
- 14.4.71 Road users of the A82 are considered to be of **low** susceptibility to changes in views and visual amenity. Views experienced by road users from this road route are considered to be of **medium** value, with elevated views south across the River Clyde to the Erskine Bridge and Dumbarton Castle from short sections of the route to the north-west of the Study Area. In combination, the judgements of value and susceptibility have been considered to determine sensitivity to the proposed development of **Low** for users of the A82.
- 14.4.72 The **M898/A898** crosses the River Clyde via the Erskine Bridge to the west of the site, and provides a busy road link between the M8 in Renfrewshire and the A82 in West Dunbartonshire. The crossing is approximately 45m above water level, and affords elevated views when travelling south and north. As for the Core Paths which cross the bridge, site survey determined that protective guardrails fixed to the bridge parapet result in views being channelled along the length of the bridge, with views north-west and south-east along the river contained by these roadside structures. However, there are long-range views available across the Clyde Basin to the Greater Glasgow conurbation, Clydebank to the east, and Dumbarton when approaching the bridge. Views to elevated areas to the south of the River Clyde such as at Gleniffer Braes and Clyde Muirshiel are available from sections of the road where open views exist. Transport infrastructure, residential development, industrial areas and steel lattice towers (supporting

overhead electricity transmission lines) adjacent to the River Clyde form the foreground and key features in short-range views from this road.

14.4.73 Road users of the M898/A898 are considered to be of **low** susceptibility to changes in views and visual amenity. Views experienced by road users from this road route are considered to be of low value. In combination, the judgements of value and susceptibility have been used to determine sensitivity to the proposed development of **Low** for users of the M898/A898.

14.4.74 Marine users of the River Clyde would experience close-range views of the site from the river. The river is still used extensively by both industrial/commercial ships and leisure/tourist craft, as well as more infrequently for recreational use (e.g. canoeists). Views from along the river are characterised by the presence of existing development on both the northern and southern banks of the river. This consists of residential, commercial and industrial development which is often intermittently screened in immediate views from the river by dense vegetation along its banks. To the east of the Erskine Bridge the river is characterised by more extensive urban development, with large scale industrial and commercial buildings, transport infrastructure, residential development, and other large scale vertical elements (e.g. the steel lattice towers supporting overhead electricity transmission lines near the site) are a common feature in views from the waterway.

14.4.75 Receptors using the River Clyde are considered to be of **medium** susceptibility to changes in views and visual amenity. Views from the River Clyde are considered to be of **low** value. In combination, the judgements of value and susceptibility have been used to determine sensitivity to the proposed development of **Low** for users of the River Clyde.

14.4.76 Desktop analysis and site survey considered the potential for visibility from these roads within the Study Area, and through this process it was determined that very limited visibility of the proposed development was likely to occur from the A726 and the unclassified route connecting the Inchinnan and Park Quay areas (Newshot Drive) to the south of the site due to the presence of dense roadside vegetation and woodland and/or intervening built form. As a consequence, changes in views from these roads were not considered in the assessment.

Representative Viewpoints

14.4.77 Representative viewpoints have been selected (see **Appendix 14.4 – Consultation**) to illustrate the potential change in views and visual amenity arising from the introduction of the proposed development. These viewpoints are illustrated on **Figure 14.2** and are detailed in **Table 14.1** below, along with the receptors and views they have been selected to represent.

14.4.78 These viewpoints have been selected to represent as wide a range of different receptors and views as possible and are all situated in publicly accessible locations and include:

- Locations selected to represent the experience of different types of visual receptor (residential, recreational, travellers);
- Specific viewpoints selected because they are promoted viewpoints within the landscape; and,
- Illustrative viewpoints chosen specifically to demonstrate a particular effect or specific issue (which could include restricted visibility in certain locations).

Table 14.1 – Representative Viewpoints used in the LVIA

Viewpoint	Grid Reference	Potential Receptors	Description and Value of View
VP1: Mountblow at Western Isles Road and Bute Drive	247316, 672519	Residential receptors north-east of the site.	<p>Western Isles Road forms the foreground of the view, passing out of view behind adjacent residential properties and roadside vegetation. Further residential properties filtered by vegetation can be seen in the middle distance of view. The horizon is formed in part by further residential development and elevated ground in Erskine to the south of the River Clyde, with the elevated hills at the south of the Clyde Basin forming the distant skyline beyond.</p> <p>The value of the view is considered to be low.</p>
VP2: Dumbarton Road/A814 at Freelands Crescent	246979, 672028	Road users travelling through the area and residential receptors.	<p>Dumbarton Road/A814 crosses the foreground of the view, with dense mature woodland below lining the route of the Forth and Clyde Canal and the adjacent NCN Route 7. The woodland screens and filters views to the River Clyde beyond, whilst the Erskine Bridge can be seen against the skyline between the trees to the north-west.</p> <p>The value of the view is considered to be low.</p>
VP3: Forth and Clyde Canal/NCN 7	247592, 671465	Recreational visitors and users of the canal and cycle path/footpath.	<p>Illustrating the glimpsed views available from the NCN7 along the Forth and Clyde Canal, the viewpoint offers views towards the site across playing fields adjacent to the canal. Bonded warehouses to the left and the large steel lattice electricity transmission towers to the right of the view frame views across the site, which is largely imperceptible due to intervening vegetation. The Erskine bridge is visible on the skyline beyond the site.</p> <p>The value of the view is considered to be low.</p>

Viewpoint	Grid Reference	Potential Receptors	Description and Value of View
<p>VP4: Cycle route north of the Erskine Bridge Hotel</p>	<p>246734, 671542</p>	<p>Recreational visitors and users of the cycle path/footpath, and represents similar views available from the adjacent Erskine Bridge Hotel.</p>	<p>The viewpoint illustrates views experienced from across the water from the footpath/cycle path which follows the south bank of the river. Adjacent industrial development is visible to the north of the site, whilst the existing redundant jetty structures are visible directly across the river, marking the southern extent of the proposed development. The residential area of Mountblow is visible above intervening woodland beyond the site, whilst riverside vegetation largely screens views into the interior of the site.</p> <p>The Erskine Bridge is visible in the middle distance, largely back clothed by the Kilpatrick Hills and forming the key feature in the view.</p> <p>The value of the view is considered to be medium.</p>
<p>VP5: Erskine Beach</p>	<p>246137, 672252</p>	<p>Recreational visitors and users.</p>	<p>Illustrating views across the river from the south bank, and Erskine Beach which lies in the shadow of the Erskine Bridge to the west, the view is focused east, south-east along the river with the large steel lattice electricity transmission towers framing the view to the south-east. Across the river existing industrial development is visible adjacent to the site, partially screened by intervening riverside vegetation, whilst views into the interior of the proposed development site are screened by woodland along the southern boundary of the site. The viewpoint also represents views experienced from the nearby Boden Boo public woodland promoted by Forestry Commission Scotland.</p> <p>The value of the view is considered to be medium.</p>
<p>VP6: Kilpatrick Braes at Drums</p>	<p>246688, 673564</p>	<p>Recreational users of West Dunbartonshire Core Path 87.</p>	<p>Enclosed grazing with scattered farmsteads defines the foreground of the view, extending towards the road infrastructure of the A82, with the A698/Erskine Bridge beyond. The northern edge of Old Kilpatrick can be seen beyond, whilst the two large steel lattice electricity transmission towers, and northern mast of the Erskine Bridge, can be seen as large vertical features on the skyline.</p> <p>The value of the view is considered to be medium.</p>

Viewpoint	Grid Reference	Potential Receptors	Description and Value of View
<p>VP7: Erskine Bridge</p>	<p>246145, 672367</p>	<p>Road users travelling on A898 crossing Erskine Bridge, and pedestrians/cyclists crossing via adjacent walkway.</p>	<p>This elevated, but somewhat artificial views illustrates the potential view experienced by stationary receptors located on the core path adjacent to the busy and dominant southbound carriageway of the A858 across the Erskine Bridge. The view is framed through the narrow railings which form the safety barrier along the edge of the bridge, offering wide views across the Clyde Basin and the Greater Glasgow conurbation. A large number of high rise tower blocks are visible on the skyline across the view to the east, whilst the two large steel lattice electricity transmission towers frame the crossing of the River Clyde with the extensive area of bonded warehouses to the south of the site a large feature in the middle distance of the view.</p> <p>The value of the view is considered to be low.</p>

14.5 Baseline Evolution and Expected Future Baseline

Current Baseline Evolution

- 14.5.1 The TCPA EIA Regulations require that the EIA Report must describe the likely evolution of the baseline scenario in the absence of the proposed development. In the absence of any development activities current baseline conditions, including extensive hydrocarbon contamination of soils and groundwater, would be likely to remain relatively unchanged, except for natural growth of existing vegetation within the site.
- 14.5.2 For the purposes of this EIA, the likely evolution of the baseline is predicated upon the approval and implementation of proposed remediation works before the commencement of the proposed development (the construction of the proposed development). Prior remediation will be needed to:
- Reduce to an acceptable level the risk to human health and environmental receptors both on and off the site from hydrocarbon and other contamination in soil;
 - Reduce to an acceptable level the risk to the River Clyde from mobile contamination within soils and contaminants floating on and dissolved within the groundwater; and therefore,
- 14.5.3 Remediation is therefore required both owing to the site's current contaminated land and Special Site designations under Part IIA of the Environmental Protection Act 1990 and to make the site suitable for the future intended use (i.e. the construction and operation of the proposed development). As such, a 'no development' baseline evolution scenario is not considered to merit further consideration in this EIA.
- 14.5.4 Whilst not forming part of the proposed development assessed in this EIA, an overview of the proposed remediation works is provided for completeness in **Chapter 6 – Ground Conditions**. In addition to intrusive works within the site, the proposed remediation works include a commitment by the Applicant to undertake further SI and subsequent remediation works on land to the east within the wider Carless landholding. This will be outwith the site of the proposed development considered in this EIA. Planning application DC18/245 for the proposed remediation works was submitted to West Dunbartonshire Council as the relevant local planning authority on 1st November 2018 and validated on 14th November 2018.

Expected Future Landscape Baseline

Expected Changes in Conditions within site

- 14.5.5 In relation to landscape and visual amenity, the effect on the site of implementing the proposed remediation works will be the removal of some existing on-site vegetation, remaining infrastructure and ground material. In accordance with good site management principles, the Applicant also intends to remove debris and dead vegetation, e.g. fallen trees. In consequence, the ground level will be altered in places and low-level screening currently provided by vegetation and debris may be reduced. However, the Existing belts of broadleaved woodland present along the western and southern boundaries of the site, which have predominantly established since the closure of the former oil depot, will be unaffected by the remediation works and would also be retained as part of the proposed development.

Expected Changes in Conditions outwith site

- 14.5.6 Potential changes outwith the extents of the site, i.e. further site investigation and remediation works in the land to the east, are likely to be similar to those within the site but will take place over a larger area. Changes within the site also have the potential to alter the perception of the site from the wider area, i.e. indirect changes.
- 14.5.7 In overall terms, the effect outwith the site of implementing the proposed remediation works will be to reduce the vegetation cover within the Study Area, to increase the extent of open ground and to potentially increase the visibility of the site (as a result of changes to the finished ground level).

14.5.8 The potential increase in visual prominence and in the extent of hard surfacing may be interpreted as an adverse effect upon landscape and visual receptors. However, this will be accompanied by an increase in the active management of the site, resulting in a 'tidier' appearance and is likely to result in a reduction in the potential for anti-social activity to be associated with the site. The overall change which will occur outwith the site would therefore be adverse.

Predicted Future Baseline Conditions

14.5.9 Changes within the site will be in the context of industrial heritage and ongoing industrial use within the area between the River Clyde and the Forth and Clyde Canal. The proposed remediation works will result in changes which will be most readily perceived within the immediate context of the site.

Predicted Future Receptor Sensitivities and Vulnerabilities

14.5.10 Although remediation activities will substantially alter the existing conditions found within the brownfield former industrial site, it is not considered that these activities will reduce the quality of the landscape, whilst in some areas, the quality will be improved as derelict remnants of the past industrial use of the site will be removed. Overall, the change which will occur as a consequence of the proposed remediation works will result in a reduction in the value of the site as a landscape receptor which, post-remediation, is judged to be **low**. The susceptibility of the site to change will be unchanged as a result of the proposed remediation works and this will remain **low**. Taking account of the judgements of value and susceptibility, overall the sensitivity of the site post-remediation is considered to be **Low**.

14.5.11 Whilst change may be perceptible from surrounding areas, the overall value, susceptibility and sensitivity of landscape receptors outwith the site will be unaltered as a result of the proposed remediation works.

Expected Future Visual Baseline

Expected Changes in Conditions within site

14.5.12 As noted above, predicted change to the site as a consequence of good site management and implementing the proposed remediation works will be the removal of debris, some existing on-site vegetation, remaining industrial infrastructure and ground material. In consequence, the ground level will be altered in places and low-level screening currently provided by vegetation and debris may be reduced. However, the existing belts of broadleaved woodland present along the western and southern boundaries of the site, which have predominantly established since the closure of the former oil depot, will be unaffected by the proposed remediation works and will also be retained as part of the proposed development.

Expected Changes in Conditions outwith site

14.5.13 Potential changes outwith the site, i.e. further site investigation and remediation works in the land to the east are likely to be similar to those within the site but will take place over a larger area. Changes within the site also have the potential to alter the appearance of the site from the wider area, when seen from elevated areas where views into the interior of the site are possible.

14.5.14 In overall terms, the effect outwith the site of implementing the proposed remediation works will be to reduce the vegetation cover within the Study Area, to increase the extent of open ground and to potentially increase the visibility of the site (as a result of changes to the post-remediation works ground level).

14.5.15 The potential increase in visual prominence of the site and the extent of hard surfacing may be interpreted as a negative change, however, this will be accompanied by an increase in the active management of the site, resulting in a tidier appearance and is likely to result in a reduction in the potential for anti-social activity to be associated with the site. The overall visual change outwith the site will therefore be neutral.

Predicted Future Baseline Conditions

14.5.16 Changes within the site will be in the context of industrial heritage and ongoing industrial use within the area between the River Clyde and the Forth and Clyde Canal. The proposed

remediation works will result in changes which will be most readily perceived within the immediate context of the site.

Predicted Future Receptor Sensitivities and Vulnerabilities

- 14.5.17 Change which will result from the proposed remediation works will take place at or near ground level. Tree lines close to the southern and western site boundaries, and along the former railway line to the north of the site, will be retained and continue to filter and screen views into the interior of the site.
- 14.5.18 The potential exception to the above is for recreational users of Core Paths running along the Erskine Bridge (**WDC Core Paths 123 and 124 and Renfrewshire Council (RC) Core Path E1/2**). This is an elevated structure which is relatively close to the site and the baseline photography and visualisation prepared for Viewpoint 7 (**Figure 14.10**) illustrates that, although the presence of the existing tree belts along the western and southern boundary of the site will be retained, the elevated views into the interior of the site will allow views of the proposed remediation works to be obtained. The change will be perceptible in these views, but will be seen in the context of the existing industrial and post-industrial landscape. It is therefore considered that the overall value of the view, the susceptibility to change and the overall sensitivity of recreational receptors crossing the bridge will be unchanged as a result of proposed remediation works.
- 14.5.19 Given the visual receptors which have been identified within the Study Area, the perceptible changes to the site as a consequence of the remediation works are not judged to alter the value of view or the susceptibility of the receptors. Therefore the overall sensitivity of most visual receptors is judged to remain unchanged from the current baseline situation.

Summary of Receptor Sensitivity and Consideration in this Assessment

- 14.5.20 Drawing upon **Sections 14.4**, and **14.5**, **Tables 14.2** and **14.3** below provides a summary of the sensitivity under the future baseline scenario of identified receptors which are likely to experience landscape and visual effects from the proposed development. As noted previously, these sensitivity levels consider judgements of both receptor value and susceptibility. These tables confirm which receptors have been carried forward to the impact assessments presented in **Sections 14.7 – 14.9** below.

Table 14.2 – Landscape Receptor Sensitivity

Landscape Receptor	Future Baseline Value	Future Baseline Susceptibility	Future Baseline Sensitivity
The site – current condition	medium	low	Medium
The site – post-remediation	low	low	Low
Urban Character Area	medium	low	Low
Rugged Moorland Hills LCT - 20b Kilpatrick Hills	medium	medium	Medium
Floodplain LCT	medium	low	Low
Rugged Upland Farmland LCT - 6a Kilmacolm	medium	medium	Medium
Raised Beach LCT - 1b Inner Firth	medium	medium	Medium

Table 14.3 – Visual Receptor Sensitivity

Visual Receptor	Future Baseline Value	Future Baseline Susceptibility	Future Baseline Sensitivity
<i>Representative Viewpoints</i>			
VP1: Mountblow at Western Isles Road and Bute Drive	low	high	Medium
VP2: Dumbarton Road/A814 at Freeland's Crescent	low	high	Medium
VP3: Forth and Clyde Canal/NCN 7	low	medium	Medium
VP4: Cycle route north of the Erskine Bridge Hotel	medium	medium	Medium
VP5: Erskine Beach	medium	medium	Medium
VP6: Kilpatrick Braes at Drums	medium	medium	Medium
VP7: Erskine Bridge	low	medium	Medium
<i>Residential Areas</i>			

Visual Receptor	Future Baseline Value	Future Baseline Susceptibility	Future Baseline Sensitivity
Mountblow	medium	high	Medium
Old Kilpatrick	medium	high	Medium
Erskine	medium	high	Medium
<i>Recreational Routes</i>			
Forth and Clyde Canal/NCN Route 7	medium	medium	Medium
Core Path 87	high	medium	Medium
Core Paths 123, 124 and EI/2	medium	medium	Medium
Core Paths EI/1 and EI/5	medium	medium	Medium
<i>Transportation Routes (Roads and Waterways)</i>			
A814 (Dumbarton Road)	low	low	Low
A82 (Great Western Road)	medium	low	Low
M898/A898	low	low	Low
River Clyde	low	medium	Low

14.6 Embedded Mitigation

14.6.1 As detailed in **Chapter 3 – The Proposed Development**, a number of design features and embedded mitigation measures have been incorporated into the design and construction of the proposed development to avoid, prevent or minimise significant adverse environmental effects and to enhance beneficial effects. Embedded mitigation measures of relevance to this assessment are:

Construction Phase

- Clearance of debris and dead vegetation from the site prior to the commencement of the proposed remediation works or the proposed development; and,
- The implementation of a Construction Environmental Management Plan (CEMP). Of relevance to this assessment, the CEMP would include standard measures and procedures including the erection of hoardings around the site boundary to provide visual screening of construction works.

Operational Phase

- Siting - selection of a brownfield former industrial site within a wider area where the existing character is influenced by current industrial development and where there is a tradition of industrial development associated with the River Clyde; and

- Design features as detailed within the submitted Design and Access Statement prepared by GD Lodge Ltd. The design of proposed buildings and structures has been informed by massing studies, the development of a lighting strategy, public consultation and feedback obtained from the West Dunbartonshire Pace & Design Panel;
- In keeping with the desire for a clean uncluttered structure, a limited palette of high-quality materials would be utilised on the external facades of the proposed fabrication shed; and,
- Retention and enhancement of existing areas of mature and semi-mature woodland vegetation along the western and southern boundaries of the site to screen views into the site from the surrounding area. Proposals for woodland enhancement are detailed further in **Chapter 9 – Terrestrial Ecology**.

14.6.2 If required, further mitigation and enhancement measures identified through the EIA process are detailed in **Section 14.8** below before likely residual effects from the proposed development are then outlined in **Section 14.9**.

14.7 Assessment of Likely Effects

Construction Phase

- 14.7.1 Construction activities associated with the proposed development would result in temporary changes to landscape character and views and visual amenity experienced locally, being most noticeable to receptors with clear visibility of the site and largely restricted to areas within the immediate vicinity of the site. The construction of the proposed development would change the character of the site and its immediate setting due to the construction activity and additional traffic movements. However, presence of the most visible elements (e.g. temporary cranes, heavy machinery, materials storage, etc.) would cease upon completion of the construction phase.
- 14.7.2 Although the construction phase of the proposed development has the potential to result in significant effects upon landscape and visual receptors, it is considered that any potential effects arising during this phase would not exceed those which would arise during the operational phase. Consequently, a detailed assessment of potential landscape and visual effects during the construction phase has not been carried out.

Operational Phase

- 14.7.3 This section provides an assessment of the landscape and visual effects likely to result from the operational phase of the proposed development, i.e. once all construction work has been completed. In accordance with the methodology detailed in **Section 14.3** and **Appendices 14.2 and 14.3**, potential effects on identified receptors have been assessed with reference to receptor sensitivity and considering the potential magnitude of landscape or visual change.

Landscape Receptors

- 14.7.4 The proposed development would be located within the site and within the wider Urban character area and therefore has the potential to result in direct effects upon them. Effects upon all other landscape receptors would be indirect.

The Site

- 14.7.5 The proposed development would alter the character of the site, resulting in the remediated but vacant brownfield area changing into an active industrial large scale marine fabrication complex including a large fabrication shed, ancillary buildings, river side jetty and hardstanding yard. The scale of change would be large and the majority of the site would be affected. Overall, the magnitude of landscape change for the site during the operational phase is considered to be **High**.

- 14.7.6 Combined with the judgement of **Low** sensitivity for the site, the level of effect is judged to be **Moderate**, and effects are judged to be neutral.

Urban Character Area

14.7.7 The proposed development would be industrial in nature and therefore, in the context of its immediate industrial and post-industrial surroundings, is judged to result in a medium scale change. The size of the fabrication shed is such that it would be perceptible from a relatively large geographic extent of the urban character area; however, the perceptibility and influence of the development would reduce substantially over distance due to the presence of other built development found across the wider character area. Overall, the magnitude of change for the Urban character area during the operational phase is considered to be **Medium**.

14.7.8 Combined with the **Low** sensitivity of the Urban character area, the level of effect is judged to be **Minor**, and effects are judged to be adverse.

Rugged Moorland Hills LCT - 20b Kilpatrick Hills

14.7.9 The proposed development would be perceptible in views from the Rugged Moorland Hills LCT from where it would represent an industrial development seen within the industrial and post-industrial context of the Clyde Basin (As illustrated in Viewpoint 6, **Figure 14.9**). It is considered that the scale of this change would be small although it would be perceptible over a relatively large geographic extent. The magnitude of change for the Rugged Moorland Hills LCT is considered to be **Low**.

14.7.10 Considering the magnitude of change in combination with the **Medium** sensitivity of the LCT, the level of effect would be **Minor**, and effects are judged to be adverse.

Floodplain LCT

14.7.11 The proposed development would be perceptible from the Floodplain LCT from where it would represent an industrial development within an industrial and post-industrial context, and from where other large industrial developments and high rise residential buildings are evident in views north across, and east along the river. It is considered that the scale of this change would be a small for the LCT as a whole. The ZTV (**Figure 14.3**) indicates that the fabrication shed would be perceptible over a relatively large area but it is likely that mature trees would limit this to a small geographic extent beyond the immediate close proximity parts of the LCT directly south of the site, where the change would be more evident (Viewpoint 4, Figure 14.7). The magnitude of change for the Floodplain LCT is considered to be **Low**.

14.7.12 Considering the magnitude of change in combination with the **Medium** sensitivity of the LCT, the level of effect would be **Minor**, and effects are judged to be adverse.

Rugged Upland Farmland LCT - 6a Kilmacolm

14.7.13 The proposed fabrication shed would be perceptible from a relatively small proportion of the Rugged Upland Farmland LCT. Although described as farmland, this part of the LCT is urban in character, as a result of continuous pressure for residential and commercial development, where the periphery of settlements have extended into the rural areas of the LCT. The nature of the change and the limited geographic extent potentially affected are such that the magnitude of change is considered to be **barely perceptible**

14.7.14 In combination with the **Medium** sensitivity of the LCT, the level of effect would be **Negligible**, and effects are judged to be adverse.

Raised Beach LCT - 1b Inner Firth

14.7.15 The proposed development would be perceptible from the Raised Beach LCT from where it would represent an industrial development within an industrial and post-industrial context, seen across the River Clyde from this LCT, from where other large industrial developments and high-rise residential buildings are evident in views north across, and east along the river. It is considered that the scale of this change would be a small for the LCT as a whole, although it would be perceptible over a relatively large geographic extent, and from close proximity areas of the LCT the change would be more evident (**Viewpoint 5, Figure 14.8**). The magnitude of change for the Raised Beach LCT is considered to be **Low**.

14.7.16 In combination with the **Medium** sensitivity of the LCT, the level effect on the Raised Beach LCT would be **Minor**, and effects are judged to be adverse.

Representative Viewpoints

14.7.17 **Table 14.3** below sets out an assessment of likely effects during the operational phase of the proposed development at representative viewpoints previously defined in **Table 14.1**. This assessment draws upon the LVIA figures provided in **Appendix 14.1** and the viewpoint selection information detailed in **Appendix 14.4**.

Table 14.4 – Viewpoint Assessment

Viewpoint 1 – Mountblow	Figure 14.4
Representative receptors: Residential receptors located within the area of Mountblow would experience similar views from access roads, walkways and areas of public greenspace within the settlement.	Sensitivity: Medium
<p>Magnitude of change: The roof and upper extent of the northern façade of the fabrication shed would be visible in views from this location. There is potential for the fabrication shed to be visible against the skyline in views from this location, however these would be filtered and partially screened by intervening trees and buildings, and the structure would not become a defining feature in the view. Ground level operations and lower structures would be screened from view. The scale of change would be small and it would occupy a small proportion of the overall available views. Similar views would be afforded from other locations within the residential area of Mountblow, however overall the geographical extent of similar views would be small.</p> <p>Overall the magnitude of visual change would be Low.</p>	
<p>Level of Effect: Taking account of the judgements of sensitivity and magnitude of change, the level of effect is considered to be Minor, and effects are judged to be adverse.</p>	

Viewpoint 2 – Dumbarton Road/A814 at Freelands Crescent	Figure 14.5
Representative receptors: Residential receptors located on the southern edge of Mountblow would experience similar views from access roads, walkways and areas of public greenspace. Road users of the A814.	Sensitivity: Medium
<p>Magnitude of change: The roof and façades of the fabrication shed would be visible against the skyline but would be filtered by intervening trees, which would provide increased levels of screening in spring and summer seasons. Ground level operations and lower structures are likely to be largely screened from view. The scale of change would be small, affecting a medium proportion of the overall view. Similar views would be afforded from several locations on the southern edge of Mountblow and from a limited number of locations within the settlement, however the geographical extent of similar views would be small.</p> <p>Overall the magnitude of visual change would be Low.</p>	
<p>Significance of Effect: Taking account of the judgements of sensitivity and magnitude of change, the level of effect is considered to be Minor, and effects are judged to be adverse.</p>	

Viewpoint 3 – Forth and Clyde Canal/NCN Route 7		Figure 14.6
Representative receptors: Recreational users of the Forth and Clyde Canal / NCN Route 7 at this specific location east of the site would experience similar views.	Sensitivity: Medium	
<p>Magnitude of change: Dense vegetation lining the canal can be seen from this location but there is an opening in this which effectively frames the view toward the site. The roof and upper extents of the northern and eastern façades of the fabrication shed would be visible, seen in the context of neighbouring industrial development, the Erskine Bridge beyond and the large scale vertical feature of the steel lattice overhead electricity infrastructure. Ground level operations and lower structures would be screened from view. This would represent a small scale of change seen in a small proportion of the available view. Similar views would generally not be available from the Forth and Clyde Canal / NCN Route 7 because of the screening effects of mature vegetation which generally lines the route. The geographical extent of similar views would therefore be small.</p> <p>Overall the magnitude of visual change would be Low.</p>		
Significance of Effect: Taking account of the judgements of sensitivity and magnitude of change, the level of effect is considered to be Minor , and effects are judged to be adverse.		

Viewpoint 4 – Cycle route north of the Erskine Bridge Hotel		Figure 14.7
Representative receptors: Recreational users of the cycle route adjacent to the south bank of the River Clyde would experience similar views.	Sensitivity: Medium	
<p>Magnitude of change: The upper extents of the eastern and southern façades of the fabrication shed would be visible above the existing semi-mature woodland which contains views into the interior of the site. In addition, the proposed marine works and partial removal of the derelict jetty structure would be visible and there is potential for ground level operations to be visible. The scale of the visual change would be medium, affecting a relatively small proportion of the available views, where the fabrication shed would appear against the backdrop of the Kilpatrick Hills beyond, but would not break the skyline formed by the hills in views from this location. Similar views would be available along the majority of the cycle route adjacent to the river; however, nearby vegetation would screen these views from further south. The geographical extent of similar views would therefore be medium.</p> <p>Overall the magnitude of visual change would be Medium</p>		
Significance of Effect: Taking account of the judgements of sensitivity and magnitude of change, the level of effect is considered to be Moderate , and effects are judged to be adverse.		

Viewpoint 5 – Erskine Beach	Figure 14.8
Representative receptors: Recreational visitors to Erskine Beach would experience similar views.	Sensitivity: Medium
<p>Magnitude of change: The upper extents of the western and southern façades of the fabrication shed would be visible above the existing on-site semi-mature woodland situated along the western and southern boundaries of the site. In addition, the proposed marine works would be visible and partial removal of the derelict jetty structure but any views into the interior of the site at ground level would be screened from this location. The scale of the change would be medium and would be seen in a medium proportion of available view. Similar views would be available from riverside locations east of the Erskine Bridge; however, nearby vegetation would screen these views from further south and the presence of the bridge in views from the west alter the perception of the proposed development (effectively reducing the perceived magnitude of change). The geographical extent of similar views would therefore be small.</p> <p>Overall the magnitude of visual change would be Medium.</p>	
<p>Significance of Effect: Taking account of the judgements of sensitivity and magnitude of change, the level of effect is considered to be Moderate, and effects are judged to be adverse.</p>	

Viewpoint 6 – Kilpatrick Braes at Drums	Figure 14.9
Representative receptors: Recreational users of Core Path 87 within the Study Area would experience similar views.	Sensitivity: Medium
<p>Magnitude of change: The roof and upper façades of the fabrication shed would be visible but would be filtered and part-screened by intervening trees, buildings and infrastructure of the A82 and A898/Erskine Bridge. Ground level operations and lower structures would be screened from view. In the context of existing built form and infrastructure, the change is considered to be small in scale and it would occupy a small proportion of the available views. Similar views would be available along the majority of the core path and from the surrounding hillside. The geographical extent of similar views would therefore be large.</p> <p>Overall the magnitude of visual change would be Low.</p>	
<p>Significance of Effect: Taking account of the judgements of sensitivity and magnitude of change, the level of effect is considered to be Minor, and effects are judged to be adverse.</p>	

Viewpoint 7 – Erskine Bridge	Figure 14.10
<p>Representative receptors: Recreational users of the Erskine Bridge would experience similar views at right angles to the direction of travel if stopping to look between railings.</p>	<p>Sensitivity: Medium</p>
<p>Magnitude of change: It is possible to see into the site where the fabrication shed, marine works and some ground level operations would be visible. This is in the context of industrial and post-industrial sites nearby. The backdrop features the Greater Glasgow conurbation with several residential tower blocks and tall pylons supporting overhead electricity transmission lines in the view. The scale of the change would be medium and would occupy a medium proportion of the available view. Similar views would be available from the majority of recreational routes on the east side of the bridge only. The geographical extent of similar views is therefore medium.</p> <p>Overall the magnitude of visual change would be Medium.</p>	
<p>Significance of Effect: Taking account of the judgements of sensitivity and magnitude of change, the level of effect is considered to be Minor, and effects are judged to be adverse.</p>	

Residential Areas

- 14.7.18 In **Mountblow**, the ZTV (**Figure 14.2**) shows that the majority of the settlement would be unaffected by the proposed development. The ZTV also indicates that people in the properties closest to the site are most likely to experience visibility of the proposed fabrication shed and that as distance from the site increases intervening buildings and vegetation/woodland would further screen and filter views of the building. Viewpoints 1 and 2 (**Figures 14.4** and **14.5**) represent the range of views which may result at affected areas in the settlement. It is considered that although views from the upper storeys of some properties at the southern edge of the settlement, including flatted properties of greater than two storeys the magnitude of change would be **Medium**, overall the magnitude of visual change for the settlement/residential area as a whole would be **Low**.
- 14.7.19 Locally, i.e. along the southern edge of the settlement, the **Medium** magnitude of change in combination with **Medium** sensitivity of residential receptors within Mountblow would result in a **Moderate** level of visual effect, and effects are judged to be adverse. However, the **Low** magnitude of visual change experienced outwith this localised area would result in a **Minor** level of visual effect for the settlement/residential area as a whole, and effects are judged to be adverse..
- 14.7.20 In **Old Kilpatrick**, the ZTV (**Figure 14.2**) suggests that there may be views of the proposed fabrication shed from properties along the southern edge of the settlement, i.e. adjacent to the Erskine Bridge and the Forth and Clyde Canal. There is also the potential for visibility of the proposed development from properties adjacent to areas of open space and roads leading toward the site. From these areas, the roofline and upper façades of the fabrication shed may be visible but would generally be filtered and part-screened by intervening trees and buildings and in the context of industrial development and transport infrastructure (i.e. behind the Erskine Bridge). Ground level operations and lower structures would be screened from view.
- 14.7.21 The magnitude of visual change for the settlement/residential area as a whole would be **Low**. Combined with the **Medium** sensitivity of residential receptors within Old Kilpatrick, this would result in a **Minor** level of visual effect for the settlement/residential area as a whole, and effects are judged to be adverse.
- 14.7.22 In **Erskine**, the ZTV (**Figure 14.2**) shows that those in properties closest to the site are most likely to experience visibility of the proposed fabrication shed and that as distance from the site increases intervening buildings would act to screen it. Exceptions to this include a small number of properties in open or elevated areas and properties adjacent to roads leading toward the site. Where visible, the roofline and upper extents of the southern façade of the fabrication shed would be visible above the intervening treeline and against the backdrop of the Kilpatrick Hills,

however views would be seen in the context of other industrial development and large scale residential tower blocks which are evident in views north across the river from the settlement. Ground level operations and lower structures would be screened from view.

- 14.7.23 It is considered that the proposed development would be largely imperceptible from the majority of this settlement, and where visible the introduction of the fabrication shed would be the only visible change resulting in a small scale change in views from the settlement. Overall, the magnitude of change would be **Low**.
- 14.7.24 In combination with the judgement of **Medium** sensitivity for residential receptors within Erskine, the magnitude of visual change experienced in a small number of open views would result in a **Minor** level of effect, and effects are judged to be adverse.

Recreational Routes

- 14.7.25 From the **Forth and Clyde Canal** the ZTV (**Figure 14.2**) indicates potential visibility of the proposed fabrication shed element of the proposed development from the majority of the towpath footpath/NCN 7 cycle route as it crosses the Study Area north-west to south-east. Desktop analysis and field observations established that views would be substantially screened and filtered by intervening vegetation concentrated along the canal corridor, particularly in summer months.
- 14.7.26 Viewpoint 3 (**Figure 14.6**) illustrates the potential change in view from one short section of the route adjacent to this recreational route, with dense vegetation lining the majority of the canal wither side of this glimpsed view from this location, where there is an opening which effectively frames the view toward the site.
- 14.7.27 The upper extents of the eastern and northern façade of the fabrication shed would be visible in these glimpsed views, as illustrated by representative Viewpoint 3, however these views would often be within the context of neighbouring industrial development/structures, such as the Erskine Bridge beyond and the large scale vertical feature of the steel lattice overhead electricity infrastructure. Ground level operations and lower structures would be screened from view. The scale of the change would be small, with views experienced from a small geographical extent of the footpath/cycle route, it is considered that there would be a **Low** magnitude of change.
- 14.7.28 In close proximity to the site, there is potential for the fabrication shed to be visible against the skyline but it would generally not be prominent in views. From some other sections of the canal, vegetation lining the route would fully screen the proposed development. When passing close to the site, the proposed development may be visible against the skyline. However, this would affect a small section of the overall route and would be at a location already affected by industrial development and both transportation and electrical infrastructure.
- 14.7.29 In combination with the judgement of sensitivity, the predicted **Low** magnitude of change would result in at most a **Minor** level of visual effect for users of the Forth and Clyde Canal, with large sections of this recreational route experiencing no change in views from the introduction of the proposed development. These effects are judged to be adverse.
- 14.7.30 From **Core Path 87** the ZTV (as illustrated by **Figure 14.2**) indicates potential visibility of the proposed fabrication shed from the majority of this route within the Study Area. Viewpoint 6 (**Figure 14.9**) indicates the potential change in view from one location on the route. This would be experienced when travelling downhill (i.e. south-east and towards the site).
- 14.7.31 The roof and upper extents of the north and west façades of the fabrication shed would be visible from Viewpoint 6 (as illustrated by **Figure 14.9**) and a small number of similar locations from the route within the Study Area. These views would generally be filtered and partially screened by intervening trees, buildings and infrastructure of the A82 and A898/Erskine Bridge. Ground level operations and lower structures would be screened from view, and the scale of change is judged to be small, experienced from a relatively short section of the Core Path located within the Study Area. This would result in an **Low** magnitude of visual change.
- 14.7.32 In combination with the judgement of **Medium** sensitivity, the level of visual effect experienced by users of this recreational route would be **Minor**, and effects are judged to be adverse.
- 14.7.33 WDC **Core Paths 123** and **124**, and RC **Core Path E1/2** cross the Erskine Bridge to the west of the site. The ZTV (**Figure 14.2**) indicates visibility of the proposed fabrication shed from these routes. Viewpoint 7 (as illustrated by **Figure 14.10**) illustrates the potential change in view from

one location on the bridge. At this point, receptors would be looking perpendicular to the direction of travel and the view would be experienced through the narrow vertical railings of the heavy duty safety barrier.

- 14.7.34 From the east side of the Erskine Bridge, views looking perpendicular to the route would experience visibility of the site and would see the fabrication shed, marine works and some ground level operations within the interior of the site. The development would be seen in the context of the surrounding industrial and post-industrial landscape and against a backdrop of the Greater Glasgow conurbation within the Clyde Basin. Several residential tower blocks and tall pylons supporting overhead electricity transmission lines in the middle ground of the view, with large scale industrial fabrication facilities visible in the distance beyond (e.g. BAE Systems at Govan Road). The scale of the change in the view from this route across the Erskine Bridge would be medium for a very small section of the core paths, experienced in the somewhat artificial views afforded from the elevated route across the River Clyde. The majority of the routes of the core path would experience a small scale change, therefore it is considered that overall the magnitude of visual change would be **Low**.
- 14.7.35 In combination with the judgement of **Medium** sensitivity, the level of visual effect would be **Minor** for views experienced by recreational users of the Core Paths 123, 124 and E1/2, and effects are judged to be adverse.
- 14.7.36 RC **Core Paths E1/1** and **E1/5** are located adjacent to the south bank of the River Clyde. The ZTV (**Figure 14.2**) indicates potential visibility of the fabrication shed along the full length of these routes within the Study Area. Viewpoints 4 and 5 (**Figures 14.7** and **14.8**) illustrate the likely maximum potential change in views experienced from this route, where both locations are situated within approximately 600m of the proposed fabrication shed).
- 14.7.37 From Viewpoints 4 and 5 (**Figures 14.7** and **14.8**), the roof and upper extents of the south, west and east façades of the fabrication shed would be visible above the existing semi-mature woodland which would be retained along the southern and western boundaries of the site. In addition, the proposed marine works would be visible from a short section of the route between the Erskine Bridge and the Erskine Hotel, where the partial removal of the existing redundant jetty structures would also be evident. The scale of visual change would be medium, experience from a small proportion of the routes in close proximity to the site. It is judged that, although a magnitude of change from a short section of the route would be medium, this would reduce as distance from the site increases, and overall, the magnitude of visual change for the route as a whole would be **Low**.
- 14.7.38 Combined with the judgement of **High** sensitivity, the level of visual effect experienced by users of these routes would be **Minor** for the routes as a whole, and effects are judged to be adverse.

Transportation Routes

- 14.7.39 Visibility of the fabrication shed is indicated by the ZTV (**Figure 14.2**) from the **A814 (Dumbarton Road)** concentrated to a short section of the route between the Erskine Bridge at Old Kilpatrick to the north-west of the site and Mountblow to the south-east of the site. Views would be substantially screened and filtered by the presence of intervening landform, built development and dense woodland found along the corridor of the Forth and Clyde Canal which lies between the road and the site. The scale of change to views would be small, experienced by road users travelling at speed and often at oblique angles of view to the direction of travel. Views would be possible from a small geographical extent, limited to approximately 1km of the route when in closest proximity to the site. Overall the magnitude of visual change would be **Low**.
- 14.7.40 Taking account of the judgement of **Low** sensitivity, the level of visual effect experienced by users of this road route would be **Minor**, and effects are judged to be adverse.
- 14.7.41 Visibility of the proposed development would be very limited from the **A82 (Great Western Road)** restricted to a short section of the road to the north-west of the Study Area. Road users would experience relatively long distance views of the fabrication shed in the context of the Erskine Bridge as the route passes west-to east between Bowling to the north-west of Old Kilpatrick, and the junction with the M898/A898 to the north of the site. The scale of change to views would be small, experienced by road users travelling from the west and often at relatively high speed along the dual carriageway. Overall the magnitude of visual change would be **Low**.

- 14.7.42 Taking account of the judgement of **Low** sensitivity, the level of visual effect experienced by users of this road route would be **Minor**, and effects are judged to be adverse.
- 14.7.43 From the **M898/A898** views of the proposed development would be possible, predominantly limited to vehicles travelling across the Erskine Bridge via the south bound carriageway, however larger vehicles which afford more elevated views would have views of the fabrication shed from the northbound carriageway. These views would however be oblique from the main direction of travel, and the view would be experienced through the narrow vertical railings of the heavy duty safety barriers along the eastern side of the bridge. The scale of change to the view would be small, and would be limited to only a small geographical extent of the route as receptors cross the elevated bridge across the River Clyde. Views northwards towards the Kilpatrick Hills from the route would be unaffected. Overall the magnitude of visual change would be **Low**.
- 14.7.44 Taking account of the judgement of **Low** sensitivity, the level of visual effect experienced by users of this road route would be **Minor**, and effects are judged to be adverse.
- 14.7.45 Views of the site from the **River Clyde** would be limited to the central and north-western extents of the Study Area, where the river allows long distance views between Newshot Island to the south-east and the Forth and Clyde Canal to the north-west. Vessels using the river would experience views of the marine works when in close proximity to the site, where the removal of the remnant jetty structures and introduction of the new jetty would represent a positive change. The fabrication shed would be visible in wider ranging views from the river, appear as a large structure in views from the river, but partially screened at ground level, along with other components of the development, by the presence of dense woodland along the southern boundary of the site adjacent to the northern bank of the river. The fabrication shed would appear in the context of other large-scale marine fabrication facilities situated along the river frontage (e.g. BAE Systems at Govan Road), and which are a characteristic of the long-standing industrial heritage of the river. Overall the magnitude of visual change would be **Medium**.
- 14.7.46 Taking account of the judgement of **Medium** sensitivity, the level of visual effect experienced by users of this route would be **Minor**, and effects are judged to be adverse.

14.8 Further Mitigation and Enhancement

- 14.8.1 Regulation 5(2)(c) of the TCPA EIA Regulations require an EIA Report to provide “*a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment*”. The assessment identifies a significant adverse landscape effect for the landscape of the site, arising from the introduction of the proposed development, however no mitigation of these landscape effects is deemed necessary as the change from a post-remediation brownfield site, to an operational marine fabrication facility with associated landscaping proposals will arguably also represent a somewhat beneficial change in the context of the existing condition and value of the site.
- 14.8.2 Potential significant adverse visual effects are predicted for views experienced from sections of recreational routes adjacent to the south bank of the River Clyde and limited views experienced by receptors within the residential area of Mountblow to the north of the site. These significant adverse visual effects arise principally through the introduction of the fabrication shed, with the majority of the other proposed components of the development largely contained within the interior of the site and not overtly visible from the surrounding area.
- 14.8.3 Owing to the urban context, spatial constraints within the site and the physical requirements of proposed engineering uses, no further mitigation or enhancement in relation to the design of buildings and structures has been proposed beyond the embedded design features set out in Section 14.6 and detailed further within the submitted Design and Access Statement.
- 14.8.4 As detailed further in **Chapter 9 – Terrestrial Ecology**, the Applicant is committed to undertaking appropriate landscape improvements around the periphery of the site to create an attractive setting for the proposed development and to contribute to wider green network enhancements. Of relevance to this assessment, the proposed landscaping improvements include new planting and the re-shaping of the existing tree/vegetation belt at the southern boundary of the site. This would enhance the level of visual screening along the River Clyde

frontage, particularly in respect of proposed low-level infrastructure. However, owing to the height of the proposed fabrication shed, any enhanced screening would not alter the predicted overall level of landscape and visual effects from the proposed development. The level of the residual effects identified in **Section 14.9** below therefore remains unchanged from the assessment in **Section 14.7**.

14.9 Residual Effects

14.9.1 Taking account of all proposed mitigation and enhancement measures, the likely residual landscape and visual effects from the operation of the proposed development are identified in **Table 14.4** and **Table 14.5** below.

Table 14.5 – Summary of Likely Residual Landscape Effects

Landscape Receptor	Sensitivity	Magnitude of Change	Residual Effect
The site – post-remediation	Low	High	Moderate (Neutral)
Urban Character Area	Low	Medium	Minor (Adverse)
Rugged Moorland Hills LCT - 20b Kilpatrick Hills	Medium	Low	Minor (Adverse)
Floodplain LCT	Low	Low	Minor (Adverse)
Rugged Upland Farmland LCT - 6a Kilmacolm	Medium	Barely perceptible	Negligible (Adverse)
Raised Beach LCT - 1b Inner Firth	Medium	Low	Minor (Adverse)

Table 14.6 – Summary of Likely Residual Visual Effects

Visual Receptor	Sensitivity	Magnitude of Change	Residual Effect
VP1: Mountblow at Western Isles Road and Bute Drive	Medium	Low	Minor (Adverse)
VP2: Dumbarton Road/A814 at Freelands Crescent	Medium	Low	Minor (Adverse)
VP3: Forth and Clyde Canal/NCN 7	Medium	Low	Minor (Adverse)
VP4: Cycle route north of the Erskine Bridge Hotel	Medium	Medium	Moderate (Adverse)
VP5: Erskine Beach	Medium	Medium	Moderate (Adverse)

Visual Receptor	Sensitivity	Magnitude of Change	Residual Effect
VP6: Kilpatrick Braes at Drums	Medium	Low	Minor (Adverse)
VP7: Erskine Bridge	Low	Medium	Minor (Adverse)
Mountblow	Medium	Medium (locally) Low (for the settlement as a whole)	Moderate (Adverse, locally); Minor (Adverse, for the settlement as a whole)
Old Kilpatrick	Medium	Low	Minor (Adverse)
Erskine	Medium	Low	Minor (Adverse)
Forth and Clyde Canal	Medium	Low	Minor (Adverse)
Core Path 87	High	Low	Minor (Adverse)
Core Paths 123,124 and EI/2	Medium	Low	Minor (Adverse)
Core Paths EI/1 and EI/5	Medium	Low	Minor (Adverse)
A814 (Dumbarton Road)	Low	Low	Minor (Adverse)
A82 (Great Western Road)	Low	Low	Minor (Adverse)
M898/A898	Low	Low	Minor (Adverse)
River Clyde	Low	Medium	Minor (Adverse)

14.10 Monitoring

14.10.1 No monitoring is considered to be proportionate or required in relation to the predicted residual significant adverse effects of the proposed development.

14.11 Cumulative Effects

14.11.1 As stated in **Section 14.3**, it is judged that there is no potential for significant cumulative landscape and visual effects to arise in combination with the proposed development. In light of this, detailed assessment of cumulative landscape and visual effects has not been undertaken.

14.12 Summary

14.12.1 The LVIA has been carried out by experienced Chartered landscape architects (CMLI), in accordance with appropriate industry standard guidance and in accordance with a tried and

tested methodology. It has been informed by consultation with statutory consultees, desktop analysis and site survey. Landscape and visual receptors were identified, and scoped out of the assessment where it was considered unlikely that significant effects would occur. Potential landscape receptors include the physical fabric of the site and landscape of the adopted Study Area, citing published landscape character assessment information. Potential visual receptors include residents, recreational visitors and road users, across the Study Area, and representative viewpoints were agreed with statutory consultees to illustrate the likely change in views and visual amenity which would be experienced by a range of these receptors.

- 14.12.2 The baseline for potential receptors has been described in terms of the current condition and consideration has also been given to the future evolution of the baseline, with specific reference to the proposed remediation of the site which is subject to a separate planning application and which once implemented would establish the future baseline against which the assessment has been considered. Judgements in relation to the value and susceptibility of receptors have been made, in order to establish the overall sensitivity of the receptors.
- 14.12.3 The proposed development, including any embedded mitigation, has been considered and used to describe the potential magnitude of change which may result for both landscape and visual receptors. Considered in combination with the judgements of sensitivity, the magnitude of change has been determined to identify the level of landscape of visual effect using a scale of negligible, minor, moderate and major. For the purposes of the assessment, potential effects of moderate and major are considered to be significant in the context of the TCPA EIA Regulations.
- 14.12.4 Potential effects upon the five LCTs assessed within the Study Area would range from negligible to minor. There would therefore be no significant effects upon these landscape receptors. The landscape of **The Site** itself would experience a **Moderate** (significant) level of landscape effect, which would be neutral, as the site undergoes the transition from the post-remediation phase brownfield industrial site to the marine fabrication facility with associated landscaping proposals.
- 14.12.5 Three settlements, Mountblow, Old Kilpatrick and Erskine, were considered in the assessment. It is judged that from residential areas of **Mountblow** in closest proximity to the site, and which occupy an elevated or open position, there is the potential for **Moderate** (significant) adverse visual effects to occur locally. Views from the settlements of Old Kilpatrick and Erskine would experience a Minor (not significant) level of visual effect and effects are judged to be adverse.
- 14.12.6 Several recreational routes were identified and views from these routes assessed. Potential effects on views from the Forth and Clyde Canal/NCN 7, Core Path 87 in the Kilpatrick Hills and the majority of other Core Paths within the Study Area would experience a Minor (not significant) level of visual effect on views. From the Core Paths EI/1 and EI/5, which provide access along the south bank of the River Clyde, Moderate (significant) visual effects are predicted from sections of these routes in closest proximity to the site. These are illustrated by the representative viewpoints **Viewpoint 4: Cycle route north of the Erskine Bridge Hotel** and **Viewpoint 5: Erskine Beach** which would experience a **Moderate** (significant) adverse level of visual effect, and effects are judged to be adverse.
- 14.12.7 Users of main roads within the Study Area were considered as potential visual receptors. In all cases it was determined that the potential level of visual effect on views experienced from these routes would be Minor (not significant), and effects are judged to be adverse.
- 14.12.8 The assessment identifies a small number of significant landscape and visual effects which would arise from the introduction of the proposed development. The potential for further mitigation measures to reduce the assessed significant effects has been considered, however, no practicable means of reducing the scale and mass of the fabrication shed (which is principal element which gives rise to these effects) has been identified. The residual effects therefore remain unchanged from those described above.

14.13 References

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15 Cultural Heritage

15.1 Introduction

15.1.1 This chapter of the EIA Report provides an assessment of the likely significant effects from the proposed development on heritage assets. The assessment is based on the characteristics of the site and surrounding area and the key parameters of the proposed development detailed in **Chapter 2 – Site and Surrounding Area** and **Chapter 3 – The Proposed Development** respectively.

15.1.2 This chapter has been prepared by CgMs Heritage. In accordance with Regulation 5(5)(b) of the EIA Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this EIA Report is provided in **Appendix 1.1**.

15.1.3 The aims of this chapter are to:

- Identify the relevant context in which the Cultural Heritage assessment has been undertaken;
- Describe the methods used to undertake the assessment;
- Outline the relevant baseline conditions currently existing at the site and surroundings;

Consider how the implementation of the proposed remediation works would affect current baseline conditions, resulting in a likely future baseline scenario;

- Identify the likely direct and indirect effects of the proposed development on cultural heritage under the likely future baseline scenario;
- Identify mitigation and enhancement measures where required to address likely identified effects;
- Assess likely residual cultural heritage effects; and,
- Assess likely cumulative effects on cultural heritage from the proposed development in combination with other relevant cumulative developments.

15.1.4 This chapter is supported by the following figures provided in **Appendix 15.1**:

- **Figure 15.1 – Designated Heritage Assets in the Study Area**; and,
- **Figure 15.2 – Nationally Important Heritage Assets within 5km**.

15.2 Policy Context, Legislation, Guidance and Standards

Legislation

15.2.1 The overarching legislative framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Subject specific legislation of relevance to this assessment is:

- The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 provides the legislative framework relating to listed buildings and conservation areas. Section 59 of the Act places a statutory duty upon the decision maker to have special regard to the desirability of preserving the setting of listed buildings when considering whether to grant planning permission for development that will affect the setting of a listed building. Section 64 requires that special attention be paid in exercise of planning functions to the desirability of preserving or enhancing the character or appearance of a conservation area.
- The Ancient Monuments and Archaeological Areas Act 1979 provides the legislative background to the Schedule of Ancient Monuments. This provides for the control of works affecting the physical fabric of scheduled monuments but does not refer to their setting.

Planning Policy

15.2.2 The planning policy framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Planning policy considerations of specific relevance to this assessment are:

- **Adopted West Dunbartonshire Local Plan (2010)**, in particular policies:
 - GD1 - Development Control;
 - Policy BE 2 - Listed Buildings;
 - BE 5 - Scheduled Ancient Monuments and other Archaeological Sites; and,
 - Policy BE 6A - Antonine Wall; and,
 - R 4(A) - Forth and Clyde Canal.
- **West Dunbartonshire LDP Proposed Plan 2015**, in particular proposed policies:
 - DS1 - Successful Places and Sustainable Design;
 - BH1 – Antonine Wall;
 - BH2 – Scheduled Monuments;
 - BH3 – Listed Buildings;
 - GN4 - Landscape Character (and the associated Kilpatrick Hills Local Landscape Area Statement of Importance Document); and,
 - GN7 – Forth and Clyde Canal;
- **West Dunbartonshire LDP2 Proposed Plan (2018)**, in particular proposed policies:
 - BE1 - Scheduled Monuments and Archaeological Sites;
 - BE2 – Listed Buildings; and,
 - FCC1 – Forth & Clyde Canal.
- **Scottish Planning Policy (2014)** including relevant provisions outlined in Table 5.2 in **Chapter 5**, in particular:
 - Principal Policy on Sustainability (paragraphs 24-35);
 - Valuing the Historic Environment Subject Policy (Paragraphs 135 – 151); and,
 - Valuing the Natural Environment Subject Policy (Paragraphs 193 - 233).

15.2.3 In accordance with sections 15 and 58 of the Marine and Coastal Access Act (2009), the marine licence application for the extent of the proposed development located below MHWS must be determined in accordance with the appropriate marine policy documents, unless relevant considerations indicate otherwise. As detailed in Chapter 5 – Legislative and Policy Context, the relevant marine policy documents and constituent comprise:

- UK Marine Policy Statement (2011);
- Scotland's National Marine Plan (2015), in particular policies:
 - GEN1 - General Planning Principle;
 - GEN19- Sound Evidence; and
 - GEN21- Cumulative Impacts.

15.2.4 Of relevance to this assessment, this planning policy framework highlights the need for development proposals to protect and enhance the setting of heritage assets.

15.2.5 Other policy considerations of relevance to this assessment are:

- Historic Environment Scotland Policy Statement (2016).

Guidance and Relevant Technical Standards

15.2.6 The following guidance and technical standards have informed this assessment:

- Environmental Impact Assessment Handbook: Appendix 1 – Cultural Heritage (SNH & HES 2018); and,
- Managing Change in the Historic Environment: Setting (HES 2016).

15.3 Methodology

Overview

Assessment Scope

- 15.3.1 This EIA Report chapter presents an assessment of likely significant effects on cultural heritage assets from the proposed development. The assessment has been prepared in accordance with the TCPA EIA Regulations.
- 15.3.2 The principal aspect considered within this assessment relates to likely effects on the setting of designated cultural heritage assets during the construction and subsequent operation of the proposed development.
- 15.3.3 In accordance with the Carless Marine Fabrication Complex EIA Scoping Report and subsequent EIA Scoping Opinion provided in **Appendix 4.1**, potential construction effects upon the fabric of cultural heritage assets have been scoped out from this assessment. This is on the basis that the implementation of the proposed remediation works will, by virtue of their intrusive nature, involve ground excavations such that any potential archaeological remains would be encountered and addressed as appropriate within the future baseline scenario, prior to the construction of the proposed development. Planning application DC18/245 for the proposed remediation works was supported by an Archaeological Desk Based Assessment (CgMS Heritage Ltd, October 2018), which concluded that as reclaimed land, the site has only very low archaeological potential.

Assessment Process

- 15.3.4 In undertaking the assessment, the following activities have been carried out:
- EIA Scoping (see below);
 - Baseline data collation and identification of potential receptors through site visits, reference to Zone of Theoretical Visibility (ZTV) and desk-based research; and,
 - Assessment of likely changes in the setting of designated heritage assets resulting from the proposed development and the resulting effect upon the asset's cultural significance.

Consultation

- 15.3.5 This assessment has been informed by an EIA Scoping Report (PBA, October 2017) and subsequent EIA Scoping Opinion issued by WDC (March 2018) in respect of the EIA for the proposed development. The EIA Scoping Opinion, which is provided in full in **Appendix 4.1**, included a list of standard requirements for consideration in this chapter. In addition, Historic Environment Scotland (HES) advised the following:
- In the first instance a ZTV should be used to assist in establishing the which heritage assets should be assessed in the EIA rather than a fixed study area. The ZTV has therefore been used to identify any nationally important heritage assets beyond the 1km study area where there is potential for significant effects (**Figures 15.1 & 15.2**);
 - "It would be helpful if the assessment contained appropriate visualisations such as photomontage and wireframe views of the development in relation to the sites [Forth and Clyde Canal: Old Kilpatrick-Linnvale and Frontiers of the Roman Empire: Antonine Wall] and their settings." Photomontages have been provided in respect of the Forth and Clyde Canal (Figure 14.6) and the Antonine Wall (Figure 14.9). In addition, a photomontage has

been provided illustrating the change in the setting of the listed Erskine Hospital Ferry Lodge (Figure 14.8).V; and,

- The assessment should contain a full appreciation of the setting of the Forth and Clyde Canal: Old Kilpatrick – Linnvale (SM6778) and the Frontiers of the Roman World Antonine Wall World Heritage Site. The setting of these assets as relevant to the current assessment and the contribution of setting to their significance has been fully considered in the assessment.

Study Area

15.3.6 The Study Area adopted for this assessment covers all designated heritage assets³⁷ within 1km of the site boundary, as shown on **Figure 15.1**. This reflects the scale of the proposed development and the highly developed and largely industrial nature of the site's surroundings; whilst the proposed development will be clearly visible at distances of greater than 1km, it will be seen as part of a currently developed landscape that incorporates many large industrial structures. As such, in the absence of specific views contributing to heritage significance of heritage assets, it is considered that significant effects upon heritage assets over 1km from the site are unlikely to occur. However, nationally important designated assets within 5km of the site were also reviewed against the ZTV to identify any such views (**Figure 15.2**) and consider these within the assessment where relevant.

Information Sources

Desk Top Study

15.3.7 Data regarding heritage assets has been gathered from the following sources:

- Historic Environment Scotland downloads website (designated heritage assets);
- West of Scotland Archaeology Service (WoSAS); and
- Historic mapping.

15.3.8 This assessment has also been informed by the Carless Archaeological Desk Based Assessment (DBA) (CgMs Heritage, October 2018) submitted to WDC in support of planning application DC18/245 for the proposed remediation works. However, this assessment can be read on a standalone basis and, reflecting the low archaeological potential of the site, no accompanying DBA is considered to be required.

Fieldwork

15.3.9 Selected heritage assets in the surrounding area were visited in order to gather baseline setting data. The following assets were visited:

- Forth and Clyde Canal (SM6778) adjacent to the site and to the west and east and Erskine Ferry Road;
- Antonine Wall (SM7064-6);
- Erskine Hospital Ferry Lodge (LB12375);
- Old Secession Church (LB14407);
- Lusset House (LB18987); and
- Lusset Road Conservation Area.

15.3.10 The Site itself was not visited as no views from the site were considered relevant to the setting assessment. The private road leading to the site was, however, visited.

³⁷ World Heritage Sites, Scheduled Monuments, Listed Buildings, Conservation Areas, Inventory Gardens and Designed Landscapes and Inventory Battlefields.

Approach to Assessment

Consideration of Relevant Receptors

- 15.3.11 Based on the information sources outlined above, the current and likely future baseline characteristics of site and the surrounding area was characterised. This led to the identification of relevant sensitive receptors to consider within the assessment, as detailed within **Section 15.4 – Baseline Conditions**.
- 15.3.12 The assessment of sensitivity has been determined on the basis of designation and, in the case of undesignated assets, with reference to WoSAS’ Non-Statutory Register (NSR) and the relevant designation criteria provided in Historic Environment Scotland’s Policy Statement (2016). As detailed in **Table 15.1** below, sensitivity to impacts reflects the level at which an asset is valued and thus its cultural heritage importance.

Table 15.1 – Guideline Criteria for determining Sensitivity

Sensitivity	Guideline Criteria
High	Assets valued at an international or national level, e.g. World Heritage Sites, Scheduled Monuments, Category A Listed Buildings, Inventory Gardens and Designed Landscapes, Inventory Battlefields, Marine Protected Areas, some Conservation Areas and non-designated assets that meet the relevant criteria for designation in the opinion of the assessor. Category B or C-Listed Buildings where the existing designation does not adequately reflect their value, in the opinion of the assessor.
Medium	Assets valued at a regional level, e.g. Category B Listed Buildings, some Conservation Areas and non-designated assets of similar value in the opinion of the assessor. Category C-Listed Buildings where the existing designation does not adequately reflect their value, in the opinion of the assessor.
Low	Assets valued at a local level, e.g. Category C Listed Buildings, some Conservation Areas and non-designated assets of similar value in the opinion of the assessor.

Impact Assessment Methodology

- 15.3.13 The level of effect has been assessed with reference to the degree of change in the asset’s cultural significance. The cultural significance of each asset potentially affected has been described and the degree to which the overall cultural significance of the asset is affected is used to arrive at a level of effect as set out below. When considering effects relating to setting, reference has been made to relevant Historic Environment Scotland guidance (2016), which defines setting as follows:

‘Setting’ is the way the surroundings of a historic asset or place contribute to how it is understood, appreciated and experienced.

- 15.3.14 The assessment of effect level in relation to setting therefore considers the change in the contribution of setting to the significance of the asset and the understanding, appreciation and experience thereof, and is not based purely on the degree of visual change.
- 15.3.15 Guidelines for the assessment of magnitude of impact are provided in **Table 15.2**.

Table 15.2 – Guideline Criteria for Determining Level of Effect

Level	Guideline Criteria	
	Adverse	Beneficial
Substantial	Changes to the fabric or setting of a heritage asset resulting in the complete or	Preservation of the asset in situ where it would be completely or almost

	near complete loss of its cultural significance, such that it may no longer be considered a heritage asset.	completely lost in the do-nothing scenario.
Moderate	Changes to the elements of the fabric or setting of the heritage asset that contribute to its cultural significance such that this is substantially altered.	Changes to key elements of the asset's fabric or setting that result in its cultural significance being preserved, where they would otherwise be lost, or restored.
Slight	Changes to the elements of the fabric or setting of the heritage asset that contribute to its cultural significance such that this is slightly altered.	Changes that result in elements of the asset's fabric or setting that detract from its cultural significance being removed.
Negligible	Changes to fabric or setting that leave significance unchanged.	

Establishment of Effect Significance

15.3.16 The level and thus significance of an effect generated by the proposed development on the cultural significance of an identified heritage asset, is assessed by combining the magnitude of the effect and sensitivity of the heritage asset. The matrix in **Table 15.3** provides a guide to decision-making but is not a substitute for professional judgement and interpretation, particularly where the importance or effect magnitude levels are not clear or are borderline between categories. Effects assessed to be at 'Moderate' level or above are considered significant in the context of the TCPA EIA Regulations.

Table 15.3 – Guideline Significance Criteria

Sensitivity	Magnitude of Impact			
	Substantial	Moderate	Slight	Negligible
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible

Approach to Cumulative Impact Assessment

15.3.17 This assessment has considered the potential for significant cumulative effects on designated cultural heritage assets to occur from the construction or operation of the proposed development in combination with other relevant developments, as detailed in **Section 2.4**. Having reviewed the information accompanying the planning applications and permissions for these relevant cumulative developments, none are considered likely to affect the setting of heritage assets. No separate cumulative impact assessment is therefore required.

Assumptions and Limitations

15.3.18 The ZTV used to inform this assessment assumes bare ground (i.e. without vegetation, fences and small structures), but takes into account the screening effect of buildings.

15.3.19 It has been assumed that areas of non-commercial woodland currently present in the Study Area (outwith the site and not under the control of the Applicant), in particular that lying between the site and the Forth and Clyde Canal, will not be clear-felled and hence current levels of screening will remain unchanged. The woodland between the site and the canal is a designated Local Nature Conservation Site and is therefore highly unlikely to be cleared,

15.4 Current Baseline Conditions

The Site

- 15.4.1 The site lies within the western part of the former Carless Oil Storage Depot. Occupying reclaimed land, this was first developed in 1918, initially comprising a single tank farm of 12 tanks. By 1939 there were six tank farms totalling 72 tanks extending approximately 800m inland, as far as Dunotter Cemetery, railway sidings and a deep water berth with a concrete jetty. The tanks were surrounded by bunds to contain any spillages. The Depot closed in 1982 and has since been demolished. The site takes in the area to the north-west of the last operational wartime tank farm and was latterly occupied the office blocks, tanks and other structures of the later oil terminal (CgMs 2018).
- 15.4.2 The site is currently vacant and covered by scrub. It is the subject of a separate planning application (DC18/245) for the proposed remediation works, which is expected to be determined by WDC in March 2019.

The Surrounding Area

- 15.4.3 The site lies on the north bank of the River Clyde. Running along the north-eastern boundary is a now dismantled railway line; the railway and the area alongside are covered by mature trees. Immediately beyond this is the Forth and Clyde Canal. Dumbarton Road runs alongside the canal and beyond it the ground starts to rise. This rising ground is occupied by the modern housing of Mountblow. This merges with further areas of housing. These are predominantly modern, with pockets of 19th century buildings marking the historic settlements.
- 15.4.4 To the north-west of the site are modern light industrial units and offices, occupying an area that was occupied by various works since the mid 20th century. To their west, Erskine Ferry Road, which served the now defunct ferry landing point, separates these buildings from the wooded site of a now demolished factory. The Erskine Bridge passes overhead and is a prominent feature in the surrounding landscape.
- 15.4.5 To the south-east of the site lies the wider Carless landholding, comprising a former tank farm with scrubland. Beyond this lies the Auchentoshan Burn and the extensive Auchentoshan bonded warehouse complex. Tall pylons carry overhead lines across the River Clyde at this point.
- 15.4.6 The opposite bank of the Clyde is much less developed, with the Boden Boo woods and park surrounding the southern end of the Erskine Bridge and scattered large scale modern buildings, including a logistics shed, office block and hotel.

Potential Receptors

- 15.4.7 There are no designated heritage assets or other potential receptors within the site which require to be considered in this assessment. Potential receptors within the Study Area of relevance to this assessment are identified below.
- 15.4.8 There are two Scheduled Monuments within the Study Area. The nearest is the Forth and Clyde Canal (SM6778), which lies approximately 30m to the north-east of the site, whilst the Mount Pleasant section of the Antonine Wall (SM7064) lies approximately 1km to the north of the site. This forms a part of the Antonine Wall World Heritage Site (WHS). As these have both been identified as relevant receptors and carried through to assessment, their baseline situation is described in detail within **Section 15.7**.
- 15.4.9 Scheduled Monuments up to 5km from the study site have been considered briefly with reference to the ZTV. The closest are the Mar Lodge crannog (SM12891), 1.4km to the north-west of the site, and the wreck of a diving support vessel at Newshot Island (SM13692), 1.8km to the south-east. The proposed development would be visible from these, but the aspect of these assets' setting that contributes to their significance is their proximity to the River Clyde. The proposed development will not affect the appreciation of this and hence there is no potential for significant effects relating to them and they are not considered further. The remaining scheduled monuments within 5km of the site either lie outwith the ZTV or are screened by the

built form or multiple areas of trees. There is no potential for significant effects and they are not considered further.

- 15.4.10 There are five listed buildings within the study area comprising one Category A, three Category B and one Category C. The nearest is the Category A Erskine Bridge (LB52482), which is approximately 500m to the north-west of the site. Built between 1967 and 1971 the bridge is a large mono cable-stayed motorway road bridge spanning the River Clyde; its height was necessary to allow large ships to pass and thereby the continued operation of the Clydeside shipyards.
- 15.4.11 The significance of the bridge resides primarily in its fabric. This reflects the bridge's innovative and elegant design and construction methods, association with significant architects and engineering companies and historic interest as part of a phase of significant infrastructure investment; the bridge was part of a wider scheme intended to bring about the industrial revitalisation of the central belt. The bridge's proximity to historic infrastructure (the Forth and Clyde Canal and North Clyde railway line) imparts a degree of group value.
- 15.4.12 Extensive views from the bridge are available along the Clyde. To the west these are primarily rural and to the east these are rural to the south of the Clyde, and industrial and residential to the north. The proposed development will be seen in the context of the latter developed area (Figure 14.10), in a location that has historically been industrialised. The proposed development will be seen in combination with the bridge from the surrounding landscape. It will occupy a location that was industrialised at the time the bridge was designed and built and represent a continuation of the industrial use of the area which the bridge was inextricably linked with and intended to promote. The proposed development will not affect the fabric of the bridge or the appreciation of its design in views from the surrounding landscape, though from some specific and limited locations near the proposed development the fabrication shed will appear as the dominant structure (Figure 14.7). Given the nature of the bridge's significance and its relationship with its setting and the historic character of the site, it is considered that there is no potential for a significant effect and the bridge has not been taken through to full assessment.
- 15.4.13 Category B Ferry Lodge (LB12375). The baseline situation in respect of this building is detailed in the impact assessment below. The two remaining Category B Listed Buildings, Old Secession Church (LB14407) and Lusset House (LB18987), respectively lie 550m and 660m to the north of the Site. The Category C Lilac Avenue Football Pavilion (LB51260) lies approximately 930m to the east of the site.
- 15.4.14 The Old Secession Church, now a house, lies below the Erskine Bridge. It is a plain building fronting onto Dumbarton Road, with little indication of its former use. Its significance relates to its architectural and historic interest as an example of a non-conformist place of worship. Its setting does not contribute to its significance. Housing dating to the 19th and 20th centuries lies adjacent and opposite. Trees under and around the bridge curtail views in the direction of the site. As such development upon the site is unlikely to be substantively visible from the church or its immediate surroundings. Given its distance from the site, the intervening trees and the generally developed nature of the church's surroundings, it is considered that there is no potential for the proposed development to result in a significant effect in respect of it.
- 15.4.15 Lusset House lies immediately to the north of the Erskine Bridge, next to Kilpatrick Station. It is an elaborate Victorian villa within an enclosed garden and its significance derives from its architectural interest as an example of its kind. The wider surroundings do not contribute to its significance. Its garden and those of neighbouring properties and the area under the bridge contain many mature trees that curtail views in the direction of the site. Given its distance from the site, the intervening trees and the generally developed nature of the house's surroundings, it is considered that there is no potential for the proposed development to result in a significant effect in respect of it.
- 15.4.16 The football pavilion dates to 1937 and is a striking Art Deco structure that overlooks its associated football pitches. It lies at the edge of a residential area, though the nearest houses have in recent years been demolished. The football pitches are bounded by trees that largely curtail views in the direction of the site. The significance of the building relates almost entirely to its architectural and historic interest as an example of pre-war corporation architecture and the provision of public facilities. Its setting, specifically the adjacent football pitches, make an important contribution to its significance as they allow the full appreciation of its historic interest.

The wider surroundings do not contribute to its significance. Development upon the site does not therefore have the potential to result in a significant effect in respect of the football pavilion.

- 15.4.17 Category A Listed Buildings beyond the study area, up to a distance of 5km from the site, have also been considered. The nearest of these is Erskine House (LB10909), now known as Mar Hall Hotel. This is located on the south side of the River Clyde, approximately 1.4km to the north-west of the site. The significance of the house relates to its architectural and historic interest as an example of a 19th century country house with further historic interest and associative value pertaining to its use as a hospital for injured servicemen. The house sits within its extensive grounds, which have been remodelled as a golf course and in parts have been developed, and looks north across the Clyde. The views north are important to an appreciation of the building's design. An area of woodland to the east of the house curtails views in the direction of the site. The site may be seen from the fringes of the golf course. These views make a negligible contribution to the house's significance and it is considered that development upon the site has no potential to result in significant effect in relation to the house. Reference to the ZTV demonstrates that all other Category A-listed buildings will have no intervisibility with the proposed development and hence have not been considered further,
- 15.4.18 There are two Conservation Areas within the study area: Lusset Road and Mount Pleasant Drive, which are respectively 620m and 750m to the north of the site. Mount Pleasant Drive comprises a strip of detached and semi-detached Edwardian villas, whilst Lusset Road is more mixed, containing buildings from the 18th century onward, and more irregularly arranged. Both Conservation Areas are relatively enclosed, but views south-west across the Clyde and to the west are available from Mount Pleasant. The significance of these Conservation Areas relates to their character and appearance and draws little on their setting, though the above views from Mount Pleasant contribute to the aesthetic appeal of Mount Pleasant and have influenced the design of the houses. Views in the direction of the site from these Conservation Areas are curtailed by the built form and trees. It is considered that development upon the site does not have the potential to result in significant effects in respect of the Conservation Areas.
- 15.4.19 There are no Inventory Gardens, Designed Landscapes (IGDL) or Battlefields within the study area. The nearest IGDL is Formakin, which is approximately 4.9km to the west of the site and largely lies outwith the Zone of Theoretical Visibility (ZTV). The nearest Inventory Battlefield is over 14km from the site. Given the scale of the proposed development there is no potential for significant effects in relation to these.
- 15.4.20 In summary, the following designated heritage assets require to be considered as receptors and have been assessed as such in the impact assessment presented in **Sections 15.7 – 15.9** below:
- Antonine Wall: Mount Pleasant and Dalnottar Cemetery sections (SM7064-6);
 - Forth and Clyde Canal (SM6778); and,
 - Ferry Lodge (LB12375).

15.5 Baseline Evolution and Expected Future Baseline

Current Baseline Evolution

- 15.5.1 The TCPA EIA Regulations require that the EIA Report must describe the likely evolution of the baseline scenario in the absence of the proposed development. In the absence of any development activities current baseline conditions, including extensive hydrocarbon contamination of soils and groundwater, would be likely to remain relatively unchanged, except for natural growth of existing vegetation within the site.
- 15.5.2 For the purposes of this EIA, the likely evolution of the baseline is predicated upon the approval and implementation of proposed remediation works before the commencement of the proposed development (the construction of the proposed development). Prior remediation will be needed to:
- Reduce to an acceptable level the risk to human health and environmental receptors both on and off the site from hydrocarbon and other contamination in soil;

- Reduce to an acceptable level the risk to the River Clyde from mobile contamination within soils and contaminants floating on and dissolved within the groundwater; and therefore,
- 15.5.3 Remediation is therefore required both to remove the site's current contaminated land and Special Site designations under Part IIA of the Environmental Protection Act 1990 and to make the site suitable for the future intended use (i.e. the construction and operation of the proposed development). As such, a 'no development' baseline evolution scenario is not considered to merit further consideration in this EIA.
- 15.5.4 Whilst not forming part of the proposed development assessed in this EIA, an overview of the proposed remediation works is provided for completeness in **Chapter 6 – Ground Conditions**. In addition to intrusive works within the site, the proposed remediation works include a commitment by the Applicant to undertake further SI and subsequent remediation works on land to the east within the wider Carless landholding. This will be outwith the site of the proposed development considered in this EIA. Planning application DC18/245 for the proposed remediation works was submitted to West Dunbartonshire Council as the relevant local planning authority on 1st November 2018 and validated on 14th November 2018.

Expected Future Baseline

Expected Changes in Conditions within site

- 15.5.5 In relation to cultural heritage, the only effect within the site of implementing the proposed remediation works would be ground disturbance through deep excavations, resulting in there being no potential for any previously unrecorded archaeology to be present following the works. The Carless Archaeological DBA submitted in support of planning application DC18/245 concluded that, as reclaimed land, the site has only very low archaeological potential and no further consideration of archaeological impacts is required.

Expected Changes in Conditions outwith site

- 15.5.6 No relevant changes outwith the site are expected as a result of the implementation of the proposed remediation works. In particular, the importance and sensitivity of heritage assets is determined by their designation and is not therefore expected to change.

Predicted Future Baseline Conditions

- 15.5.7 The site lies within an area of reclaimed land and hence has minimal archaeological potential. The proposed remediation works will result in ground disturbance resulting in there being no potential for the proposed development to affect previously unrecorded archaeological assets. Effects upon such assets have accordingly been scoped out.

Summary of Receptor Sensitivity / Importance and Consideration in this Assessment

- 15.5.8 Drawing upon **Sections 15.4**, and **15.5**, the assessment presented in **Sections 15.7 – 15.9** provides an assessment of likely significant effects upon the following receptors:
- Antonine Wall: Mount Pleasant and Dalnottar Cemetery sections (SM7064-6). This is a Scheduled Monument and a part of a World Heritage Site and hence of national/international importance and High sensitivity;
 - Forth and Clyde Canal (SM6778). This is a Scheduled Monument and hence of national importance and High sensitivity; and,
 - Ferry Lodge (LB12375). This is a Category B Listed Building and hence of regional importance and Medium sensitivity.

15.6 Embedded Mitigation

- 15.6.1 As detailed in **Chapter 3 – The Proposed Development**, a number of design features and embedded mitigation measures have been incorporated into the design and construction of the proposed development to avoid, prevent or minimise significant adverse environmental effects

and to enhance beneficial effects. However, none of the proposed embedded mitigation measures are of specific relevance to cultural heritage and thus to this assessment.

15.7 Assessment of Likely Effects

Construction Phase

- 15.7.1 As noted in **Section 15.3**, any physical effects, both direct and indirect, resulting from the construction phase have been scoped out of this assessment. For the avoidance of doubt, the assessment of likely transport effects provided in **Chapter 11 – Transport and Access** of this EIA Report confirms that no abnormal loads are expected to be required during the construction phase of the proposed development. Therefore no alterations to the Erskine Ferry Road Bridge that might affect the scheduled Forth and Clyde Canal will be necessary.
- 15.7.2 Any likely setting effects resulting entirely from construction works within the site will be short term and hence . As such construction phase setting effects have not been assessed..

Operational Phase

- 15.7.3 This section presents an assessment of likely operational phase effects on the setting and cultural heritage significance of the Antonine Wall Frontiers of the Roman Empire World Heritage Site (WHS), the Forth and Clyde Canal Scheduled Monument and the Ferry Lodge Category B Listed Building.

Antonine Wall Frontiers of the Roman Empire WHS

- 15.7.4 The Antonine Wall forms a part of the Frontiers of the Roman Empire WHS. The Statement of Outstanding Universal Value (Unesco 2008) sets out the following reasons for its inclusion:
- *“The Antonine Wall is one of the significant elements of the Roman Limes present in Europe, the Middle East and North Africa. It exhibits important interchanges of human and cultural values at the apogee of the Roman Empire.*
 - *“The Antonine Wall bears testimony to the maximum extension of the power of the Roman Empire, by the consolidation of its frontiers in the north of the British Isles, in the middle of the 2nd century AD. The property illustrates the Roman Empire's ambition to dominate the world in order to establish its law and way of life there in a long-term perspective.*
 - *“The Antonine Wall is an outstanding example of the technological development of Roman military architecture and frontier defence.”*
- 15.7.5 The stretch of the Antonine Wall relevant in the current context has no surface expression; it has either been ploughed out (SM7066-7 & SM7069) or built over. However, where it has been ploughed out its line is followed by a path and it is broadly possible to perceive its relationship with the local topography and there are occasional general views to the Clyde that are suggestive of a relationship, though the detail of this is not apparent on the ground. As a result, the significance of this stretch of the Antonine Wall relates primarily to its intrinsic value as a potential source of archaeological data of great importance owing to its contextual value as a part of a wider frontier system. The local topography contributes to the contextual value as it allows a limited understanding of the Wall's use of local topography and hence intended operation; it is evident walking along the line of the Wall that it follows a natural terrace and would have overlooked the banks of the Clyde and more generally that the Wall's line has been greatly influenced by the landform. The Buffer Zone takes in land adjacent to the Wall itself that contributes in this way; the site lies outwith the Buffer Zone. Relationships with particular landscape features, such as river crossings, and related heritage assets are not readily apparent on the ground. Consequently, there are not specific views that contribute strongly to an appreciation or experience of the Wall.
- 15.7.6 Views in the direction of the site from the line of the Antonine Wall itself are generally obscured by trees in the foreground or the built form. Where glimpsed views towards the site are available they contain extensive areas of development and large scale modern features, such as the Erskine Bridge and pylons, and make a negligible contribution to the significance of the Antonine Wall. Clearer views are available from higher ground within the Buffer Zone and the proposed

development would be partially visible from this area. Again the proposed development would be seen in the context of numerous other modern features in general views that make a limited contribution to significance. The introduction of the proposed development would not affect the legibility of the Wall's relationship with topography and would therefore leave its significance unchanged. It is concluded that the introduction of the proposed development would represent a permanent Negligible magnitude of change, resulting in a **Negligible Adverse** effect.

Forth and Clyde Canal Scheduled Monument

- 15.7.7 The Statement of National Importance³⁸ for the scheduled Forth and Clyde Canal describes it as a 'superlative example of Georgian engineering'. It was the first of Scotland's canals to open and illustrates the growth in infrastructure that was essential to the industrialisation of the country. The section that runs past the site is well-preserved and is the work of Robert Whitworth, a leading canal engineer. There are bridges, locks and other structures that together illustrate the full workings of the canal, although some of these elements, such as the Erskine Ferry Road Bridge, are later additions and are not themselves scheduled. It has intrinsic value as a well-preserved example of its kind that illustrates the development of transport infrastructure that played a key role in the industrialisation of Scotland and a degree of contextual value resulting from its relationships with industrial structures, other transport infrastructure and local topography, which heavily influenced its design. In addition, it has associative value owing to its being the work of notable engineers. Whilst the canal is no longer important in terms of commercial traffic, the canal and its towpath are popular with recreational users, who are likely to appreciate the canal and its associated structures in aesthetic terms.
- 15.7.8 Inevitably given its length, the surroundings of the canal are varied and have developed over time. This section passes through residential and industrial areas, for the most part developed in the 20th century. There is no historical relationship between the site and the canal, the site having been developed long after the canal's heyday had passed. The wooded line of a former railway passes between the site and the towpath and the trees effectively screen views into the site, though in winter occasional filtered views are available. A narrower strip of trees runs along the northern bank. Dumbarton Road and the modern housing on the opposite side are clearly visible, albeit filtered through trees. Vehicles using the road are clearly visible and audible. Therefore, although this section of the canal runs through a developed area it has a slight feeling of separation from the developed surroundings. The canal is not readily visible from its surroundings.
- 15.7.9 The Forth and Clyde Canal lies approximately 30m to the north-east of the site. From its immediate vicinity, the proposed development would for the most part be screened from view from the towpath and canal by the thick band of trees (which are a designated Local Nature Conservation Site) that lies between it and the site. At points, however, it may be possible to see the proposed development above the trees or filtered through trees. Lighting and noise may also be perceptible; particularly during winter lighting is likely to be visible filtered through the trees. At points further along the towpath to the south-east, it would be possible to see the proposed development above the trees, with the Auchentoshan bonded warehouses in the foreground (**Figure 14.6**). Given that modern buildings are clearly visible from the canal and towpath and that vehicles on Dumbarton Road are visible, this would represent an incremental change that would not appreciably affect the aesthetic experience of this stretch of the canal as a Scheduled Monument. The intrinsic and contextual value of the canal will remain unchanged and the presence of industry in close proximity to the canal is entirely in keeping with its historical function. It is concluded that the introduction of the proposed development would represent a permanent Negligible magnitude of change, resulting in a **Negligible Adverse** effect.

Ferry Lodge Category B Listed Building

- 15.7.10 The Category B-listed Ferry Lodge was built in the latter part of the 19th century for the Erskine House estate on the southern bank of the Clyde³⁹. It served as the ticket office for the Erskine Ferry and stands at the end of the ferry slipway. It has architectural and historic interest as an example of a lodge house that served an atypical function and provides tangible evidence of

³⁸ <http://portal.historicenvironment.scot/designation/SM6778>

³⁹ <http://portal.historicenvironment.scot/designation/LB12375> & <https://canmore.org.uk/site/197647/erskine-house-ferry-lodge>

the historic crossing point. The slipway on the opposite bank remains in place can be seen and this contributes to the appreciation of its historic interest; the lodge has a bay window facing the slipway that was presumably intended to allow a clear view of the ferry crossing.

15.7.11 The lodge’s surroundings are largely rural, but there are views to the north-west that take in the more developed bank opposite and the Erskine Bridge is prominent. Although the currently visible development is largely modern, this situation reflects the historic split between the more heavily industrialised north bank of the Clyde and the more rural south bank. The lodge’s largely rural surroundings contribute to the current experience of visitors to the lodge complementing its architecture, which is typical of 19th century gate lodges. Views of the lodge from its immediate surroundings contribute to its significance as they allow an appreciation of the lodge’s historical function and architecture.

15.7.12 Ferry Lodge lies approximately 350m to the west of the site, on the opposite side of the Clyde. A cluster of self-seeded trees immediately to its south-west effectively screen the site from view at present. The proposed development would, however, be clearly visible from the beach immediately to the west of the lodge (Figure 14.8), the slipway and, if the trees were to be removed, the immediate environs of the lodge. The proposed development would be seen from this location in the context of the developed northern bank of the Clyde, but would be substantially larger and more prominent than existing development. It would therefore represent a substantial degree of visual change in the setting of the lodge, which is likely to detract from the general aesthetic experience of the lodge. However, the introduction of the proposed development would not interfere with the appreciation of the lodge’s architectural interest; its relationship with the slipways, which contributes to its historic interest, would remain unchanged as would short range views of the lodge, which contribute to its architectural and historic interest. Furthermore, the proposed development would represent a direct continuation of the historical pattern of industrial development, comprising ship-building and other maritime industry, on the north bank of the River Clyde. Overall the introduction of the proposed development would therefore only very slightly diminish the significance of the lodge and would not result in serious detriment to its character. In accordance with **Table 15.3**, it is concluded that the introduction of the proposed development would represent a permanent Slight magnitude of change, resulting in a **Minor Adverse** effect.

15.8 Further Mitigation and Enhancement

15.8.1 In the absence of any likely adverse effects on the setting of designated heritage assets at a level which would be considered significant in the context of the TCPA EIA Regulations, no further mitigation or enhancement measures are considered to be required.

15.9 Residual Effects

15.9.1 The likely residual effects from the construction and operation of the proposed development are identified in **Table 15.4** below. These will persist through the lifetime of the proposed development. As no further mitigation has been identified in **Section 15.8** as being required, the level of all likely transport effects remains the same as assessed in **Section 15.7**.

Table 15.4 – Summary of Likely Residual Effects

Potential Effect	Impacted Receptor	Receptor Sensitivity	Residual Magnitude of Change	Residual Level of Effect	Residual Significance of Effect
Changes in Setting	Antonine Wall – Scheduled Monument and WHS	High	Negligible Adverse	Negligible Adverse	Not significant
	Forth and Clyde Canal Scheduled Monument	High	Negligible Adverse	Negligible Adverse	Not significant

	Category B-listed Ferry Lodge	Medium	Slight Adverse	Minor Adverse	Not significant
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15.10 Monitoring

15.10.1 No monitoring is considered to be proportionate or required in relation to the likely residual effects of the proposed development identified above.

15.11 Cumulative Effects

15.11.1 As detailed in **Section 15.3**, no relevant cumulative developments have been identified which could result in likely significant cumulative effects in combination with the proposed development. In consequence, a separate assessment of likely significant cumulative effects is not required.

15.12 Summary

15.12.1 This assessment has considered the potential effects of the proposed development upon cultural heritage assets. Specifically, it considers the effects relating to the setting of designated heritage assets (Scheduled Monuments, Listed Buildings, Inventory Gardens and Designed Landscapes, Inventory Battlefields and Conservation Areas).

15.12.2 In line with current national and local policy it has sought to identify heritage assets that may be affected and their importance in order to inform the planning process and to allow any necessary mitigation measures to be developed. Potential effects are restricted to setting effects and in line with relevant guidance, the assessment has identified heritage assets that might be affected by the proposed development through a desk study using the Zone of Theoretical Visibility and site visits. This study considered all designated heritage assets within 1km of the proposed development and nationally important designated assets within 5km. Potentially significant effects were identified in relation to three assets: the Antonine Wall, which is a World Heritage Site, the scheduled Forth and Clyde Canal and the Category B-listed Ferry Lodge. Their setting has been described and its contribution to their heritage significance identified. Finally, the change in setting resulting from the proposed development and the consequent change in the asset's heritage significance has been assessed. This assessment is supported by visualisations where appropriate. Whilst the proposed development will result in perceptible change in the setting of all three, it was concluded that this would not affect the heritage significance of the Antonine Wall and the Forth and Clyde Canal, resulting in a negligible effect, whilst it would result in a minor adverse effect in respect of Ferry Lodge. These effects are not significant in the terms of the EIA Regulations and no mitigation measures are proposed in relation to them.

15.13 References

- CgMs (2018) Former Carless Oil Terminal, Old Kilpatrick: Archaeological Desk-Based Assessment.
- HES (2016) Managing Change in the Historic Environment: Setting.
- HES & SNH (2018) EIA Handbook.
- Unesco (2008) Examination of nomination of natural, mixed and cultural properties to the World Heritage List - Frontiers of the Roman Empire.
- West Dunbartonshire Council (2017) Luset Road and Mount Pleasant Drive, Old Kilpatrick: Conservation Area Appraisal.

16 Socio-economics

16.1 Introduction

16.1.1 This chapter of the EIA Report provides an assessment of the likely significant socio-economic effects from the proposed development. The assessment is based on the characteristics of the site and surrounding area and the key parameters of the proposed development detailed in **Chapter 2 – Site and Surrounding Area** and **Chapter 3 – The Proposed Development** respectively.

16.1.2 This chapter has been prepared by Peter Brett Associates, now part of Stantec. In accordance with Regulation 5(5)(b) of the TCPA EIA Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.1**.

16.1.3 The aims of this chapter are to:

- Identify the relevant context in which the socio-economic impact assessment has been undertaken;
- Describe the methods used to undertake the assessment. This includes confirming the nature and extent of likely significant socio-economic effects and therefore the required scope of the assessment;
- Outline the relevant baseline conditions currently existing at the site and surroundings to identify relevant socio-economic receptors which could be affected by the proposed development;
- Consider how the implementation of the proposed works would affect current baseline conditions, resulting in a likely future baseline scenario;
- Identify the likely direct and indirect socio-economic effects, including cumulative effects, likely to result from the construction and operation of the proposed development. In overall terms, the proposed development has the potential to impact upon economic (labour market and sectoral) and infrastructure receptors, with no wider community infrastructure or recreational impacts considered likely;
- Where relevant, identify further mitigation and enhancement measures as required to address likely effects;
- Assess residual predicted effects; and,
- Identify and assess any cumulative effects on socio-economic conditions likely to result from the proposed development in combination with other relevant cumulative developments.

16.1.4 The impact assessment presenting in this chapter is supported by more detailed baseline and assessment information provided in:

- **Appendix 16.1 – Figures;**
- **Appendix 16.2 – Socio-economic Baseline;** and,
- **Appendix 16.3 – Net Employment Additionality Assumptions.**

16.2 Policy Context, Legislation, Guidance and Standards

Legislation

16.2.1 The overarching legislative framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. There is no subject specific legislation of relevance to this assessment.

Policy

16.2.2 The planning policy framework applicable to this EIA for the proposed development is outlined in **Chapter 5 – Legislative and Policy Context**. Planning policy considerations of specific relevance to this assessment are:

16.2.3 Planning policy considerations of specific relevance to this assessment are:

- **Approved Clydeplan Strategic Development Plan (2017)**, in particular Policy 5 – Strategic Employment and Industrial Locations (SEILs).
- **Adopted West Dunbartonshire Local Plan (2010)**, in particular:
 - LE6: Strategic Employment Locations;
 - UR1: Urban Renewal;
 - RP1- Regeneration Priorities;
 - Policy SUS1: Sustainable Development
 - GD1: Development Control; and,
 - GD 2(9): Carless, Old Kirkpatrick.
- **West Dunbartonshire LDP Proposed Plan 2015**, in particular:
 - ‘Changing Places’ Carless Redevelopment Strategy (Section 3.6).
- **West Dunbartonshire LDP2 Proposed Plan (2018)**, in particular proposed policies:
 - Carless Policy 1 – Business and Industrial Development
 - WD1: Waterfront Development; and,
 - ENV10 - Implementation of the SEA Environmental Report.
- **National Planning Framework 3 (NPF3) (2014)**, in particular the priorities identified for the Glasgow and Clyde Valley City Region in respect of remediating derelict land.
- **Scottish Planning Policy (SPP) (2014)**, in particular the Principal Policy on Sustainability (paragraphs 24-35) and Supporting Business and Employment Subject Policy (paragraphs 92-108).
- **West Dunbartonshire Economic Development Strategy 2015-2020**, in particular the priorities outlined to support the development of growth businesses and supporting internationalisation (page 7), enabling the delivery of major regeneration sites (page 13), maximising West Dunbartonshire competitiveness as an investment location (page 16).

16.2.4 In accordance with sections 15 and 58 of the Marine and Coastal Access Act (2009), the marine licence application for the extent of the proposed development located below MHWS must be determined in accordance with the appropriate marine policy documents, unless relevant considerations indicate otherwise. As detailed in **Chapter 5 – Legislative and Policy Context**, the relevant marine policy documents and constituent comprise:

- **UK Marine Policy Statement (2011);**
- **Scotland’s National Marine Plan (2015)**, in particular policies:
 - GEN1 - General Planning Principle;
 - GEN 2 - Economic benefit;
 - GEN19 - Sound Evidence; and,
 - GEN21 - Cumulative Impacts.

16.2.5 Other policy considerations of relevance to this assessment are:

- **UK Industrial Strategy**

- ⊖ Sets out ambition to boost productivity by strengthening the foundations of productivity, building long-term strategic partnerships with businesses, and taking on grand challenges.
 - **Scottish Government Economic Strategy**
 - ⊖ This policy document outlines the Scottish Government's ambitions to create a more cohesive and resilient economy that improves opportunities, life changes, and wellbeing of every citizen in our country. The policy document emphasises four key priorities: investment, innovation, inclusive growth and an international outlook.
 - **City Region Economic Action Plan**
 - ⊖ This policy document sets out the ambitions for the Glasgow city region, with an emphasis on building a strong, inclusive, competitive and outward-looking economy, sustaining growth and prosperity with every person and business reaching their full potential.
 - **Scottish Enterprise Business Plan**
 - ⊖ The Scottish Enterprise Business Plan builds on the growth opportunities identified in Scotland's Economic Strategy, a key component of which is the Technology and Engineering sector (including aerospace, defence and marine).
- 16.2.6 The above-listed policies are relevant to the assessment process as they provide the broad legislative basis for projects and developments which create a more resilient and robust economy for everyone. With regards to the socio-economic impacts of the proposed development, the stated policies emphasise important issues such as strengthening identified key growth sectors such as engineering and manufacturing, and they focus on key social issues including inclusive growth.

Guidance and Relevant Technical Standards

- 16.2.7 As detailed in **Section 16.3**, this socio-economic assessment has adopted a methodology consistent with the UK Government's Green Book appraisal guidance. The latest iteration of the Green Book (March 2018) has informed the best practices and provided the basis for the socio-economic analysis contained in this chapter.

16.3 Methodology

Overview

Assessment Scope

- 16.3.1 All developments have the potential to generate socio-economic effects at the local, regional and/or national level. This is principally in relation to changes in economic development, employment opportunities and tourism or recreational activities. Aspects considered within this assessment are those where there is a potential for the proposed development to result in likely significant socio-economic effects, namely:
- Direct and indirect employment / labour market effects during the construction and operational phases of the proposed development;
 - Direct, indirect and induced expenditure during the construction and operational phases of the proposed development;
 - Direct and indirect effects on relevant business sectors, specifically the construction and marine engineering sectors, during the operational phase of the proposed development; and,
 - Other indirect and induced economic effects during the construction and operational phases of the proposed development, including regeneration and agglomeration effects within the wider Carless landholding.

16.3.2 In accordance with the Carless Marine Fabrication Complex EIA Scoping Report and subsequent EIA Scoping Opinion provided in **Appendix 4.1**:

- Likely effects on housing and associated provision and use of community infrastructure has been scoped out of the assessment. The relatively low number of net additional operational jobs created directly by the proposed development within the Study Area means there is no potential for associated effects on housing or community infrastructure to be significant within the context of the TCPA EIA Regulations; and,
- Potential effects on public access and recreational routes have been scoped out of this assessment, as they are addressed elsewhere in the assessments provided in **Chapter 11 – Transport and Access** and **Chapter 14 – LVIA**.

Assessment Process

16.3.3 The methodology for this socio-economic assessment has been informed by the principles outlined in HM Treasury's Green Book (2018). In undertaking the assessment presented in this EIA Chapter, the following activities have been carried out:

- EIA Scoping (see below);
- Reviewing relevant legislation and policy;
- Definition of appropriate Study Areas (see below) to underpin the assessment;
- Desktop research to establish baseline socio-economic conditions at the site and across the identified Study Areas in order to identify sensitive receptors for consideration in the assessment;
- Defining receptor sensitivity to likely socio-economic changes resulting from the proposed development;
- Identification of the likely effects of the proposed development under future baseline site conditions;
- Evaluation of the level and significance of likely effects by considering the sensitivity of identified receptors within the future baseline scenario and the likely magnitude of socio-economic effects;
- Identification of proposed measures and enhancement to avoid or minimise likely adverse effects and maximise beneficial effects resulting from the proposed development; and,
- Evaluation of the residual significance of likely socio-economics effects after mitigation or enhancement.

Temporal Scope

16.3.4 The temporal scope of the analysis of the construction and operational phases has been determined with time frames set out by the Applicant. The crucial aspects which influenced the temporal scope of the assessment are:

- Construction phase – three years. Construction is anticipated to begin in (Q3 or Q4) 2019 and be finished by the end of 2021, as per the applicant's expected timeline.
- Operational phase – From late 2021 or early 2022 onwards. Operation is expected to commence upon completion of the construction phase.

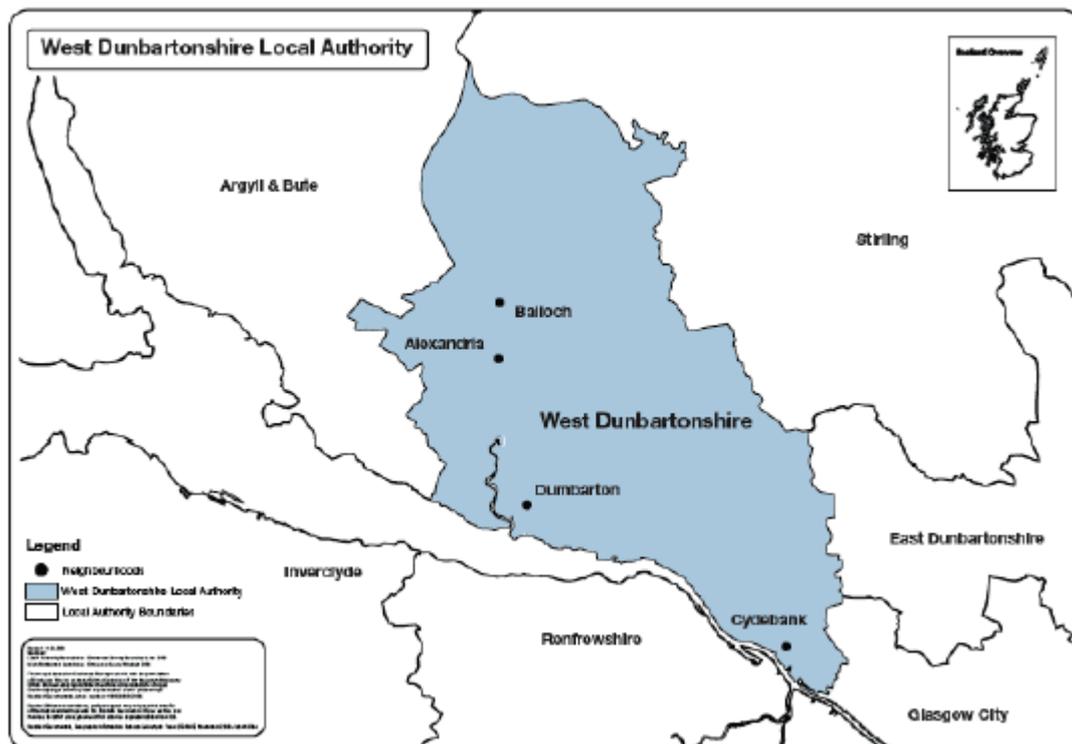
Consultation

16.3.5 This assessment has been informed by an EIA Scoping Report (PBA, October 2017) and subsequent EIA Scoping Opinion issued by West Dunbartonshire Council (March 2018) in respect of the EIA for the proposed development. The EIA Scoping Opinion, which is provided in full in **Appendix 4.1**, included a list of standard requirements for consideration in this chapter. No further consultation relevant to socio-economic effects was conducted.

Study Area

- 16.3.6 Two study areas have been adopted in this assessment, a Local Study Area comprising the West Dunbartonshire Council (WDC) administrative area and a Wider Study Area comprising the Glasgow City Region, defined by the Glasgow and Clyde Valley Strategic Development Plan (2017) as comprising of Glasgow City, East Dunbartonshire, West Dunbartonshire, North Lanarkshire, South Lanarkshire, Renfrewshire, East Renfrewshire and Inverclyde council authorities. These geographical delineations for the Local and Wider Study Areas will be used to identify and compare the baseline conditions with respect to relevant socio-economic indicators against which the likely socio-economic impacts from the proposed development will be assessed. Comparisons of key socio-economic indicators have also been made against Scottish national averages to provide additional context.
- 16.3.7 The assessment of likely employment effects has considered the Glasgow City Region (Wider Study Area) as the overall applicable labour market. The local labour market of West Dunbartonshire (Local Study Area) also operates within this and as such, has been considered.
- 16.3.8 **Figure 16.1** and **Figure 16.2** below depict the spatial regions considered in this assessment, and are referred to throughout this document as the Local Study Area and Wider Study Area, respectively.

Figure 16.1 - Local Study Area, West Dunbartonshire Council



Source: West Dunbartonshire Council

Figure 16.2 – Wider Study Area, Glasgow City Region



Source: Scottish Development Planning Authority

Information Sources

Desk Top Study

16.3.9 A desk-based review of publicly available data was undertaken to establish baseline socio-economic conditions at the site and across the identified Study Areas, as well as to consider how these conditions compare with the Scottish national average. The following socio-economic indicators were considered:

- Current demographic characteristics, including population size and age structure; and
- Current labour market characteristics, including working age population profile (level of economic activity, occupation and skills profiles) as well as the workplace economy profile (employment by industry and earnings).

16.3.10 The data used to prepare the baseline profile reflects the range of publicly available statistics applicable to the Local Study Area and the Wider Study Area, as well as Scotland used as a comparator where appropriate. Key data sources used include:

- Office of National Statistics;
- NOMIS; and,
- Experian.

Modelling

- 1.3.10 Relevant socio-economic data was input into a bespoke economic model developed by PBA to anticipate the gross and net socio-economic effects, including employment and expenditure, from the construction and operational phases of the proposed development. This model applies economic multipliers and additionality assumptions as detailed under the **Impact Assessment Methodology** subheading.

Approach to Assessment

Receptor Sensitivity

- 16.3.11 Based on the information sources outlined above, the current and likely future baseline characteristics of site and the surrounding area were characterised. This led to the identification of relevant sensitive receptors to consider within the assessment, as detailed within **Section 16.4 – Current Baseline Conditions**. **Table 16.1** below sets out the criteria used to determine the sensitivity of each identified receptor to socio-economic effects of a type likely to be generated by the proposed development (i.e. labour market, sectoral and regeneration effects).
- 16.3.12 For employment effects, the availability of labour and skills is critical in accommodating the demands, needs and requirements of the proposed development. Adequate labour capacity results in a low sensitivity, while limited capacity results in a high sensitivity. The sensitivity of the labour market, therefore, has been defined in relation to:
- The availability of skilled labour in the assessed Study Areas relative to national averages;
 - The proportion of employment in relevant sectors (e.g. construction workers) within the assessed Study Areas;
 - The availability of labour (including the unemployed) within the assessed Study Areas; and,
 - Relevant education and training provision, including existing and proposed programmes provided by institutions serving the assessed Study Areas.
- 16.3.13 Receptor sensitivity criteria are shown in **Table 16.1** below.

Table 16.1 - Receptor Sensitivity

Sensitivity	Example
High	There is a shortfall of appropriate labour and skills. The proposed development would therefore lead to labour market pressure and distortions (i.e. skills and capacity shortages, import of labour, wage inflation).
Medium	There is a low/limited supply of appropriate labour and skills. The proposed development may therefore lead to labour market pressure or distortions.
Low	There is a readily available supply of appropriate labour and skills. The proposed development is therefore unlikely to lead to labour market pressure or distortions.
Negligible	There is an existing surplus of readily available labour with directly relevant and transferable skills. The proposed development would therefore not lead to labour market pressure or distortions.

- 16.3.14 For wider socio-economic effects, including changes in activity levels within key business sectors (e.g. marine engineering) and impacts on the industrial regeneration of derelict land, receptor sensitivity was determined with reference to the importance of the receptors likely to be affected and the extent to which any socio-economic change upon these receptors could affect their economic performance. The sensitivity of relevant receptors was therefore determined on a case by case basis.

Impact Assessment Methodology

- 16.3.15 The magnitude of change of the effects have been determined based on the proposed development's socio-economic outputs and the baseline structure of the area. The key socio-

economic receptors are participants within the labour force and the level of occupational skills available in the study area.

16.3.16 The magnitude of change from the construction and/or operation of the proposed development on identified socio-economic receptors was determined using the criteria set out in **Table 16.2**.

Table 16.2- Socio-economic Magnitude of Change Criteria

Magnitude of Change	Type of Change	Criteria
High	Adverse	Employment changes: the number of jobs lost in the Study Area would be greater than 250 (based upon the EU definition of small and medium enterprises ⁴⁰). Other socio-economic changes: adverse changes to identified receptors would be observed on an international, national or regional scale. Changes are likely to be experienced over the long term (i.e. 5+ years).
	Beneficial	Employment changes: the number of jobs created in the Study Area would be greater than 250 (based upon EU definition of small and medium enterprises). Other socio-economic changes: beneficial changes to identified receptors would be observed on an international, national or regional scale. Changes are likely to be experienced over the long term (i.e. 5+ years).
Medium	Adverse	Employment changes: the number of jobs lost in the Study Area would be greater than 50, but fewer than 250. Other socio-economic changes: Noticeable adverse changes, judged to be important at a local scale, to identified receptors. Changes are likely to be experienced over the medium term (i.e. 3-5 years).
	Beneficial	Employment changes: the number of jobs created in the Study Area would be greater than 50, but fewer than 250. Other socio-economic changes: Noticeable beneficial changes, judged to be important at a local scale, to identified receptors. Changes are likely to be experienced over the medium term (i.e. 3-5 years).
Low	Adverse	Employment changes: the number of jobs lost in the Study Area would be greater than 10, but fewer than 50. Other socio-economic changes: Small scale adverse changes to identified receptors at the local level only. Changes are likely to be experienced over the short term (i.e. 1-2 years).
	Beneficial	Employment changes: the number of jobs created in the Study Area would be greater than 10, but fewer than 50. Other socio-economic changes: Small scale beneficial changes to identified receptors at the local level only. Changes are likely to be experienced over the short term (i.e. 1-2 years).
Negligible	Adverse	Employment changes: the number of jobs lost in the Study Area would be less than 10. Other socio-economic changes: very small-scale adverse changes to identified receptors at the local level only. Changes are likely to be experienced over the short term (i.e. less than 6 months).
	Beneficial	Employment changes: the number of jobs gained in the Study Area would be less than 10. Other socio-economic changes: very small-scale beneficial changes to identified receptors at the local level only. Changes are likely to be experienced over the short term (i.e. less than 6 months).
No Change		No change would be perceptible, either beneficial or adverse.

⁴⁰ http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en

16.3.17 In line with standard EIA practice, a matrix-based approach was adopted to consider the sensitivity of identified receptors in tandem with the likely magnitude of socio-economic change from the proposed development. This method allowed the level and significance in EIA terms of all predicted socio-economic effects to be determined. The EIA significance matrix adopted in this assessment is detailed in **Table 16.3** below.

Table 16.3 - EIA Significance Matrix - Significance of Socio-economic Effects

Sensitivity	Magnitude of Change			
	High	Medium	Low	Negligible
High	Substantial	Moderate/Substantial	Moderate	Slight
Medium	Moderate/Substantial	Moderate	Slight/Moderate	Slight
Low	Moderate	Slight/Moderate	Slight	Negligible
Negligible	Slight	Slight/Negligible	Negligible	Negligible

16.3.18 Effects which are predicted to occur at levels of moderate, major or substantial are significant in the context of the EIA Regulations.

Assumptions and Limitations

16.3.19 A number of assumptions were made such that economic modelling accounted for relevant multipliers and additionality effects. Two sets of additionality assumptions were used in the analysis to account for the different effects resulting from the construction and operational phases, please refer to **Appendix 16.3 – Additionality Assumptions** for details. The following assumptions have been applied in this assessment:

Gross Employment Calculations

- Gross construction employment effects have been calculated by dividing the expected capital cost of the proposed development, based on estimates provided by the applicant, by the average annual employment turnover associated with a construction worker in West Dunbartonshire Council, some £94,917. The figure for turnover associated with a construction worker in the Wider Study Area is £143,446, and across Scotland it is £136,231.
- Gross operational employment figures are based on estimates provided by the Applicant, and the Applicant is anticipating that 40 existing staff will be transferring from existing facility and 50 new employment opportunities are expected to be created due to increased site capacity and business growth.

Net Employment Calculations

- Employment multipliers and additionality assumptions were applied to predicted gross employment figures in order to calculate the likely net additional direct and indirect employment effects.

Employment additionality assumptions

- To comply with best practice, anticipated construction and operational effects have been adjusted for additionality factors. Appropriate guidance and understanding of the local area’s socio-economic characteristics have been used to estimate values of leakage, deadweight, displacement, and multipliers. Employment additionality assumptions for the construction and operational phases are discussed in further detail in **Appendix 16.3 – Additionality Assumptions** and summarised below:
 - **Leakage** – the proportion of employment opportunities accessed by people living outside of the Local Study Area (West Dunbartonshire);
 - **Deadweight** – the proportion of benefits that would have happened in absence of the proposed intervention;

- **Displacement** – the proportion of the project’s benefits accounted for by a reduction in benefits elsewhere; and
- **Multipliers** – values used to estimate further economic activity resulting from additional income and supplier purchases, i.e. indirect and induced expenditures (Type II multiplier).

Approach to Cumulative Impact Assessment

16.3.20 From reviewing the relevant cumulative developments listed in **Paragraph 16.3.2**, it considered that there is no potential for significant cumulative socio-economic effects to occur from the proposed development in combination with other existing or approved development. This is owing to the relatively low level of proposed employment at the site, relevant cumulative developments not being substantial employment generating uses and due to their physical separation from the site.

16.3.21 The one exception is the proposed remediation works within the site under planning application DC18/245, which for EIA purposes represents a relevant cumulative development in relation to the proposed development. The purpose of the proposed remediation work is inherently to remediate the site to make the land suitable for the proposed development and to reduce contamination across the wider Carless landholding. Notwithstanding the need for the Applicant to comply with site management obligations under Part IIA of the Environmental Protection Act 1990, the reason why the Applicant has acquired the site and submitted a planning application for the proposed remediation works are that these works are needed to unlock the proposed development and the potential future use of the wider Carless landholding for industrial and employment generating uses. This regeneration effect is considered to relate both to the proposed remediation works and the proposed development, and it has therefore been assessed in relation to the proposed development. In the absence of any other likely significant cumulative socio-economic effects, a standalone cumulative impact assessment is therefore not required and has been scoped out of this assessment.

16.4 Current Baseline Conditions

16.4.1 This section identifies the pertinent aspects of current socio-economic baseline conditions of relevance to this assessment and considers how these conditions may evolve in the absence of the proposed development. The sensitivity of all identified receptors to potential socio-economic effects is identified in **Table 16.1** and used within the impact assessment presented in **Sections 16.7 – 16.10**.

16.4.2 More detailed baseline information which has informed this impact assessment (e.g. with regards to the selection of employment additionality assumptions) is provided in **Appendix 16.2 – Baseline**.

The Site

16.4.3 The site is a derelict oil refinery formerly operated by the petrochemical company Carless. The refinery has since shuttered operations and the site has been out of use since 1992. The site is located in West Dunbartonshire along the River Clyde in Old Kilpatrick, situated between the River Clyde and the Forth and Clyde Canal, in close proximity to the Erskine Bridge which sits to the North West of the proposed development.

16.4.4 The site was historically used as a refinery and fuel depot and suffered from bombing campaigns in WWII. As a result of the site’s previous uses, and the damages incurred during the war, there is hydrocarbon contamination across the site which requires remediation in order to return the land to productive economic use and unlock further development potential.

16.4.5 The wider landholdings controlled by the applicant total some 17.7ha, however the proposed development consists of a 4.7ha parcel on the western and central portion of the wider landholding.

The Surrounding Area

Overview

- 16.4.6 The Local Study Area, West Dunbartonshire, lies on the western edge of Scotland's Central Belt and occupies an area from the north bank of the River Clyde to the south-eastern shores of Loch Lomond. It sits to the west of Glasgow and contains numerous commuter towns and villages such as Alexandria; Balloch; Bowling; Clydebank; Dalmuir; Dumbarton; Old Kilpatrick; and a number of other small settlements. The region can be roughly divided into three parts: the town of Clydebank (the largest settlement), the town of Dumbarton, and the Vale of Leven district.
- 16.4.7 The Glasgow City Region is defined in the Glasgow and Clyde Valley Strategic Development Plan 2017, and constitutes the Wider Study Area for the purposes of this assessment. Specifically, the Glasgow City Region comprises eight Local Authorities: East Dunbartonshire; East Renfrewshire; Glasgow City; Inverclyde; North Lanarkshire; Renfrewshire; South Lanarkshire; and, West Dunbartonshire.
- 16.4.8 The Wider Study Area's constituent council areas account for one-third of Scotland's population, per 2017 mid-year estimates, and cover an area extending from the middle of the central belt to the west coast.
- 16.4.9 In 2015, the economy of West Dunbartonshire was worth around £1.6bn, or approximately 3.9% of the Wider Study Area economy and 1.3% of the Scottish economy. The Local Study Area's economy has grown on average by 3.2% per annum since 2000, which is slightly below the national average growth rate of 3.4%.

Employment and Labour Supply

Demographic Factors

- 16.4.10 The population of the Local Study Area is estimated to be roughly 89,600, according to 2017 mid-year figures. This equates to approximately 5% of the overall population of the Wider Study Area, and 1.65% of overall population of Scotland.
- 16.4.11 In contrast to both the Wider Study Area and national trends, the population of the Local Study Area has been in decline since 1987. Further to this there has been a demographic shift within the Local Study Area, where there has been a reduction in both youth (0-15) and working age (16-64) populations, some 3.57% and 2.76% respectively. This has been accompanied by a simultaneous increase of 1.73% in the population of pensionable age (65+).
- 16.4.12 The trend of an ageing population is consistent with patterns on the national scale, as is the reduction in the 0-15 age group, albeit the rate of reduction is greater in the Local Study Area. The reduction in the 16-64 age group is in contrast to trends observed in the Wider Study Area and national spatial levels.
- 16.4.13 These population figures suggest that the Local Study Area is facing structural challenges to attract or retain demographic groups which can contribute to the economic vitality of the area. The proposed development will deliver salient and measurable benefits to the Local Study Area and address a variety of challenges through supporting a key industry sector and emphasising inclusive growth.

Economic Activity and Employment

- 16.4.14 The supply of appropriate labour and the availability of firms to support the construction of the proposed development are key factors in ensuring that socio-economic benefits are realised by local communities.
- 16.4.15 The economic activity rate (or labour force participation rate) is the percentage of the population, both employed and unemployed, aged between 16-64 years. The activity rate in the Local Study Area suffered a steady decline between 2010 and 2014 as a result of the economic recession, falling from 74.5% to 71.8%. At present, the economic activity rate is at 76.4%, slightly below the Wider Study Area average of 77% and the national average of 77.8%.
- 16.4.16 The employment rate in the Local Study Area stands at 72.5%, fractionally higher than that of the Wider Study Area at 71.9%, yet marginally below the national average of 74.5%.

16.4.17 The relevant industries likely to be affected by the proposed development include construction and marine engineering. The construction industry is comprised of some 1250 workers in the Local Study Area, and the marine engineering industry at present numbers 40 jobs. A table with the full breakdown of employment by sector can be found in **Appendix 16.2 – Baseline**.

16.4.18 The recovery from the recession has been below that of the Wider Study Area and national rates. While employment in manufacturing showed some recovery in 2012 due to the expansion and relocation of Aggreko at Lomondgate, the number of jobs in the services sector decreased considerably. The comparatively slower recovery can be partially attributed to the demographic trends already explored, as well as the education and skills levels of the local workforce – see **Paragraph 16.4.30**. Furthermore, the proximity to Glasgow and its higher concentrations of industry as well as its larger and more skilled workforce can help explain why the Local Study Area's recovery has been sluggish.

Occupational Profile

16.4.19 The occupational structure within the Local Study Area follows a similar distribution to that of the Wider Study Area and national profiles, however there is a noticeable reliance on public sector employment, which accounts for over 40% of employment within the Local Study Area. Other important sectors to the Local Study Area's economy are Wholesale and Retail (including motor trades), as well as Financial and other Business Services, which respectively represent 15% and 14.5% of the workforce.

16.4.20 While the Local Study Area has an outsized reliance on public sector employment, manufacturing remains as the largest GVA contributor to the Local Study Area economy, accounting for 43% in 2016. This is in stark contrast to the 16% across the Wider Study Area.

16.4.21 Furthermore, the Local Study Area has a lower proportion of highly skilled occupations (37%) when compared to the Wider Study Area (43%) or national figures (42%). This is in part offset by a larger proportion of the workforce in semi-skilled occupations, 37%, whereas the Wider Study Area and national rates are at 30% and 31% respectively.

Labour Productivity

16.4.22 In 2016, GVA per head in the Local Study Area stood at £17,960, which is below the Wider Study Area and national averages of £23,025 and £23,685. Not only is the GVA per head in Local Study Area lower than both the Wider Study Area and national figures in absolute terms, but the growth rate in GVA is also slightly below that of the benchmark comparators.

16.4.23 The next largest contributor to GVA in the area is the wholesale, retail and repairs industry, which adds 13% of the region's GVA, and following that is transport and storage services which account for 9% of total GVA in the Local Study Area.

Resident and Workplace Employment

16.4.24 Taking into consideration the age of the data, the 2011 census, travel-to-work patterns provide an indicator of local economic activity. The Local Study Area experiences a net daily outflow of people to neighbouring areas, which indicates a lack of suitable employment opportunities within the Local Study Area. The available figures show 10,689 in-commuters and 18,183 out-commuters, representing a daily net worker outflow of 7,494 from the Local Study Area.

16.4.25 The primary destination for out-commuters is Glasgow City, at 10,474, and Glasgow is also the primary origin of in-commuters, sending 4,155 workers to the Local Study Area. The net effect is an outflow of 6,319 workers from West Dunbartonshire to Glasgow City.

Unemployment and Deprivation

16.4.26 The latest available figures indicate that as of June 2018 some 2,200 individuals were unemployed in the Local Study Area, which equates to an unemployment rate of 5.1%. This is higher than the rates of unemployment in both the Wider Study Area (4.6%) and Scotland (4.2%).

16.4.27 Currently, the claimant rate in the Local Study Area for Job Seekers Allowance (JSA) is at 2.7%, higher than both the Wider Study Area and Scotland averages of 1.5% and 1% respectively. A detailed graph of the JSA claimant rate can be found in **Appendix 16.2 – Baseline**.

16.4.28 The 2016 Scottish Index of Multiple Deprivation (SIMD) shows that while the overall levels of deprivation in West Dunbartonshire are relatively low, there are a number of Strategic Output Areas (SOA's) within the 10% worst performing areas nationally. This consist of 20 SOA's in the area with a population of 13,720. They are located primarily in the south of the Local Study Area around Clydebank and Dalmuir, as well as in the north and north-west near Balloch and Dumbarton. Diagrams of the SIMD can be found in **Appendix 16.2 – Baseline**.

16.4.29 The site is in close proximity to Clydebank and Dalmuir, and the creation of the MFC will enhance employment opportunities for the Local Study Area labour market by revitalising a presently derelict and unproductive site with an historically significant industry.

Education and Skills

16.4.30 The residents of the Local Study Area are overall less qualified than the residents in the Wider Study Area and nationally. The proportion of people with no qualifications in the Local Study Area is 11.6%, which is above the averages for the Wider Study Area and Scotland as a whole, where the figures are 9.94% and 8.7% respectively. Further to that, the proportion of Local Study Area residents with NVQ4 and above, 32.9%, is substantially lower than the Wider Study Area and national averages of 43.3% and 43.9%. A table detailing the breakdown of qualifications held by the working age population can be found in **Appendix 16.2 – Baseline**.

16.4.31 The result of the distribution of qualifications held by the residents of the Local Study Area manifests itself in the occupational profile, as detailed in **Paragraph 16.4.19**, where there is a lower proportion of highly skilled employees when compared to the Wider Study Area or national averages. On average, the Local Study Area is more reliant on administrative and secretarial positions, as well as care, leisure and other service occupations than the Scottish average.

Income

16.4.32 Median gross weekly pay of full-time employees in the Local Study Area in 2018 was £519. This was the lowest of all local authorities comprising the Wider Study Area. For comparison, the average median weekly wage in the Wider Study Area is £597, and the Scottish national median weekly wage is £563. These figures are respectively some 15% and 8.4% higher than the median weekly wage in the Local Study Area.

16.4.33 Median annual pay of full-time employees in the Local Study Area is £26,927. This is 8.6% below the Scottish national median income of £29,248, and 13.7% below the Wider Study Area's median annual income of £30,630. A table detailing gross weekly pay of full-time employees for each council authority in the Wider Study Area can be found in **Appendix 16.2 – Baseline**.

Key Business Sectors

16.4.34 The two key sectors which may experience socio-economic effects during the construction and/or operational phases respectively are the construction and marine engineering sectors.

Construction

16.4.35 The construction sector in the Local Study Area accounts for some 1,250 jobs, or slightly more than 4% of total employment in the Local Study Area yet contributes a significant portion of the GVA to the region – some £52m in 2016. This represents a GVA per construction employee of £23,111, which is 29% above the average GVA per employee in the Local Study Area of £17,960.

Marine Engineering

16.4.36 The River Clyde has a long history of excellence in maritime engineering and shipbuilding. The industry reached its peak before the outbreak of WWI, and experienced significant decline in the decades following WWII.

16.4.37 While not directly on the Clyde at present, the Applicant, Malin Group, currently operates from leased premises in Renfrew. Malin Group provide a range of specialist marine engineering services ranging from fabrication to vessel chartering and marine operations. These services represent substantial contributions to the sector across the Wider Study Area and nationally.

Furthermore, the remediation of the site undertaken by the Applicant will unlock additional investment potential across the wider site

16.4.38 There are two currently active shipyards on the Upper Clyde – one in Scotstoun and the other in Govan – both operated by defence contractor BAE Systems Plc which builds warships and defence systems for the Royal Navy. Some 3,000 people are employed in shipbuilding between the two facilities.

16.4.39 Ferguson Marine Engineering Ltd operates a shipyard in Port Glasgow, Inverclyde Council, and is currently the only builder of merchant ships in operation on the River Clyde. As of 2018 there were 350 people employed at this shipyard. Their primary business is in constructing ferries which provide crucial transport links to the Scottish Isles.

16.4.40 According to the latest available figures, the Local Study Area currently has 40 people employed in the shipbuilding industry. The proposed development will support growth in this industry sector and rejuvenate a historically significant industry along the River Clyde.

Regeneration and Economic Development

16.4.41 The site benefits from long-standing policy support for economic led regeneration, and has been identified as a key priority for rejuvenation. The site offers direct access to the River Clyde, a deep channel water body, which is crucial for industries involved in shipping and marine-centred activities. West Dunbartonshire Council have worked collaboratively with the Applicant to define a mutually beneficial redevelopment strategy for the site, as set out in the West Dunbartonshire Proposed Plan (2018).

16.4.42 The LDP outlines a strategy to revitalise the economy of West Dunbartonshire by directing development or investment proposals to a number of identified sites, of which the former Carless Oil Refinery is one. The remediation required for the MFC at the proposed development location will have the added effect of unlocking development potential across the rest of the site and regenerating previously derelict land, returning it to economically productive use, and encouraging further development.

16.5 Baseline Evolution and Expected Future Baseline

Current Baseline Evolution

16.5.1 The TCPA EIA Regulations require that the EIA Report must describe the likely evolution of the baseline scenario in the absence of the proposed development. In the absence of any development activities current baseline conditions, including extensive hydrocarbon contamination of soils and groundwater, would be likely to remain relatively unchanged, except for natural growth of existing vegetation within the site.

16.5.2 This section outlines the expected future baseline conditions of relevance to this socio-economic assessment resulting from the implementation of the proposed remediation works on top of the existing baseline. This provides an EIA future baseline against which impacts from the proposed development can be assessed.

16.5.3 For the purposes of this EIA, the likely evolution of the baseline is predicated upon the approval and implementation of proposed remediation works before the commencement of the proposed development (the construction of the proposed development). Prior remediation will be needed to:

- Reduce to an acceptable level the risk to human health and environmental receptors both on and off the site from hydrocarbon and other contamination in soil;
- Reduce to an acceptable level the risk to the River Clyde from mobile contamination within soils and contaminants floating on and dissolved within the groundwater; and therefore,

16.5.4 Remediation is therefore required both to remove the site's current contaminated land and Special Site designations under Part IIA of the Environmental Protection Act 1990 and to make the site suitable for the future intended use (i.e. the construction and operation of the proposed development). As such, a 'no development' baseline evolution scenario is not considered to merit further consideration in this EIA.

16.5.5 Whilst not forming part of the proposed development assessed in this EIA, an overview of the proposed remediation works is provided for completeness in **Chapter 6 – Ground Conditions**. In addition to intrusive works within the site, the proposed remediation works include a commitment by the Applicant to undertake further SI and subsequent remediation works on land to the east within the wider Carless landholding. This will be outwith the site of the proposed development considered in this EIA. Planning application DC18/245 for the proposed remediation works was submitted to West Dunbartonshire Council as the relevant local planning authority on 1st November 2018 and validated on 14th November 2018.

Expected Future Baseline

Expected Changes in Conditions within site

16.5.6 In overall terms, the effect within the site of implementing the proposed remediation works in relation to socio-economic effects will be that contamination sources and pathways are removed or reduced such that the site is made suitable for the future intended industrial use. The proposed remediation works will therefore directly unlock the potential to bring the site back into productive economic (industrial) use through the proposed development.

Expected Changes in Conditions outwith site

16.5.7 As with the changes expected within the site, the implementation of the proposed remediation works will result in the removal or reduction in contamination sources and pathways in the extent of the wider Carless landholding where intrusive remediation is proposed under planning application DC18/245. No intrusive remediation works are presently proposed on the eastern part of the wider Carless landholding at the existing containment basins, although available evidence indicates that this area is likely to be less contaminated than the site of the proposed development. The implementation of the proposed remediation works will therefore either directly or indirectly help to unlock the use of the wider Carless landholding for productive economic uses that are compatible with the proposed development. This regenerative effect is likely to increase inward investment, result in industrial co-location within the wider Carless landholding and stimulate local economic activity through indirect and induced economic effects.

Predicted Future Baseline Conditions

16.5.8 The sensitivity and vulnerabilities of identified socio-economic receptors from the current baseline scenario are not themselves expected to change materially under the future baseline scenario (see **Table 16.8** below).

Summary of Receptor Sensitivity / Importance and Consideration in this Assessment

16.5.9 **Table 16.8** below summarises the receptors that have been considered in this assessment. The sensitivity of relevant receptors under the likely future baseline scenario has been determined with reference to the criteria listed in **Table 16.1**. This table also identifies the sensitivity of each identified receptor as well as the phase(s) of the proposed development in which they would be likely to experience the associated socio-economic effects.

Table 16.4 - Summary of Receptor Sensitivity

Receptor	Sensitivity	Rationale	Phase of Likely effect(s)
Labour Market	Local Study Area: Medium Wider Study Area:	The Local Study Area has elevated rates of unemployment when compared to the Wider Study Area or Scottish averages, however the lower levels of attainment may result in some pressures on the local labour market.	Construction & Operation

Receptor	Sensitivity	Rationale	Phase of Likely effect(s)
	Medium	The Wider Study Area represents a significant portion of the national labour market, and consequently is assessed to have low sensitivity, as there is greater flexibility and capacity within the labour market on that spatial level.	
Construction Sector	Local Study Area: Medium Wider Study Area: Low	The presence of other significant construction projects in the region may result in increased competition for contractors and workers. Given the sector's size, it is not anticipated to distort the market significantly. However specialised skillsets may experience greater demand. The Wider Study Area has a larger and more diverse labour pool than the Local Study Area, meaning the sensitivity of this labour market receptor is assessed to be low.	Construction
Marine Engineering Sector	Local Study Area: Medium Wider Study Area: Medium	The Local Study Area has a relatively small marine engineering sector, but the development of the MFC will result in the creation and relocation of jobs as well as the revitalisation of a key manufacturing sector. The Wider Study Area has a more robust marine engineering sector than the Local Study Area, however this spatial level is assessed to be of medium sensitivity given the number of jobs created.	Operation
Old Kilpatrick	Medium	The number of jobs anticipated from the construction and operational phases of the propose development results in the Local Study Area being assessed to be of medium sensitivity.	Construction and Operation

16.6 Embedded Mitigation

16.6.1 As detailed in **Chapter 3 – The Proposed Development**, a number of design features and embedded mitigation measures have been incorporated into the design and construction of the proposed development to avoid, prevent or minimise significant adverse environmental effects and to enhance beneficial effects. Embedded mitigation measures of relevance to this assessment are:

Construction Phase

- Where possible, construction material will be sourced locally to support local supply chain businesses and enhance potential effects of the proposed development on the local labour market.

- The implementation of a Construction Environmental Management Plan (CEMP) and constituent Construction Traffic Management Plan (CTMP) to be provided post-consent and prior to the commencement of the construction phase. Of relevance to this assessment, the CEMP and CTMP will include measures and procedures to minimise traffic disruption and amenity effects during construction, including to adjacent site owners and users. Particular consideration will be afforded through the CTMP to maintaining continuity of access and minimising traffic disruption along the un-named private road which connects the site with Erskine Ferry Road.

Operational Phase

- The Applicant's intention is that, once completed and operational, the proposed development will replace their existing fabrication facility which is currently located in leased premises in Renfrew. Whilst the re-location of the facility is relatively localised and will remain within the Wider Study Area, the Applicant will make reasonable endeavours to support the retention of existing employees from their current facility to the new site;

16.6.2 If required, further mitigation and enhancement measures identified through the EIA process are detailed in **Section 16.8** below before likely residual effects from the proposed development are then stated in **Section 16.9**.

16.7 Assessment of Likely Effects

Construction Phase

Capital Expenditure

16.7.1 The construction requirements for the proposed development can be broken down into four major sections:

- Remediation of the existing site. These costs fall under a different planning application and are therefore excluded from the analysis;
- The construction of the Marine Fabrication Shed;
- The construction of a two-storey office and staff facilities block; and,
- External and site works comprising adoptable standard/hgv lorry loading specification to access and egress roads, internal carpark roads and permeable paving to parking bays, concrete yard space with bottoming and surface water drainage, and soft and hard landscaping.

16.7.2 The above-listed sections, excluding remediation works, constitute the construction phase of the proposed development and are therefore factored into the analysis. These major construction sections will yield direct capital expenditure as well as resulting in indirect or induced expenditure, all of which would result in associated employment effects as detailed below in **Table 16.5** and **Table 16.6**.

16.7.3 Total estimated capital cost of the above-stated construction phases for the proposed development is estimated at £19.9m. This figure does not include costs associated with necessary remediation works, as these fall under a separate planning application and are therefore not considered by this assessment.

16.7.4 As a Principle Contractor has not yet been appointed, it must be noted that actual contract values and construction expenditure may be subject to revision. At the time of writing the above-stated capital cost estimate of £19.9m has been used in the economic modelling and subsequent analysis.

Gross Employment

16.7.5 Dividing the expected construction costs of the proposed development by the average turnover required to support one construction employee indicates that the construction phase of the project is likely to create or support 210 full-time equivalent (FTE) in gross construction employment. The proposed development is therefore projected to support or create 70 construction jobs (FTE) per annum during the construction phase. Actual employment figures

may fluctuate over the three-year period due to the complexity and range of specialities required to construct a project of this scale.

Net Employment

16.7.6 Taking into account the additionality factors of leakage, deadweight and displacement, detailed in **Appendix 16.3 – Additionality Assumptions**, the gross employment estimates have been converted to net employment figures. On the basis of these additionality assumptions, over the three-year construction period the 210 construction jobs supported or created (gross) are expected to support approximately:

- 120 net additional jobs in the Local Study Area; and,
- 81 net additional jobs in the Wider Study Area; and,

Table 16.5 - Net Construction Jobs **Error! Not a valid link.**

16.7.7 In accordance with the criteria detailed in **Section 16.3**, likely construction employment associated with the proposed development on the **Medium Sensitivity** labour market receptors in both the Local and Wider Study Areas, which would represent a **Moderate Beneficial** magnitude of change on the labour market across both spatial areas.

Key Business Sectors

Construction

16.7.8 The proposed development is not expected to result in significant construction displacement, as there is a reasonable supply of construction labour in the Local Study Area, see **Appendix 16.3 – Additionality Assumptions** for details. On the whole, when considering the level of construction activity in the Wider Study Area, the addition of the proposed development is considered to be a **Slight/Moderate Beneficial** magnitude of change within the construction sector of the Local Study Area and the Wider Study Area.

Operational Phase

16.7.9 For the purposes of modelling, the proposed development is assumed to operate in perpetuity and likely socio-economic effects from the operational phase of the proposed development have been assessed accordingly.

16.7.10 The substantial advantages afforded by the proposed development site, in terms of increased area and direct water access, will enable significant growth in the Applicant's business, with consequential effects on employment and industrial activity expected. Once operational, effective linkages with local job centres, employability programmes and partners will be established to help maximise the employment of local residents, defined as those residing within the Local Study Area.

Gross Employment

16.7.11 Employment estimates provided by the Applicant indicate that 40 employees will transfer from their existing facility in Renfrew to the new MFC, and an additional 50 will be hired at the new site. These figures yield a total gross employment figure for the operational phase of 90 Full Time Equivalent (FTE) positions.

Net Employment

16.7.12 As with construction phase employment, the gross operational phase employment figures need to be adjusted for additionality factors (leakage, displacement, deadweight and multiplier), detailed in **Appendix 16.3 – Additionality Assumptions**. The additionality assumptions have been used to convert the predicted gross direction operational employment from the proposed development into overall net employment for the operational phase. It is anticipated that the jobs created by the proposed development (i.e. the non-transferred positions) will be phased in over the first few years of operation, however the net employment impact is assessed on the expected capacity of the operational facility.

16.7.13 Based on expected gross FTE employment estimates for the proposed development, the application of the additionality assumptions suggests that the proposed development will support a net 78 FTE jobs during the operational phase in West Dunbartonshire i.e. to the Local

Study Area. As 40 jobs are transfers within the Wider Study Area, only the additional net jobs are assessed on this spatial scale.

Table 16.6 – Net Operational Jobs

Net Operational Jobs	
WDC	78
GCR	9

Key Business Sectors

Marine Engineering

16.7.14 Beginning in year one of operations, 2022, the proposed development would represent a net addition to the marine engineering sector. The proposed development site will afford the Applicant the additional in space and direct water access necessary to increase growth in their businesses and secure higher value vessel and plant equipment building contracts. The new facility will result in clear beneficial effects to both the Local and Wider Study Areas. The Local Study Area will experience an increase in employment opportunities through the construction of the proposed development and the revival of a key industry sector, with the benefits occurring in each phase respectively. The Wider Study Area will experience benefits through the increase in productive capacity on the part of the Applicant and the subsequent knock-on benefits propagating through the economy via supply chain effects.

16.8 Further Mitigation and Enhancement

16.8.1 In the absence of any likely adverse socio-economic effects from the construction and operation of the proposed development, no further mitigation or enhancement measures are considered necessary.

16.9 Residual Effects

16.9.1 Taking account of proposed mitigation and enhancement measures, the likely residual effects from the construction and operation of the proposed development are identified in **Table 16.7** below.

Table 16.7 - Summary of Likely Residual Effects

Potential Effect	Duration	Impacted Receptor(s)	Receptor Sensitivity	Residual Magnitude of Change	Residual Effect Level	Residual EIA Significance	Rationale
Construction Phase							
Net Additional Employment	Short Term	Labour Market	Medium	Low	Moderate Beneficial	Significant	As per assessment in Section 1.6
New Economic Activity	Short Term	Construction Sector	Medium	Medium	Moderate Beneficial	Significant	As per assessment in Section 1.6
Operational Phase							
Operational Expenditure (Direct and Supply Chain)	Long Term	Marine Fabrication & Supply Chain	Medium	Unknown	Unknown beneficial	Unknown	As per assessment in Section 1.6
Net Additional Employment	Long Term	Marine Fabrication Sector	Medium	Low	Minor beneficial	Significant	As per assessment in Section 1.6
New Economic Activity	Long Term	Manufacturing & Supply Chain	Medium	Low	Moderate Beneficial	Significant	As per assessment in Section 1.6
Regeneration and Resilience	Long Term	Old Kilpatrick / West Dunbartonshire Council	Low	Medium	Moderate Beneficial	Significant	As per assessment in Section 1.6

16.10 Monitoring

16.10.1 In the absence of any likely significant adverse socio-economic effects from the construction and operation of the proposed development, no monitoring of likely socio-economic effects is considered to be required.

16.11 Cumulative Effects

16.11.1 Further to the analysis in **Paragraph 16.3.21** no relevant cumulative developments have been identified which could result in likely significant cumulative effects in combination with the proposed development. As a result, a separate assessment of likely significant cumulative effects is not required.

16.12 Summary

16.12.1 This chapter of the EIA report identifies and assesses the likely significant socio-economic effects resulting from the construction and operation of the proposed Marine Fabrication Centre.

16.12.2 Taking account of the relevant additionality factors, the assessment examines likely socio-economic effects from the proposed development on the labour market and key business sectors. The assessment has been informed by detailed baseline analysis of the West Dunbartonshire labour market and business demographics.

16.12.3 The assessment examines likely socio-economic effects in relation to:

- Direct, indirect and induced employment/labour market effects;
- Direct and indirect effects on relevant business sectors (construction and marine engineering);

16.12.4 Taking account of both the sensitivity of identified receptors and the magnitude of predicted socio-economic effects, the assessment concludes that the proposed development is likely to result in the following residual effects:

Construction Phase

- Net additional employment: The creation of 119 net additional FTE jobs in the Local Study Area, resulting in a **Moderate Beneficial** and Short Term effects on net additional employment;
- New economic activity: **Moderate Beneficial** and Short Term effects on net additional economic activity.

Operational Phase

- Net additional employment: The creation or support of 78 net additional jobs during the operational phase represent a **Minor Beneficial** and Long Term effects in the labour market;
- Net additional economic activity: **Moderate Beneficial** and Long Term effects from new economic activity;
- Regeneration and Resilience: **Moderate Beneficial** and Long Term effects in terms of regeneration and enhancing resilience through expansion of the business base; and,
- Operational Expenditure (Direct and supply chain): **Unknown Beneficial** and Long Term effects on marine engineering and supply chain.

16.12.4 The assessment therefore concludes that the proposed development would result in likely significant socio-economic effects, with respect to EIA regulations, in relation to net additional employment; key business sectors (construction and marine engineering); local economic development; regeneration and resilience; and operational expenditure. In all cases, predicted likely effects on the population would be beneficial in nature.

16.13 References

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17 Risk Management

17.1 Introduction

- 17.1.1 This chapter sets out a proportionate assessment of expected and likely significant effects deriving from the vulnerability of the proposed scheme to relevant environmental and major accident and disaster risks as they relate to environmental receptors.
- 17.1.2 This chapter is provided solely to satisfy relevant requirements within the EIA Regulations; it is not intended to present a full risk assessment of the proposed development or to be used outwith the context of EIA. No liability relating to potential risks is therefore accepted as a consequence of the inclusion of this chapter in the EIA Report.

17.2 Approach to Risk Assessment and Management

Statutory Requirements

- 17.2.1 This assessment seeks to confirm that all environmental and major accident and disaster risks of relevance to the proposed development and being likely to result in significant environmental effects have been assessed within this EIA Report.
- 17.2.2 Schedule 4 of the EIA Regulations sets out the following requirements regarding the assessment of environmental risks and the vulnerability of a development proposal to major accidents and disasters (leading to associated environmental effects):
- A general requirement to describe within an EIA Report the likely significant effects “*resulting from...risks to human health, cultural heritage or the environment (for example due to accidents or disasters)*”. This can be summarised as requiring consideration of the ‘environmental risks’ from a development proposal; and
 - A specific requirement to identify, describe and assess “*the expected effects deriving from the vulnerability of the development to risks, so far as relevant to the development, of major accidents and disasters*”. There is also a similar requirement for Environmental Statements to describe “*the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned*”. These requirements can be summarised as requiring consideration of ‘major accident and disaster risks’ and associated environmental effects from a development proposal. In line with other EIA requirements, the assessment should focus on those risks likely to result in significant effects on environmental receptors.
- 17.2.3 The EIA Regulations also require that “*where appropriate, this description (of a project’s vulnerability to major accidents and disasters) should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies*”. This dovetails with the overarching requirement set out within Schedule 4 (paragraph 7) to identify mitigation measures and any proposed monitoring arrangements to address identified likely significant adverse environmental effects.
- 17.2.4 The above requirements to assess environmental and major accident and disaster risks in this ES are considered to be applicable given the nature of the proposed development and known flood and contamination risks affecting the site.

Scope

- 17.2.5 Applicable legislation pertaining to the safety of construction and operational works must be complied with during the construction and operational phases of the proposed development. These wider legal requirements operate separately from and should not be considered in the context of the EIA Regulations, the function of which is solely to assess likely significant effects from the proposed development. Risks addressed through applicable health and safety

legislation (e.g. risks to the health and safety of construction workers and employees on the site from undertaking construction and operational activities) have therefore been scoped out of this assessment.

17.2.6 The assessment of risk has been informed by the environmental characteristics of the site, with particular reference to those which have the potential to generate risk, including:

- Contamination as a result of historical activities on the site
- Unexploded Ordnance from WWII
- Ecological Designations – Inner Clyde SPA, SSSI and RAMSAR site.
- Flood Risk from the River Clyde
- Neighbouring activities –
 - Bonded whisky warehouses located east of the site are a COMAH Top Tier Site and a HSE Notification Zone surrounds the warehouses.
 - This Zone also covers a strip of land within the site where a High Voltage overhead power line and live electricity substation are present

Policy Context

17.2.7 This assessment has been prepared in accordance with relevant planning policy considerations as detailed in **Chapter 5 – Legislative and Policy Context**, in particular the following relevant policies within the LDP2 Proposed Plan:

- WD1 Waterfront Development
- Policy FCC1 – Forth & Clyde Canal
- CP1 – Creating Places
- CP3 Masterplanning and Development briefs
- BE1 Scheduled Monuments and Archaeological Sites
- BE2- Listed Buildings
- ENV1 Nature Conservation
- ENV2: Landscape Character
- ENV5- Water Environment
- ENV6 – Flooding
- ENV8- Air, Light and Noise Pollution
- ENV9- Contaminated Land
- ENV10- Implementation of the SEA Environmental Report
- CON1 Transportation Requirements for New Development
- CON3- Core Paths and Natural Routes
- ZW1 Sustainable Waste Management

Key Terms and Definitions

17.2.8 To remain proportionate, this assessment focuses on the identification, assessment and management of ‘relevant risks’ (i.e. risks relating to the site and the proposed development) which have the potential to occur and to result in ‘serious damage’ to the environment, which for this EIA is defined as:

The loss of life or permanent injury and/or permanent or long-lasting damage to an environmental receptor which cannot be restored through minor clean up and restoration efforts.

17.2.9 Risks unrelated to the site or the proposed development or which have no possibility of resulting in serious damage to the environment even if they did occur have therefore not been considered. The UK Government's National Risk Register of Civil Emergencies – 2017 Edition was used to define potential major accident and disaster risks and the scope of this ES as set out in **Section 4.5** was used to define potential environmental risks. From this, 'relevant risks' relating to the site and the proposed development were then identified and subject to further consideration.

Assessment Methodology

17.2.10 A systematic approach was adopted to identify and assess relevant risks arising from the proposed development. This considered:

- Whether potential risks are 'relevant' and could result in 'serious damage' to the environment (as defined above). Only relevant risks resulting in serious damage were considered further;
- Risk characteristics - the nature of the potential exposure of sensitive receptors to hazards, major accidents or disasters and of the potential consequences, i.e. considering the likelihood and severity of the relevant risk occurring as they pertain to the environment;
- Whether or not the risk has been sufficiently assessed through the technical assessments presented in **chapters 6 – 13** to identify all likely significant effects on the environment. This demonstrates compliance with the requirement in Schedule 4 of the EIA Regulations to describe "*the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned*"; and
- Whether or not suitable prevention, management, preparedness and response measures are proposed to address the identified risks arising from or affecting the proposed development. This would ensure the avoidance of any likely significance effects resulting from identified environmental and major accident and disaster risks.

17.3 Assessment of Relevant Risks

17.3.1 The only environmental or major accident and disaster risks relevant to the site and the proposed development are:

- Disturbance of presently unknown archaeological remains – assessed in **Chapter 15 – Cultural Heritage**. Taking account of proposed mitigation, no residual significant risks are considered likely;
- Flooding – assessed in **Chapter 10 – Water**. Taking account of proposed mitigation, no residual significant risks are considered likely;
- Contamination risks (to workers, residents, wildlife, the River Clyde and the public) - assessed in **Chapter 6 – Ground Conditions**. Taking account of proposed mitigation, no residual significant risks are considered likely;
- Unexploded Ordnance from WWII – This risk has primarily been dealt with in the application for remediation works (DC18/245) to allow for ground works to progress. Site investigations have included a desk study and an intrusive search for unexploded Ordnance as a precursor to current site investigation works and subsequent remediation work. The future baseline reported in this ES, will have mitigated the risk from Unexploded ordnance as reported in **Chapter 6 – Ground Conditions** .
- Geo technical stability – presence of previously deposited material (made ground in the West of the site – assessed in **Chapter 6 – Ground Conditions**. Taking account of proposed mitigation, no residual significant risks are considered likely;
- Poor air quality events – assessed in **Chapter 12 – Air Quality**. No residual significant risks are considered likely;

- Transport incidents - assessed in **Chapter 7 – Traffic and Transport**. Taking account of proposed mitigation, no residual significant risks are considered likely; and,
- Risks from neighbouring activities – The adjoining whisky bond at Dalmuir is a COMAH upper tier site. An emergency plan is in place to mitigate risk in the event of an accident in this location, however residual risk remains for the future users of the Malin Group buildings in this location.

17.3.2 Other potential risks (e.g. risks of fire and explosion, security breaches, etc.) are either not relevant to the site and the proposed development or would not result in likely significant environmental effects in the event that such risk events did occur.

17.3.3 Potential risks from the construction and operation of the proposed development will be addressed through relevant management plans, specifically including the development and implementation of a CEMP, and the implementation of appropriate operational procedures including an Operational Emergency Preparedness and Management Plan.

Conclusion

17.3.4 The assessment provided above demonstrates that:

- Relevant environmental and major accident and disaster risks associated with the proposed development which have the potential to result in likely significant effects on the environment have already been assessed in this EIA Report. No further assessment is considered to be required to demonstrate compliance with the EIA Regulations and applicable planning policy considerations; and,
- Appropriate management measures have been proposed to address any environmental or major accident arising from the proposed development.

17.4 Summary

17.4.1 This chapter has set out a proportionate assessment of likely risks arising from the proposed development. The assessment concludes that no risks likely to give rise to **residual** significant adverse effects have been identified and that appropriate management measures have been proposed (as embedded or further mitigation) to address any environmental or major accident risks arising from the proposed development.

17.5 References

17.5.1 Cabinet Office, HM Government (2017) National Risk Register of Civil Emergencies – 2017 Edition:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/644968/UK_National_Risk_Register_2017.pdf

18 Environmental Interactions: Health & Amenity Impacts

18.1 Introduction

18.1.1 This chapter builds upon the individual technical assessments presented in **Chapters 6 – 16** and the assessment of likely environmental and major accident and disaster risks presented in **Chapter 17** to provide an assessment of likely impact interactions and synergistic effects from the construction and operation of the proposed development.

18.2 Methodology

18.2.1 The assessment of individual likely significant effects from the proposed development has been based on the generic EIA significance criteria provided in **Table 4.1** and topic specific impact assessment methodologies detailed within **subsection X.3 of Chapters 6 – 16**. To identify likely impact interactions and synergistic effects, this chapter considers whether each identified likely residual effect would be likely to interact with any other effects, and what the consequences of this occurring are likely to be. In doing so, this chapter also provides a summary of likely significant residual effects from the proposed development.

18.3 Overview of Likely Residual Significant Environmental Effects

18.3.1 Taking account of all proposed mitigation and enhancement measures (as detailed in **Chapter 19**), the only residual significant effects (beneficial or adverse) which are considered likely to arise from the proposed development are.

Transport (Chapter 11)

Construction Phase

- Traffic effects on Road Users of the Unnamed Private Road and Erskine Ferry Road (including Bridge) and NCN Crossing: **Moderate Adverse** and Short Term effect.

Operational Phase

- Traffic effects on Road Users of the Unnamed Private Road and Erskine Ferry Road (including Bridge) and NCN Crossing: **Moderate Adverse** and Long Term effect.

Landscape and Visual (Chapter 14)

Operational Phase

- Landscape and visual effects experienced at Mountblow and from the South Bank of the River Clyde (Viewpoints 4 and 5 as representative locations) as a result of the proposed development are **Moderate and Adverse Long-term effects**.

Socio-economics (Chapter 12)

Construction Phase

- Net additional employment: **Moderate Beneficial** and Short Term effect.
- New Economic activity: Moderate Beneficial and Short Term effect

Operational Phase

- Net additional employment: **Minor Beneficial** and Long Term effect; and
- Net additional economic activity: **Moderate Beneficial** and Long Term effects from new economic activity;

- Regeneration and Resilience: **Moderate Beneficial** and Long Term effects in terms of regeneration and enhancing resilience through expansion of the business base;
- 18.3.2 The assessments presented in **Chapters 6 - 16** conclude proposed construction activities and the subsequent operation of the proposed development are also likely to result in a range of other beneficial and adverse effects, each of which would be not significant in the context of the EIA Regulations.
- 18.3.3 The interaction of all assessed likely environmental effects could generate synergistic economic, health and amenity effects, each of which are considered below in turn.

18.4 Likely Impact Interactions and Synergistic Effects

Economic Effects

- 18.4.1 As noted above, the assessment of likely socio-economic effects provided in **Chapter 16** concludes that the construction and operational phases of the proposed development are likely to generate a range of beneficial effects, principally in terms of employment creation, and economic activity within key business sectors. Taken together, these individual socio-economic effects are likely to generate a beneficial synergistic effect on the overall health of the economy within West Dunbartonshire.

Health Effects

- 18.4.2 Regulation 5(4) of the EIA Regulations requires an EIA to identify, describe and assess significant effects on “*population and human health*”, whilst Schedule 4 of the same regulations requires an ES to describe likely significant effects resulting from “*risks to human health*”. In the context of the proposed development, likely effects on human health have the potential to arise from effects relating to pollution risks and physical environmental quality (e.g. from noise and air quality emissions, risks of contamination exposure, changes in flood risk, etc.). As assessed in **Chapters 6 – 16**, these types of effects are primarily likely to occur during construction activities, although limited operational effects are also predicted.
- 18.4.3 Taking account of proposed mitigation and enhancement measures, no individual likely residual significant effects on physical environmental quality are considered likely. The interaction of predicted residual adverse effects on physical environmental quality is also not likely to result in any wider synergistic residual significant adverse effects arising.
- 18.4.4 In the absence of any likely residual significant effects on physical environmental quality, no overall residual significant human health effects are predicted to arise from the proposed development. No monitoring of potential health risks or effects is therefore considered necessary.

Amenity Effects

- 18.4.5 As noted above, the construction and operational phases of the proposed development are predicted to result in a number of residual adverse, albeit not significant, effects on the physical environment. Emissions (noise and air) are however predicted to remain within legally accepted limits and mitigation measures including a CEMP and constituent CTMP would be adopted to minimise adverse amenity effects.
- 18.4.6 In the context of the proposed development, likely effects on amenity have the potential to arise from:
- Direct effects relating to pollution risks and physical environmental quality, as considered above; and
 - Indirect effects relating to the quality of the built environment, in particular upon landscape character, visual receptors, recreational receptors and the setting of heritage assets within the vicinity of the site. These individual effects are assessed in relevant technical assessment chapters.

18.4.7 Each of the likely direct and indirect effects on aspects of amenity would not interact with any other likely effects from the proposed development, e.g. in terms of affecting the amenity of the same receptor in multiple ways (synergistic effects). On this basis it can be concluded that the proposed development would not give rise to overall amenity effects of a level likely to be either overbearing or significant in the context of the EIA Regulations. No monitoring of potential amenity effects is therefore considered necessary.

18.5 Summary

18.5.1 This chapter has provided an assessment of likely impact interactions and synergistic effects from the construction and operation of the proposed development. The assessment concludes that whilst a range of beneficial and adverse residual environmental effects are likely to arise from the construction and operation of the proposed development, the interaction of these effects is no likely to result in significant effects on human health or overall amenity.

19 Schedule of Mitigation and Monitoring

19.1 Introduction

- 19.1.1 This chapter of the EIA Report provides a consolidated schedule of all mitigation and enhancement measures proposed to avoid significant adverse effects and enhance beneficial effects from the construction and operation of the proposed development.
- 19.1.2 The chapter is provided primarily to assist WDC as the relevant local planning authority and EIA competent authority with its obligation under Regulation 29(f) of the TCPA EIA Regulations to secure any proposed mitigation measures and monitoring arrangements relating to significant adverse effects within any planning permission decision notice granted for the proposed development. Whilst EIA screening has confirmed that the MW EIA Regulations are not specifically engaged by the proposed development, this chapter is also provided to assist the Scottish Ministers (Marine Scotland) as the relevant marine licencing authority in securing any proposed mitigation measures and monitoring arrangements relating to the proposed marine works through any marine licence granted for the works.
- 19.1.3 As the site and the development footprint of the proposed development therein (including the proposed marine works) straddles MHWS and MLWS levels, it will be important for WDC and the Scottish Ministers to closely align the wording of any planning and marine licence conditions required in order to effectively secure the same level of environmental protection across the terrestrial, marine and inter-tidal components of the proposed development. As WDC is the sole EIA competent authority for the purposes of the proposed development, it is expected that WDC may determine the planning application for the proposed development prior to the Scottish Ministers then promptly determining the marine licence for the proposed marine works, taking account of any planning permission already having been granted by WDC.

19.2 Proposed Mitigation Measures

- 19.2.1 **Table 19.1** below summarises all mitigation and enhancement measures committed to by the Applicant for the construction and operational phases of the proposed development.
- 19.2.2 To allow WDC and the Scottish Ministers (Marine Scotland) to secure the mitigation and enhancement measures relevant to the element of the proposed development within their respective jurisdictions (i.e. all proposed development down to MLWS and up to MHWS respectively), **Table 19.1** identifies separately the measures proposed for the whole proposed development and those which apply solely to the proposed marine works (N.B. relevant measures applying to the whole proposed development also apply by default to the proposed marine works).
- 19.2.3 The proposed implementation of relevant mitigation measures through conditions attached to any planning permission and marine licence granted will secure their undertaking by the Applicant and ultimately provide an enforcement mechanism should this be required.

Table 19.1 – Summary of Proposed Mitigation Measures

Mitigation / Enhancement Measure Type	Proposed Measures	Planning Conditions Required?	Marine Licence Conditions Required?
Geo-Environmental / Contamination	<p><u>Proposed Development</u></p> <ol style="list-style-type: none"> 1. Verification that specific areas of land above MHWS level where construction activities and subsequent operational uses are proposed has been made suitable for the future intended use through prior remediation works before the commencement of such activities (Section 6.6 refers). 2. Site investigation (SI) to be undertaken on land proposed to accommodate compensatory flood storage within the wider Carless landholding (land within the Applicant's control) (Section 6.8 refers). 3. Following SI, any remediation necessary to make the proposed flood compensatory storage area suitable for the intended use to be implemented and verified prior to construction (Section 6.8 refers). 4. Development and implementation of Ground Improvement Method Statement, taking account post-remediation site conditions (Section 6.8 refers). 5. Risk Assessments and Method Statements (RAMS) for undertaking work on contaminated land to be prepared prior to the commencement of construction and thereafter implemented (including through use of appropriate personal protective equipment (PPE) construction workers (Section 6.6 refers). 	YES	NO
	<p><u>Proposed Marine Works Only</u></p> <ol style="list-style-type: none"> 6. Marine SI to be undertaken within the footprint of the proposed marine works for geo-technical and geo-environmental purposes (Section 7.8 refers). 7. Following marine SI, any remediation works necessary to reduce levels of sediment contamination, limit contamination dispersal into the water column and to make the footprint of the proposed marine works suitable for future intended use (as a heavy lift quay) to be implemented and verified prior to construction of the proposed marine works (Section 7.8 refers). 		
Design Features	<p><u>Proposed Development</u></p>	YES	YES – measures 10, 11, 16 and 17 only

Mitigation / Enhancement Measure Type	Proposed Measures	Planning Conditions Required?	Marine Licence Conditions Required?
	<ol style="list-style-type: none"> 8. Adoption of Mitigation Hierarchy and Key Ecological Mitigation Parameters defined in Section 9.6 to avoid adverse effects on Inner Clyde SPA, SSSI and Ramsar Site qualifying and special interests (Section 9.6 refers). 9. Development in accordance with Appendix 6.4 – Ground Investigation Report (Geotechnical), including use of suitable and safe piling techniques (Section 6.6 refers); 10. Development in accordance with submitted planning and marine licence application drawings (Section 3 refers). In consequence: <ol style="list-style-type: none"> i. Provision of large ground slab, concrete hard standing and landscaping within the proposed development (Section 6.6 refers). ii. No buildings within the functional floodplain and finished floor levels of buildings to be below the T200+cc Q2+cc, peak flood level with a 600mm freeboard allowance (Section 8.6 refers). iii. Screening of building plant behind large buildings to reduce noise (Section 13.8 refers). 11. Development and implementation of Detailed Drainage Plan in accordance with Appendix 8.3 – SuDS and Drainage Strategy, including: <ol style="list-style-type: none"> i. Foul discharges to River Clyde in accordance with WAT-RM-03 (Section 8.6 refers). ii. Surface water drainage to be designed using SuDS principles such that a level of treatment will be provided prior to discharge of surface waters to the River Clyde (Section 8.6 refers). iii. Provision of proposed BioDisc package waste water treatment plant in accordance with identified specification (Section 8.8 refers). 12. Provision of adequate compensatory flood storage on suitable land within the wider Carless landholding (under the control of the Applicant) (Section 8.8 refers). 13. Provision of landscape design features as detailed within submitted Design and Access Statement (Section 14.6 refers). 14. Use of limited palette of high-quality materials on external facades (Section 14.6 refers). 15. Development and implementation of Landscape and Ecology Management Plan (LEMP), including: 		

Mitigation / Enhancement Measure Type	Proposed Measures	Planning Conditions Required?	Marine Licence Conditions Required?
	<ul style="list-style-type: none"> i. Retention and enhancement of existing mature and semi-mature woodland vegetation along western and southern site boundaries (Section 14.6 refers). ii. New planting and re-shaping of existing tree/vegetation belt at the southern site boundary to enhance green network (Section 14.8 refers). <p>16. Development and implementation of Lighting Strategy in accordance with Appendix 9.3 – Lighting Design Technical Note (Section 9.6 refers).</p> <p>17. Avoidance of direct effects on Inner Clyde SPA, SSSI and Ramsar Site through use of jetty cells 3 & 4 and adjacent land for proposed heavy lift quay (Sections 7.6 and 10.6 refer).</p> <p>18. Installation of gas protection measures on proposed buildings unless gas and vapour monitoring (post site remediation) determines no requirement for such measures (Section 6.6 refers).</p>		
	<p><u>Proposed Marine Works Only</u></p> <p>19. Minimisation of proposed marine works footprint, not exceeding 2,400m² (Section 7.6 refers).</p>	NO	YES
Construction Phase Pollution Prevention Measures	<p><u>Proposed Development</u></p> <p>20. Development and implementation of Construction Environmental Management Plan (CEMP), to include:</p> <ul style="list-style-type: none"> i. Procedures and methods to manage and extract any encountered residual contamination (Section 6.6 refers). ii. Phasing plans, working methods and physical controls to segregate construction and remediation activities (Section 6.6 refers). iii. Phasing plans, working methods and physical controls to minimise noise and vibration effects to adjacent site users (Section 13.6 refers). iv. Contractor management (Section 3 refers). v. Materials storage (Section 3 refers). vi. Construction traffic and parking management (Section 11.6 refers). vii. Construction dust mitigation measures as specified in IAQM Guidance (Section 12.6 refers). 	YES	YES – measures 20 – 24 only

Mitigation / Enhancement Measure Type	Proposed Measures	Planning Conditions Required?	Marine Licence Conditions Required?
	<ul style="list-style-type: none"> viii. Measures and procedures to manage sources of potential pollution from fuel and other chemical spillages, concrete contamination, sediments, silts, grits and other pollutants (Section 8.6 refers). ix. Oil storage in accordance with General Binding Rules (GBRs) 26, 27, and 28 (Section 8.8. refers). x. Chemical and hazardous substances storage procedures (Section 8.8 refers). xi. Deployment of spill kits and drip trays for any refuelling activities (Section 8.8 refers). xii. Regular inspection and maintenance of vehicles, tanks and bunds to be undertaken (Section 8.8 refers). xiii. Welfare facilities to include closed-system toilets, with disposal of foul drainage by tanker to a suitable off-site facility (Section 8.8 refers). <p>21. Adherence to all Controlled Activities Regulations (CAR) Licence requirements (to be authorised by SEPA) and associated Pollution Prevention Plan (PPP) (Section 8.6 refers).</p> <p>22. Development and implementation of Construction Drainage Plan in accordance with Appendix 8.3 – SuDS and Drainage Strategy, including:</p> <ul style="list-style-type: none"> i. Diversion of clean runoff from vegetated areas and offsite around construction areas to avoid mixing with sediment laden water (Section 8.8 refers). ii. Deployment, maintenance and regulation inspection of construction phase SuDs, containment systems and suitable treatment or settlement facilities in accordance with CAR Licence, PPP, WAT-SG-75 and relevant CIRIA guidance (CIRIA 2001) to prevent release of sediments and pollutants to the water environment (Section 8.8 refers). iii. Equipment to be washed in areas specifically designed to contain wet concrete and wash water. Wash water to then be disposed of to suitable authorised off-site facility (Section 8.8 refers). iv. Construction access tracks to incorporate appropriate drainage including ditches, camber to shed water to the road channel, frequent cross drains and grips/ offlets. Trackside drainage to be routed to the construction SuDS measures prior to discharge to the water environment (Section 8.8 refers) 		

Mitigation / Enhancement Measure Type	Proposed Measures	Planning Conditions Required?	Marine Licence Conditions Required?
	<p>23. Adoption of specific management measures for short-term storage and testing of any suspected contaminated material encounter (post remediation) (Section 8.8 refers).</p> <p>24. Construction site management and activities to be sited and undertaken in accordance with relevant guidance within BS5228-1:2009+A1:2014 to minimise noise and vibration effects to ecological receptors and adjacent site users (Section 13.6 refers).</p> <p>25. Concrete and mortar preparation to be sited on impermeable areas at least 10m away from watercourses or surface water drains (Section 8.8 refers).</p> <p>26. Use of oil separator if required due to high risk of fuel/ oil contamination (Section 8.8 refers).</p> <p>27. Development and implementation of Soil Management Plan, including procedures for:</p> <ul style="list-style-type: none"> i. Areas stripped of hardstanding, earth and vegetation to be kept to a minimum at any one time (Section 8.8 refers). ii. Soil loss and erosion to be minimised through careful storage, reinstatement and landscaping (Section 8.8 refers). iii. Soil stockpiles to be placed in areas of minimal risk of slippage or erosion from drainage, not located within 20m of the River Clyde (Section 8.8 refers). <p>28. Excavations to be undertaken and managed in accordance with CAR General Binding Rule 11, including:</p> <ul style="list-style-type: none"> i. Drainage or pumping from excavations to be minimised through design. Temporary cut-off drains to be installed, if required, to prevent surface water runoff entering excavations (Section 8.8 refers). ii. Excavations to be left open for minimum period required for undertaking construction works to avoid ingress of water, minimise erosion and the need for de-watering (Section 8.8 refers). iii. Any water pumped out of excavations to be treated by passing through SuDS prior to discharge to the water environment (Section 8.8 refers). 		

Mitigation / Enhancement Measure Type	Proposed Measures	Planning Conditions Required?	Marine Licence Conditions Required?
	<p>iv. Mechanical silt traps to be deployed where runoff contains significant amounts of silt which may overwhelm conventional SuDS features (Section 8.8 refers).</p>		
<p>Construction Phase Ecological Mitigation Measures (additional to Pollution Prevention)</p>	<p><u>Proposed Development</u></p> <p>29. Development and implementation of Bird Hazard Management Plan (to safeguard aviation interests), including monitoring of standing water, earthworks, re-instatement of grass verges, species numbers and spacing of trees and shrubs (Section 9.6 refers).</p> <p>30. Appointment of Ecological Clerk of Works (EcOW), with attendance on-site to supervise construction activities likely to generate ecological disturbance effects (Section 9.6 refers).</p> <p>31. EcOW to carry out pre-site clearance checks where site clearance (vegetation clearance) is required during the bird breeding season (March-August inclusive) (Section 9.6 refers).</p> <p>32. Provision of Temporary Visual Screening: A physical barrier along the southern boundary of the working area (e.g. mesh or fabric screen on Heras fencing, wooden hoarding or similar) will provide a visual screen against visual and noise disturbance from the construction works to the SPA, where these take place the site during the winter months (September-March inclusive).</p> <p>33. EcOW to undertake regular monitoring of CEMP implementation and management of any required pre-construction or updated ecological surveys as required to monitor activity of protected or otherwise notable species (Section 9.6 refers).</p> <p>34. Where possible, clearance of suitable nesting habitat to be timed to take place in autumn and winter in order to avoid the nesting season (March to September inclusive). This will include enabling vegetation clearance works in advance of commencement of the construction works, wherever possible (Section 9.6 refers).</p> <p>35. Any clearance works carried out during the nesting season to be completed under an Ecological Watching Brief with EcOW pre-commencement surveys and supervision. Any nests are identified to be retained in-situ within an appropriate buffer (Section 9.6 refers).</p> <p>36. Trenches and excavations to be covered at the end of each working day, or to include ramps, and stored pipes to be capped (or stored vertically), to prevent</p>	<p>YES</p>	<p>YES – measures 30, 32, 36, 38 and 39 only</p>

Mitigation / Enhancement Measure Type	Proposed Measures	Planning Conditions Required?	Marine Licence Conditions Required?
	<p>entrapment of animals. During longer periods of site shut down, trenches and excavations to be infilled or covered (Section 9.6 refers).</p> <p>37. Bright construction lighting to be avoided during September-March inclusive, overnight, around dusk/dawn and in the direction of adjacent Local Nature Conservation Site (Section 9.6 refers).</p> <p>38. Site speed limit of 15 mph to be enforced for all construction traffic (Section 9.6 refers).</p> <p>39. European Protected Special (EPS) licence for otter disturbance to be obtained from SNH and thereafter implemented, including through pre-construction surveys and avoidance of foreshore construction activity at dawn/dusk and during hours of darkness (Section 9.8 refers).</p> <p><u>Proposed Marine Works Only</u></p> <p>40. Development and implementation of Marine Piling Method Statement, including:</p> <ul style="list-style-type: none"> i. Use of vibro piling where practicable (Section 10.6 refers). ii. Marine piling works restricted to daylight hours (where practicable) and to between mid-November and April (Section 10.8 refers). iii. Use of soft start piling techniques (Section 10.8 refers). 		
Construction Phase Other Mitigation Measures	<p><u>Proposed Development</u></p> <p>41. Construction activities to be carried out in full compliance with appropriate health and safety legislation, guidance documents and approved codes of practice published by the Health and Safety Executive (HSE) (Section 6.6 refers).</p> <p>42. Watching brief to be maintained during construction for large and significant quantities of visible asbestos and asbestos containing materials (ACMs) in subsurface. If encountered, work to be paused pending further assessment (Section 6.6 refers)</p> <p>43. Unexploded ordnance risk assessment to be undertaken prior to construction of the proposed marine works, with subsequent specialist supervision of the works if required (Section 7.8 refers).</p> <p>44. Development and implementation of Construction Traffic Management Plan (CTMP), to include:</p> <ul style="list-style-type: none"> i. Construction traffic routing, site access/deliveries, parking, contractor management, parking, fuels and materials storage, standard dust and noise 	YES	YES – measures 40 - 42 only

Mitigation / Enhancement Measure Type	Proposed Measures	Planning Conditions Required?	Marine Licence Conditions Required?
	<p>suppression techniques, and standard pollution prevention and control techniques (Section 11.6 refers).</p> <ul style="list-style-type: none"> ii. Measures to minimise traffic disruption and amenity effects adjacent site owners and road users. Particular consideration to be afforded to maintaining continuity of access and minimising traffic disruption along the un-named private road which connects the site with Erskine Ferry Road (Section 11.6 refers). iii. Staff parking and plant/materials storage to be accommodated on suitable land within the site or the wider Carless landholding (adjacent land within the control of the Applicant) (Section 11.6 refers). 		
Operational Phase Pollution Prevention Management Measures	<p><u>Proposed Development</u></p> <ul style="list-style-type: none"> 45. Surface water drainage and (permanent) SuDS facilities to be managed in accordance with CAR licence and associated PPP (Section 8.6 refers). 46. Surface water drainage and SuDS facilities to be subject to regular inspection and maintenance in accordance with Appendix 8.3 – SuDS and Drainage Strategy (Section 8.8 refers). 47. BioDisc package waste water treatment plant to be operated in accordance with design specification and subject to regular inspection and maintenance in accordance with Appendix 8.3 – SuDS and Drainage Strategy (Section 8.8 refers). 48. Development and implementation of procedures to minimise and address accidental spillages from land or buildings in accordance with established industry guidance and protocols (Section 7.6 refers). <p><u>Proposed Marine Works Only</u></p> <ul style="list-style-type: none"> 49. Development and implementation of procedures to minimise and address accidental spillages from vessels in accordance with established industry guidance and protocols (Section 7.6 refers). 	NO (subject to CAR Licence)	No (subject to CAR Licence)
Operational Phase Other Mitigation Measures	<p><u>Proposed Marine Works Only</u></p> <ul style="list-style-type: none"> 50. Vessel launches to be subject to pre-launch resting otter surveys and undertaken during daylight hours where practicable (Section 9.6 refers). 	YES – measures 49 – 51 only	YES – measures 49 and 51 only

Mitigation / Enhancement Measure Type	Proposed Measures	Planning Conditions Required?	Marine Licence Conditions Required?
	51. Development and implementation of a Travel Plan to promote sustainable travel choices by staff and visitors to the site (Sections 11.6 and 12.6 refer). 52. Operational Emergency Preparedness and Management Plan to be developed, maintained and subject to regular review by the Applicant (Section 17 refers). 53. The Applicant will make reasonable endeavours to support the retention of existing employees moving from their current facility to the new site (Section 16.6 refers).		
Potential Enhancement Measures	<u>Proposed Development</u> 54. Consideration could be given by WDC to linking the traffic signal operations with the bridge operations such that the traffic lights stop traffic when the bridge is opened (Section 11.8 refers). 55. Consideration could be given by WDC to changing the priority markings and instating give-way lines at the exit from the Recycling Centre (Section 11.8 refers). 56. Where possible, construction material to be sourced locally to support local supply chain businesses (Section 16.6 refers).	NO	NO

19.3 Management Plans

19.3.1 As highlighted in bold within **Table 19.1** above, many of the proposed mitigation and enhancement measures will be developed and implemented through a suite of management plans and method statements:

- Ground Improvement Method Statement;
- Construction Drainage Plan
- Detailed Drainage Strategy;
- Landscape and Ecology Management Plan (LEMP);
- Construction Environmental Management Plan (CEMP);
- Soil Management Plan;
- Bird Hazard Management Plan;
- Marine Piling Method Statement;
- Construction Traffic Management Plan (CTMP);
- Travel Plan; and,
- Operational Emergency Preparedness and Management Plan.

19.3.2 It is expected that conditions may be attached to any planning permission and marine licence granted for the proposed development requiring these plans and statements to be submitted by the Applicant, approved by the relevant competent authority (WDC or the Scottish Ministers (Marine Scotland) and thereafter implemented during the construction and operational phases of the proposed development as appropriate.

19.3.3 To allow for a potential need to vary the individual measures or procedures detailed in these management plans and statements after their approval (for example, to address potential changes in site conditions or environmental sensitivities which are presently unforeseen, but which may emerge during the construction process), a suitable worded variation clause should be included in all relevant planning and marine licence conditions. Subject to written consent from WDC and/or the Scottish Ministers (Marine Scotland) as appropriate, this would enable the management plans to be varied after their initial approval and thereafter for the revised management plans to be implemented.

19.4 Proposed Monitoring Arrangements

19.4.1 For the reasons detailed in **Section X.10** of the technical assessments presented in **Chapters 6 – 16**, no monitoring is considered to be proportionate or required specifically in relation to the likely residual effects of the proposed development.

19.4.2 More widely, the Applicant has already committed to undertaking monitoring of boreholes at the periphery of the site (and on the wider Carless landholding) through planning application DC18/245 for the proposed remediation works. Boreholes in these locations will continue to be monitored to confirm the absence of hydrocarbon free product migrating to the River Clyde. It is provisionally envisaged that monitoring will take place every 2 months for 2 years with the ongoing frequency and duration to be evaluated at that stage as required.

19.4.3 In the event that the hanging wall barrier element of the proposed remediation works (under planning application DC18/245) requires to be installed, new monitoring and extraction boreholes will be required on the northern land-side whilst wells and pumps will require operation and maintenance. It is provisionally envisaged that monitoring, extraction and maintenance would take place every 2 months for 2 years. with the ongoing frequency and duration to be evaluated at that stage as required.

19.4.4 For the avoidance of doubt, whilst borehole monitoring would be undertaken in tandem with the construction and operation of the proposed development, this borehole monitoring will be secured through any planning permission granted for the proposed remediation works and does

therefore not need to be secured through any planning permission or marine licence application granted for the proposed development.

