

Gourock Pierhead Regeneration

Environmental and Public Realm Improvements

Environmental Statement



ri
Inverclyde Riverside

FAIRHURST

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CONTENTS

Environmental Statement

1.0	Introduction
2.0	Site Location and Description of Development
3.0	Planning Policy and Environmental Designations
4.0	Need and Alternatives
5.0	Socio-economic
6.0	Transport and Access
7.0	Marine Ecology
8.0	Water Environment
9.0	Hydrology and Flood Risk
10.0	Soils, Contamination and Geology

Appendices

1.1	Screening Request
1.2	Screening Opinion
1.3	Scoping Report
1.4	Scoping Response
1.5	Pollution Prevention Statement

Transport and Access

6.1	Transport Assessment
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Marine Ecology

7.1	Phase 1 Habitat Survey and Expert Eye Survey
7.2	MSC Pierhead Intertidal Survey Report

Water Environment

8.1 **Figures and Photographs**

Hydrology and Flood Risk

9.1 **Flood Risk Assessment**

Soils, Contamination and Geology

10.1 **Desk Study**

10.2 **Interpretative Report**

Drawings and Plans

87097/8001 **Location Plan**

1194/37 **Site Boundary and Existing Site Plan**

1194/40 **Split Carriageway Option Sketch Design**

87097/7201 **Marine Licence Consent Indicative Works**

1.0 Introduction

1.1 Fairhurst have been appointed by Riverside Inverclyde (RI) to undertake an Environmental Impact Assessment (EIA), presented within this Environmental Statement (ES), of the first phase of a programme of regeneration activity in and around Gourock Pierhead. This programme of regeneration work aims to:

- Improve the amenity of the area for residents, businesses and visitors;
- Promote sustainable development by increasing the viability of the town centre as a local shopping area, providing appropriate residential accommodation and improving leisure options;
- Increase spend in the town by passing tourist or day tripper traffic particularly those using the transport facilities or National Cycle Route; and
- Promote the growth of appropriate new or existing businesses.

1.2 This ES reports the likely significant effects of the first phase of the programme of regeneration work described above. Detailed planning permission is now being sought for this first phase and this ES accompanies the planning application. This first phase consists of the following development, which for the avoidance of doubt and hereafter is referred to as “the Proposals”:

- Streetscape improvements along the south side of Kempock Street;
- Realigned pedestrian and vehicular access junctions to the train station and Kempock Street car parks;
- A new vehicular access junction to the station car park at the south east edge of the site;
- Environmental improvements, soft landscaping and hard landscaping throughout the site;
- Reconfiguration of the two car parks;
- A new area of open space / public realm at the northern corner of the station car park;
- A new road on ‘reclaimed land’ across the existing beach area, supported by rock revetments, joining the two car parks, creating a one way traffic movement system through the town centre and extending the Kempock Street car park; and
- A new slipway for recreational access to the sea.

1.3 Following Fairhurst’s Screening Opinion request on 31 May 2011 (Appendix 1.1), Inverclyde Council (the Council) adopted a Screening Opinion on 21 June 2011 (Appendix 1.2) confirming that an EIA of the Proposals must be undertaken.

1.4 To focus the EIA on the environmental issues which require most attention, identify those issues which do not require detailed study and reach agreement on the most appropriate means of assessing potential effects on the environment, Fairhurst prepared a Scoping Report and then requested that the Council adopt a Scoping Opinion on 28 July 2011 (Appendix 1.3). The Council adopted a Scoping Opinion on 30 August 2011 (Appendix 1.4).

- 1.5 This ES is based on the outcomes of the Screening and Scoping processes, and also takes into account the consultation undertaken to date with the Scottish Environment Protection Agency (SEPA), Scottish Natural Heritage (SNH) and Marine Scotland. As such, the following issue specific chapters have been included in this ES, as these are the areas which the Scoping process has identified as being likely to have significant effects on the environment:
- Planning Policy and Environmental Designations;
 - Need and Alternatives;
 - Socio-economic;
 - Transport and Access;
 - Marine Ecology;
 - Water Environment;
 - Hydrology and Flood Risk; and
 - Soils, Contamination & Geology.
- 1.6 A Pollution Prevention Statement (PPS) is also included within Appendix 1.5 in line with Scoping consultation responses.
- 1.7 Additionally, this ES also contains the information required under Schedule 4 of The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 (the Regulations) and addresses the issues raised within the Scoping Response. In accordance with Schedule 4 Part 2 of the Regulations, a Non-Technical Summary has also been produced.
- 1.8 It should be noted that the Scoping process established that the likely effects on the environment in terms of Noise and Vibration, Landscape and Visual Impact, Terrestrial Ecology, Air Quality and Cultural Heritage are not likely to be significant and are not assessed in this ES. These issues have been addressed as and where appropriate in the documentation which accompanies the planning application (including the Design and Access Statement).

The Environmental Impact Assessment Process

- 1.9 EIA is a means of systematically compiling an assessment of a project's likely significant environmental effects. It presents information in a form that enables the Local Planning Authority to grant consent in full knowledge of any likely significant effects on the environment. It also enables public scrutiny of a project's likely significant effects on the environment.
- 1.10 Effects are considered on the basis of their magnitude, duration and reversibility. Cumulative and combined effects are also considered where appropriate and summarised within each specialist Chapter of the ES.
- 1.11 The significance of an effect is evaluated on the basis of the scale of the effect and the importance or sensitivity of the receptor(s). Where significant environmental effects are identified in the assessment process, mitigation and / or compensation measures are

identified and the residual effects after mitigation / compensation are evaluated. Where applicable, an indication of any difficulties encountered in compiling the required information has been identified in accordance with Schedule 4, Part 1, Section 7 of the Regulations.

1.12 Although some of the specialist assessments follow discipline-specific assessment guidance (most notably Marine Ecology), standard terminology has been used throughout the ES to describe the significance of effects for ease of comparison. The terms used where applicable are:

- Major adverse / major beneficial;
- Moderate adverse / moderate beneficial;
- Minor adverse / minor beneficial;
- Negligible adverse / negligible beneficial; and
- No significant effect.

1.13 Where applicable, short to medium term effects and long-term effects have been clearly defined in the specialist assessments.

1.14 Each specialist assessment sets out the assessment methodology followed, including the methods used for the collection of data, for the prediction and assessment of effects and evaluation of effects. Any assumptions made or limitations encountered are clearly defined.

Planning Policy

Introduction

1.15 Although the Regulations do not have a requirement for planning policy to be assessed within an ES, planning policy (and other relevant legislation) is contained within the applicable Chapters. This is in order to provide a background to the planning policies and legislation against which the planning application will be determined.

1.16 Chapter 3 provides a detailed review of planning policy and the relevant documents have been outlined below.

National Planning Policy

1.17 National planning policy is contained in the consolidated Scottish Planning Policy (SPP) and the National Planning Framework 2 (NPF) which will be addressed within the appropriate Chapters of this ES.

1.18 Guidance and advice is also set out in a range of national level publications from the Scottish Government and consultees such as SEPA.

Development Plan

1.19 The Development Plan which will be used to determine the planning application for the Proposals consists of:

- Glasgow & Clyde Valley Joint Structure Plan (GCVJSP) (2006);
- Proposed Draft of the Glasgow and Clyde Valley Joint Strategic Development Plan (SDP) (2011); and
- The Inverclyde Local Plan (the Local Plan) (2006).

2.0 Site Location and Description of Development

Site Location

- 2.1 The site is located within Gourock town centre, to the rear of Kempock Street and extends around the area of foreshore / beach directly to the west of Gourock Railway Station (refer to Drawing Number 87097/8001 which outlines the location of the site).
- 2.2 The main components of the site are two areas of car parking, the first at the railway station (refer to Photograph 2.1) and the second between the buildings on the north side of Kempock Street and the Firth of Clyde (refer to Photograph 2.2). There is an area of rough, apparently previously developed land, to the north-west of the station car park, which forms the pierhead between the car park itself and the Firth of Clyde (refer to Photograph 2.3).
- 2.3 The station car park is currently accessed via a junction with Shore Street, and the western car park is currently accessed via a junction with Albert Road, at the western end of Kempock Street. Separating these two areas is a stretch of rough ground and intertidal foreshore / beach, situated on the Firth of Clyde below buildings at the east end of Kempock Street (Please refer to Photographs 2.4 – 2.5).
- 2.4 There are areas of the public highway included in the site, such as along Kempock Street and the junctions which will be remodelled as part of the Proposals. Albert Road, Kempock Street and Shore Street provide the main arterial routes to, from and through Gourock.
- 2.5 The site's surroundings are a combination of established residential areas, commercial floor space along Kempock Street and the railway station.



Photograph 2.1 – Station Car Park



Photograph 2.2 – Kempock Street Car Park



Photograph 2.3 – Pierhead to North of Station Car Park



Photograph 2.4 – Rough Ground and Intertidal Area (looking towards Kempock Street Car Park)



Photograph 2.5 – Rough Ground and Intertidal Area (looking towards Station Car Park)

Description of Development

Introduction

2.6 The Proposals will comprise of the following aspects, and this is reflected by the application for detailed planning permission which this ES relates to:

- Streetscape improvements along the south side of Kempock Street;
- Realigned pedestrian and vehicular access junctions to the train station and Kempock Street car parks;
- A new vehicular access junction to the station car park at the south east edge of the site;
- Environmental improvements, soft landscaping and hard landscaping throughout the site;
- Reconfiguration of the two car parks;
- A new area of open space / public realm at the northern corner of the station car park;
- A new road on 'reclaimed land' across the existing beach area, supported by rock revetments, joining the two car parks, creating a one way traffic movement system through the town centre and extending the Kempock Street car park; and
- A new slipway for recreational access to the sea.

2.7 This ES reports the effects of both the construction and the operation / use of the Proposals. With this in mind, the following information is provided at this stage in terms of the likely construction processes and operations which will be used to develop the Proposals. Reference should be made to the detailed planning application as well as Drawing Numbers 87097/8001 'Site Location', 1194/37 'Site Boundary and Existing Site Plan', 1194/40 'Split Carriageway Option Sketch Design' and 87097/7201 'Marine Licence Consent Indicative Works'.

Streetscape Improvements along Kempock Street

2.8 The streetscape improvements will largely consist of alterations to parking bays and lane delineation. This will be achieved through repainting and minor physical alterations.

Realigned and New Junctions

2.9 The realignment of junctions will be undertaken by extending and altering the existing public highway using standard road construction methods. Existing surface water arrangements will be used unless specifically noted.

2.10 The new junction at the south east edge of the site will be used for vehicles to access the reconfigured station car park. Again, this will be constructed using standard road construction methods. Vehicles will not be able to exit the car park via this junction. Alterations to the

junctions around Kempock Place will be achieved by painting the road or undertaking other minor physical alterations.

Environmental Improvements and New Areas of Open Space

- 2.11 Public realm / open space improvements will consist of areas of new and enhanced open space, planting, soft landscaping and hard landscaping. This includes an area of open space in the northern corner of the site at the pierhead where a 'feature' public realm area is proposed. The rearrangement of junctions will facilitate environmental improvements, especially around the junction at the south west corner of the site.

Reconfiguration of the Car Parks

- 2.12 It is not proposed to resurface the car parks. In order to reconfigure them, the painted layout will be altered to improve circulation and parking capacity. There will be new areas of landscaping and pedestrian circulation areas, especially in the station car park (to facilitate ease of movement to and from the station). Surface water drainage will not be altered significantly, and existing outfalls will be used.

New Road and Land Reclamation etc

- 2.13 Fairhurst Drawing Number 87097 / 7201 shows a typical make up of the proposed land reclamation and new road, which will connect the two car park areas and facilitate the proposed one way traffic circulation system.
- 2.14 At this stage, it is anticipated that material will be deposited to create a development platform before primary and secondary rock armour is placed in front of this platform to create the revetment. Geotextile material will be incorporated into the make up of this aspect of the Proposals. The platform will then be further upfilled and the proposed road (which will extend through the Kempock Street car park) built on top of this platform using standard road construction methods. This will create a road which is similar to nearby adopted public highways. Surface water from the new road and car park extension will be discharged to the sea via gulleys, and filter trenches, as appropriate. There will be no alterations to existing sea walls other than cosmetic connections and interfaces at street level. This aspect of the Proposals will not extend beyond the Mean Low Water Springs level.
- 2.15 The general level of the extension to the car park and the new road will be approximately 4.5m Above Ordnance Datum (AOD). A wall of 1.2 metre in height will be incorporated into the design of the road and the car park extension.
- 2.16 It is likely that rock importation will be via road, and the route will be via the public highway, onto the site via the existing station car park junction.

New Slipway

- 2.17 A new slipway is proposed at the eastern end of the new road. This will allow continued access to the sea for recreational users (small boats, kayaks etc). This will be constructed in concrete and, again, will not extend beyond the Mean Low Water Springs level.

Phasing

- 2.18 The Proposals will be constructed in one overall phase, with no significant pauses in the construction process anticipated. However, to avoid disruption, there will be an element of 'phasing' to ensure that as much of the facilities as possible can remain open throughout construction. At this stage, it is anticipated that the final stage of the construction phase will be the construction of the junction at the station car park.

Construction Timescales

- 2.19 It is anticipated that construction of the Proposals will commence in September 2012. The construction phase is expected to last until March 2014, a construction period of 18 months.

3.0 Planning Policy and Environmental Designations

Introduction

- 3.1 This Chapter sets out the relevant planning policy and details of relevant environmental designations applicable to the determination of the planning application.

Environmental Designations

- 3.2 Based on SNH's website (SiteLink), Fairhurst note that there are no national designations in, adjacent or in close proximity to the site which have the potential to be affected by the Proposals. The western boundary of the Inner Clyde Site of Special Scientific Interest, Special Protection Area and RAMSAR is approximately 3.5 miles to the south east of the site.
- 3.3 It is noted from the Local Plan's Environmental Constraints Plan that the site is partially within the Gourock Harbour Hazardous Use and Consultation Zone. The Kempock Standing Stone Scheduled Ancient Monument (SAM) is located approximately 60 metres to the south of the site and overlooks Kempock Street. From online records it is noted that 44 - 50 Kempock Street (even numbers only) are B Listed Buildings.

National Policy

- 3.4 SPP notes that increasing sustainable economic growth is the overall purpose of the Scottish Government. SPP states that this includes creating a supportive business environment and infrastructure development. SPP also notes that the Scottish Planning System is essential to achieving the goal of sustainable economic growth.
- 3.5 In terms of the location of the Development, SPP also states that proposals associated with economic improvements should be located in sustainable locations, and that coastal areas make significant contributions to the Scottish economy.
- 3.6 SPP notes that town centres play an important role in Scotland's economy and social fabric. Town centres should be the focus of a mix of uses, which planning authorities should support and aim to enhance.
- 3.7 SPP also states that improving the natural environment and the sustainable use of natural resources is a key national priority. The preservation of biodiversity is a duty of planning authorities and other public bodies.
- 3.8 In terms of flooding and drainage issues, SPP states that "development which would have a significant probability of being affected by flooding or would increase the probability of flooding elsewhere should not be permitted". Flood risk should be taken into consideration by developers.

- 3.9 SPP defines the functional flood plain as land with a greater than 0.5% chance of flooding annually. Although development in the functional flood plan is resisted, there are certain exceptions including specific operational reasons or being unable to site the development elsewhere. In these cases, the development should be able to function in a flood event and not impede water flow.
- 3.10 Development in the Medium to High Risk area (annual probability of flooding is greater than 0.5%) in undeveloped areas will generally not be suitable. However, and as detailed above, exceptions can be made for operational reasons such as transportation and infrastructure development.
- 3.11 As detailed above, SPP states that the overriding aim of the Scottish Government is to increase sustainable economic growth, and the planning system plays a key role in this. The planning system should ensure that the design of new development results in places that people want to spend time in or live in.

Regional Policy

- 3.12 The Glasgow and the Clyde Valley Joint Structure Plan 2006 (GCVJSP) identifies Gourock as a town centre to be safeguarded under **Strategic Policy 1 – Strategic Development Locations**. As such, Gourock is included in locations where investment should be prioritised to maximise the scale of urban renewal.
- 3.13 Gourock is within the **Clyde Waterfront Development Corridor** in the Proposed Draft of the Glasgow and Clyde Valley Joint Strategic Development Plan (SDP). Within this area, development which supports economic activity, housing, tourism, fixed and green infrastructure, culture, leisure, education, health and public transport will be supported.

Inverclyde Local Plan 2006

- 3.14 The site falls within various site specific allocations and is covered by policies of the Inverclyde Local Plan (the Local Plan) (2006). There are a number of general policies which the Proposals will be assessed against. These policies are set out below to provide the planning policy context which has guided the preparation of this ES in certain areas.
- 3.15 The site is within Gourock Town Centre under **Policy R1 – Designated Centres. Policy R2 – Support for Designated Centres** states that the centres identified by Policy R1, including Gourock, will be protected, enhanced and developed through initiatives whose aims include:
- Encouraging a diverse range of activities which support the centre's vitality and viability;
 - Improving the quality of the environment through streetscape and open space improvements;
 - Improving the integration of, and the accessibility by, the full range of public transport options;

- Improving accessibility for pedestrians and cyclists;
 - Managing parking; and
 - Managing traffic to minimise disturbance and prioritise pedestrians and cyclists.
- 3.16 Specifically in terms of Gourock, the allocation area of **Policy R9 – ‘Gourock Town Centre Development Strategy’** of the Local Plan covers the site. This policy states that the Council “will seek to secure the improvement of Gourock Town Centre through the implementation of proposals set out in the ‘Central Gourock Development Strategy’ (the CGDS), and any successor strategy, in accordance with Special Area Policy SA4”. Policy SA4 encourages the development of the Gourock Pierhead site and emphasises that any development should include an integrated transport exchange. Over the long term, a range of uses are encouraged within the area to ensure the regeneration of the town centre area.
- 3.17 **Policy TA13 – Safeguarding Land for New Road Proposals** safeguards the land for, and supports the development of, the “Gourock (Kempock Street) Relief Road”. The area of foreshore within the site is allocated for “Mixed Use” under **Policy SA4 – Central Coastal Gourock**. The northern corner of the site, where it is proposed to develop a new area of public realm / open space, is shown as an Environmental Improvement Opportunity area (**ei3 – Gourock Town Centre, Including ‘The Pierhead’**).
- 3.18 **Policy HR17 – Improving the Public Realm** states that the Council will seek to improve the public realm, by entering into Partnerships with other agencies, to promote good design and landscaping.
- 3.19 The above policies demonstrate that the site is considered by the Council to be a priority for development, and the Proposals are therefore compliant with planning policy.
- 3.20 **Policy DS3 – Promotion of the Inverclyde Waterfront** states that in order for regeneration to be in line with the strategic aspirations of regional planning policy, development should be directed towards the river in line with the development frameworks of the ‘Special Areas’. This includes the site, which is covered by **Policy SA4 – Central Coastal Gourock**.
- 3.21 In terms of the Proposals, under this policy the Council will support the redevelopment of the pierhead area, the relief road and the public transport interchange to support the regeneration of Gourock. All schemes in this area must take into consideration views over the Clyde, the shoreline, and the wider landscape (such as the entrances into sea lochs on the north side of the Firth of Clyde). Effective cycling and pedestrian access throughout the area must be provided. The urban design, detailing and materials of development must reflect and complement the character of Gourock. The Council will support an attractive area of open space at the pierhead area, which could be part of a wider harbour / pier feature. The Council also wish to prioritise pedestrians and improve the environment around Kempock Street / Kempock Place. Highway access into and through the area should be through the proposed relief road, with the entrance at the western extent of the area (the existing Kempock car park entrance), the Kempock Street / Kempock Place entrance into the station car park and an access into the station car park near John Street.

- 3.22 **Policy DS4 – Presumption in Favour of Appropriate Development in Town Centres** states that the vitality and viability of existing town centres will be protected and enhanced by presuming in favour of new retailing and other appropriate uses in or on the edge of town centres.
- 3.23 **Policy DS5 – Promotion of Quality in New Building Design and in Townscape/Landscaping** aims to protect and enhance the built environment and quality design will be expected in new developments.
- 3.24 **Policy DS6 – Promotion of a Sympathetic Approach to Enhance the Environment of the Coastline** aims to safeguard the coast and development will only be supported where adequate and sustainable sea defences are included and the proposals will enhance, and not detract from, this asset.
- 3.25 **Policy DS7 – Promotion of the Integration of Transport and Land Use Planning** states that the transportation implications of new developments will be assessed and new development will be directed towards locations which are accessible by a range of transport options. Sustainable transport options and development will be protected and supported.
- 3.26 **Policy TA1 – Promotion of Sustainable Transport** states that the Council will support the development of an integrated and sustainable transport system.
- 3.27 **Policy TA4 – Managing the Strategic Road Network** states that the Council will seek to manage the road network with a view to allowing essential road traffic to make journeys as efficient as possible.
- 3.28 **Policy TA6 – Safeguarding the Public Transport Network** states that the Council will support proposals that will improve or extend the public transport network. This policy also specifically states that land and infrastructure will be safeguarded for a public transport interchange in Gourock town centre.
- 3.29 Under **Policy TA7 – Promotion of Walking and Cycling** the Council will aim to ensure that centres are well connected for pedestrians and cyclists.
- 3.30 **Policy HR1 – Designated Environmental and Built Heritage** states that proposals which adversely affect any of a range of environmental and built heritage designations, including listed buildings, will only be supported where they do not compromise visual amenity and townscape, no other site is available, social and economic benefits outweigh the negative effects, the impact on the environment is minimised and the loss can be compensated elsewhere.
- 3.31 **Policy HR4 – Water Quality and Environment** states that proposals which could affect water quality will be assessed taking into consideration the impact on;
- Water quality and quantity;

- Leisure and recreational facilities;
 - Economic activity; and
 - Natural and built heritage resources.
- 3.32 **Policy HR15 – The Setting of Listed Buildings** states that development must take into consideration the setting and views from listed buildings and not have a detrimental impact on their principal elevations and main approaches.
- 3.33 Through **Policy LR1 – Safeguarding Open Space**, the Council will support, safeguard and enhance areas of open space suitable for leisure, recreation and sport.
- 3.34 Under **Policy LR8 – Inverclyde Coastal Route**, developers must make appropriate provision for cyclists and pedestrians along the waterfront in planning applications, especially within the Special Development Areas, including the Gourock Special Development Area.
- 3.35 **Policy LR10 – The Promotion and Provision of Tourism Facilities** supports new or improved tourism facilities providing they do not have a significant adverse effect on the environment, do not conflict with other local plan policies, achieve a high standard of design and are accessible by public transport.
- 3.36 **Policy UT3 – Sustainable Urban Drainage Systems** states that the Council will require and support Sustainable Urban Drainage Systems (SUDS / SUD Systems) schemes where appropriate. Additionally, the continual maintenance of the scheme must be assured before planning permission is granted.
- 3.37 **Policy UT4 – Reducing Flood Risk** reflects the relevant national and regional policy and guidance. Flooding on the functional flood plain will be resisted, although where proposals are at risk from flooding the Council will;
- Require a Flood Risk Assessment (FRA) and a Drainage Impact Assessment (DIA);
 - Require flood prevention measures to protect against a 1 in 200 year flood event taking into consideration climate change and subsequent sea level changes to 2050;
 - Consult with SEPA should the development mean a number of buildings are at risk from flooding; and
 - Require Clyde waterfront and coastal development to be protected from coastal flooding to a level of 5m AOD.
- 3.38 It is also stated that flood prevention measures and defences should not result in an increased flood risk elsewhere. Planning permission for such defences will rely on ensuring their continued maintenance and management being agreed.

4.0 Need and Alternatives

Introduction

- 4.1 This Chapter assesses the need for the Proposals and potential alternatives in delivering the Proposals. The Chapter also considers the implications on the locality should the Proposals not be delivered.

Assessment Methodology

- 4.2 The methodology for assessing the needs and alternatives associated with the Proposals has been guided by the Scoping process and the requirements set out in the Regulations.
- 4.3 Section 5.2 of Fairhurst's Scoping Report (Appendix 1.3), 'Need for Development and Alternatives' is noted. This included an initial assessment of the need for the development and its likely regenerative impacts as well as stating that:

'The main aspect of the scheme which has been considered in terms of alternatives is the link road, specifically in relation to its design (retaining wall / revetment).

For the link road, two main options have been considered, and these were assessed in terms of a number of factors, including technical suitability, cost and environmental considerations...[A] revetment has been selected by Riverside Inverclyde as the preferred option and full details of why this option was considered will be included within the Environmental Statement.'

- 4.4 Inverclyde Council's Scoping Opinion (Appendix 1.4) states that:

'Having reviewed the submitted information I am satisfied that the scope of the proposed study should be sufficient to address all likely relevant areas.'

- 4.5 The Regulations state that the ES should include:

'an outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for the choice made, taking into account the environmental effects'¹.

Baseline Conditions

- 4.6 At present, private vehicles and service vehicles park and unload on the north side of Kempock Street. At times, this results in congestion along Kempock Street. As will be outlined in Chapter 6, delays often occur at present due to service vehicles or buses waiting on the carriageways preventing free flow of traffic.

¹ The Regulations, Schedule 4, Paragraph 3

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- 4.7 Kempock Street car park has 200 existing car parking spaces and has one access / egress from Albert Road / Kempock Street.
- 4.8 The configuration of the car park at present has a poor environment for pedestrians as there are no specific pedestrian routes through the car park, for example, linking the car park to the open air swimming pool located to the west of the site. The car park has poor surface materials and lighting creating an unsafe, or perception of an unsafe, environment.
- 4.9 The result of the above is a transport dominated high street and Pierhead with a lack of a distinctive waterfront which does not complement the views across the Firth of Clyde to the Argyll Hills.

Need

- 4.10 The need for the proposed development is justified within various site specific allocations and policies in the Inverclyde Local Plan (adopted 2005). The key policies of the Inverclyde Local Plan are as follows:
- 4.11 Policy R9 states that the Council *'will seek to secure the improvement of Gourock Town Centre through the implementation of proposals set out in the 'Central Gourock Development Strategy' (the CGDS), and any successor strategy, in accordance with Special Area Policy SA4'*. Fairhurst consider that this policy of the Local Plan provides the Council's support to initiatives to improve Gourock's town centre.
- 4.12 Policy SA4 encourages the development of the Gourock Pierhead site and emphasises that any development should include an integrated transport exchange. Over the long term, a range of uses are encouraged within the area to ensure the regeneration of the town centre area.
- 4.13 Policy HR17 states that the Council will seek to improve the public realm, by entering into Partnerships with other agencies, to promote good design and landscaping.
- 4.14 It is also important to note that at a special meeting of Inverclyde Council's Regeneration Committee in July 2011, the phased Masterplan prepared by Riverside Inverclyde was approved. The Proposals comply with the Masterplan by facilitating the new road and improving the public realm.

Alternatives

Alternative Locations for the Development

- 4.15 As the proposed development involves the addition and improvement of car parking spaces to serve Gourock Town Centre and its railway station, and as the development complies with the Masterplan, no alternative locations were considered.

Alternative Design Options

- 4.16 An option process has been undertaken to determine the most appropriate form of construction to provide retention to the land reclamation on the seaward face. Due to the shallow sloping foreshore the primary alternatives to the retention structure were either to provide a sloping or vertical face.
- 4.17 A vertical face was beneficial as it required less land-take on the foreshore. The forms of vertical face construction considered were:
- A steel sheet piled wall with a tie-rod system above high water level; and
 - A precast concrete interlocking block system with sufficient width and mass to act as a gravity retaining wall.
- 4.18 The sheet pile wall was discounted due to financial constraints and was less durable than the alternatives. Similarly, the precast concrete form of construction was discounted due to financial constraints and also the risk of the bearing stratum having insufficient capacity was considered too great and may have required piling or significant excavation down to stronger layers.
- 4.19 The option process determined that a sloping rock armour revetment was appropriate for the following reasons:
- The cost estimate for the revetment system was significantly less than vertical faced alternatives;
 - A sloping rock armour face has good wave energy absorption properties;
 - The form of construction has fewer risks associated with it in terms of soil bearing capacity and construction methods;
 - The construction materials have a natural appearance and can create an additional habitat for marine species; and
 - The form of construction is considered more durable than the alternatives.

Do Nothing

- 4.20 If the Proposals are not undertaken it is expected that the current congestion in this part of Gourock would worsen, and the subsequent regenerative benefits, would not be realised.

Summary

Need

- 4.21 The Proposals comply with the approved Masterplan. The need for the proposed development is also demonstrated through adopted planning policy, most notably Policy R9 and Policy HR17 of the Inverclyde Local Plan.

Alternatives

- 4.22 As the proposed development involves the addition and improvement of car parking spaces to serve Gourock town centre and the railway station in accordance with the approved Masterplan, no alternative locations were considered for the proposed development.
- 4.23 An option process has been undertaken to determine the most appropriate form of construction to provide retention to the land reclamation on the seaward face. Due to the shallow sloping foreshore the primary alternatives to the retention structure were either to provide a sloping or vertical face.
- 4.24 The option process determined that a sloping rock armour revetment was the preferred option for the following reasons:
- The cost estimate for the revetment system was significantly less than vertical faced alternatives;
 - A sloping rock armour face has good wave energy absorption properties;
 - The form of construction has fewer risks associated with it in terms of soil bearing capacity and construction methods;
 - The construction materials have a natural appearance and can create an additional habitat for marine species; and
 - The form of construction is considered more durable than the alternatives.
- 4.25 If the proposed development was not undertaken it is expected that the current congestion in this part of Gourock would worsen, and the regeneration benefits envisaged as part of the approved phased Masterplan would not be realised.

5.0 Socio-Economic

Introduction

- 5.1 This Chapter assesses the likely significant socio-economic effects of the Proposals and investigates and assesses the current socio-economic baseline for Gourock and the application site. The Chapter summarises the social and economic impacts that the Proposals are expected to generate, and considers whether mitigation measures over and above those covered in other Chapters of this ES are required.

Relevant Legislation and Planning Policy Context

- 5.2 Chapter 3 sets out the relevant legislation and planning policy for the Proposals. However, the key policies that have been consulted which relate to socio-economic impacts are provided below.

National Policy

- 5.3 Scottish Planning Policy (SPP) notes that increasing sustainable economic growth is the overall purpose of the Scottish Government. SPP states that this includes creating a supportive business environment and infrastructure development.
- 5.4 In terms of the location of the development, SPP also states that proposals associated with economic improvements should be located in sustainable locations and that coastal areas make significant contributions to the Scottish economy.
- 5.5 SPP notes that town centres play an important role in Scotland's economy and social fabric.

Regional Policy

- 5.6 The GCVJSP identifies Gourock as a town centre to be safeguarded under **Strategic Policy 1 – Strategic Development Locations**. As such, Gourock is included in locations where investment should be prioritised to maximise the scale of urban renewal.
- 5.7 Gourock is within the **Clyde Waterfront Development Corridor** in the SDP. Within this area, development which supports economic activity, housing, tourism, fixed and green infrastructure, culture, leisure, education, health and public transport will be supported.

Inverclyde Local Plan 2006

- 5.8 The site falls within various site specific allocations and is covered by policies of the Local Plan. There are a number of general policies which the Proposals will be assessed against. These are set out in Chapter 3.

Assessment Methodology

- 5.9 Fairhurst's Scoping Report dated 27 July 2011 (Appendix 1.3) stated that a qualitative socio-economic assessment of the Proposals would be undertaken. The report set out that the following characteristics of the Proposals have the potential to have a significant effect on the social and economic fabric of the site and its surroundings:
- Changes to the accessibility and visibility of commercial properties;
 - Changes to the character of the area and sense of place; and
 - Changes to the parking arrangements and the environmental quality of the car parks.
- 5.10 The Scoping Report also set out that the following characteristics may potentially be affected:
- Local economy (Kempock Street and nearby commercial areas); and
 - Character and 'sense of place' of the site and its surroundings.
- 5.11 The Scoping Opinion from the Council dated 30 August 2011 (Appendix 1.4) stated "that the scope of the proposed study should be sufficient to address all likely relevant areas". Therefore, the above areas will form the basis of this assessment.
- 5.12 In line with the Regulations Fairhurst are reporting on these figures with the aim of assessing the direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative socio-economic effects of the Proposals.
- 5.13 Although it is not considered that significance tables are appropriate for this qualitative socio-economic impact assessment, the following terms will be used to describe the significance of the impact where applicable:
- Major adverse / major beneficial;
 - Moderate adverse / moderate beneficial;
 - Minor adverse / minor beneficial;
 - Negligible adverse / negligible beneficial; and
 - No significant effect.

Baseline Conditions

- 5.14 Gourock is a popular residential area which has experienced growth since the 2001 Census where the population was 11,551. The last available data, in 2008, showed the population at 11,680.
- 5.15 In comparison to Inverclyde (21.37%) and Scotland (19.96%), Gourock has a higher total population of pensionable age (29.31%). There are also a greatly reduced number of children within Gourock with less than 7% of the population making up this group. The figure is around 17% for Inverclyde and Scotland.

- 5.16 The information above is taken from General Register Office for Scotland and Scottish Neighbourhood Statistics.
- 5.17 Gourock first became established as a settlement during the 18th century, stimulated by the growth of small scale local industries including fishing, mining, quarrying and boat-building. During the 19th century the town began to grow, especially when railway companies extended lines to Gourock. In the latter half of the 19th century the town became a significant riverside tourist destination.
- 5.18 The popularity of Gourock declined into the second half of the 20th century and visitor numbers reduced. The decline in visitors to Gourock has had an impact on the town and specifically the Pierhead area which was once a focal point. This area is now fragmented from the high street (Kempock Street) and the area along the waterfront is dominated by car parking.
- 5.19 As set out within the Masterplan “there is still a remnant of an image of Gourock as a visitor destination and new initiatives should aim to build on the town’s unique qualities and renew the image of the town as a place to visit. This should be based on the concept of an ideal place for a day trip or stop off – a small, attractive, walkable town with comfortable, appealing streets and spaces, an exceptional riverfront location and an excellent complement of distinctive facilities and amenities”.

Existing Site

- 5.20 The site description has previously been provided within Chapter 2; however, this chapter provides further description in terms of the environment and character of the proposed site. This is to provide a baseline environment from which to assess any potential impacts against.
- 5.21 Kempock Street car park has 200 existing car parking spaces and has one access / egress from Albert Road / Kempock Street. The most westerly point of the car park is currently being used as the site compound associated with the refurbishment works for the open air swimming pool which is due to re-open in summer 2012.
- 5.22 The configuration of the car park at present has a poor environment for pedestrians as there are no specific pedestrian routes through the car park, for example, linking the car park to the open air swimming pool located to the west of the site.
- 5.23 The station car park to the east of the site also suffers from similar characteristics with a car dominated environment and poor linkages between the station and the town. An area currently being utilised as a site compound for the quay wall strengthening work at the Pierhead area to the north of the car park is further impacting on the environment but this work will be completed in 2012 prior to the commencement of the Proposals.
- 5.24 Kempock Street includes a number of shops such as an independent greengrocer, butcher, baker and a number of other facilities typical of a small town high street. There are a limited

amount of national retailers located within the town. However, planning permission has recently been granted for a Sainsbury's on Kempock Street.

- 5.25 The street itself has a number of differing architectural styles and 44 - 50 Kempock Street (even numbers only) are B Listed Buildings.
- 5.26 There is unrestricted parking on the northern side of Kempock Street but double yellow lines are included on the southern side. The road is two way traffic at present.
- 5.27 As will be outlined in Chapter 6, delays often occur due to service vehicles or buses waiting on the carriageways preventing free flow of traffic. This has the potential to impact on people's perceptions of the area as a large number of vehicles within a small area may create negative impressions and detract from the positive sense of place which would otherwise be attributable to Kempock Street.
- 5.28 Also any vehicles driving through and not necessarily visiting Gourock or Kempock Street may not have good visibility of the facilities on the high street which may influence the decision to stop within the town. This may also influence decisions to visit Gourock in the future.
- 5.29 The result of the above is a transport dominated high street and Pierhead with a lack of a distinctive waterfront which does not compliment the views across the Firth of Clyde to the Argyll Hills.
- 5.30 The beach, located between the two car parks, is utilised for recreational access to the Firth of Clyde. The beach itself is a small rocky intertidal foreshore. It was noted at the time of the site visit that there was litter on the beach and it appeared that the area was sometimes used for anti-social behaviour.

Impact Assessment

Potential Impacts

Construction

- 5.31 The proposed construction period for the works is from September 2012 until March 2014. Throughout the construction phase it is considered that there will be some disruption to the town in terms of loss of facilities (parking and use of the beach). However, this will be a temporary disruption and the works will, to a certain extent, be phased so, for example, complete loss of one of the car parks will not be experienced. It is considered that the impact associated with this would be minor adverse.
- 5.32 There may be a slight impact on noise and air quality as a result of the construction works but again this will be temporary and mitigation measures will be employed as set out in the Pollution Prevention Statement (Appendix 1.5) and in line with relevant legislation and guidance. However, this impact was deemed to not be significant as both were scoped out of the EIA. The impact is, therefore, considered to be of negligible adverse impact.

- 5.33 It is envisaged that a number of jobs will be created by the development for the 18 month construction period. However, the precise number is unknown at present.
- 5.34 Riverside Inverclyde will ensure that the best opportunity is given to local people when recruiting employees. Condition of contract clauses have been introduced by Riverside Inverclyde requiring a minimum of 10% of the person-weeks for non-specialised works required for the contract's duration being allocated to new entrant trainees living in Inverclyde. This will bring employment opportunities for people undergoing construction-related training, for apprentices and for construction workers unemployed for six months.
- 5.35 There may be some induced and indirect impacts, in that those employed are likely to use facilities on Kempock Street, for example, food shops and cafes, and there will also be positive economic benefits in terms of the supply chain (construction materials and sub-contractors etc). It is considered that this will have a minor beneficial impact on Kempock Street and other areas of Gourock town centre throughout the construction period.
- 5.36 Cumulative impacts in terms of construction have been considered. The works currently being undertaken to the open air swimming pool and the strengthening of the quay wall will have been completed prior to the commencement of the Proposals, therefore, there will be no cumulative impact as a result. At present, it is not known when the Sainsbury's store will be constructed but it is considered that if this takes place at the same time as the Proposals this will create a minor adverse impact on Kempock Street in terms of disruption. However, the increased spending from those involved in the construction would be beneficial.
- 5.37 All of the above impacts are considered to be short term temporary impacts which will last the duration of construction (18 months).

Operation

- 5.38 The proposed streetscape improvements along the south side of Kempock Street and the inclusion of a one way system on this road will create an improved pedestrian environment also improving the sense of place associated with the high street. This will assist in making the town and Kempock Street a more attractive place to visit not only for those living within Gourock but those from further afield, for example, passing tourists or day visitors. The Proposals will also improve the perception of a safer environment which will influence the nature and extent to which people use the area.
- 5.39 The Proposals will also improve the visibility of the shops through a reduction in traffic. The accessibility of the shops will also be improved for all users, through improvements to parking arrangements through the use of dedicated drop off areas. All of the above factors will assist in increasing footfall on the street and increase the use of the facilities. This will in turn have a beneficial impact on the local economy and in sustaining a more viable town centre.
- 5.40 The realigned pedestrian and vehicular access junctions to the train station and Kempock Street car parks, as well as the reconfiguration of the two existing car parks, new road and one way system have been assessed in transportation terms and this assessment is set out

in Chapter 6. However, in socio-economic terms, it is considered that the Proposals will improve the environment for all users due to the proposed pedestrian and cycle routes throughout, and areas of hard and soft landscaping. Permeability will also be improved between the car parks and the town / Kempock Street.

- 5.41 The environment and sense of place is further improved by the public realm improvements at the northern corner of the station car park. The existing public art at the east end of Kempock Street “Girl on Suitcase” will be retained and will assist in creating community identity making Gourock a place where people want to visit and live.
- 5.42 The new road will have a major impact on the existing beach area. In socio-economic terms, however, this is considered to be beneficial. In terms of its social impact a new slipway for recreational access to the sea is proposed. At present there is no formal access into the water so this slipway and the associated boat lay-by proposed, which can be used by users of canoes / kayaks and small recreational boats, will improve recreational access to the sea.
- 5.43 Cumulative effects, with regard to strengthening of the quay wall works adjacent to the railway station, have been assessed, where applicable, within each chapter. However, it is not considered there are any relevant socio-economic impacts associated with this. With regard to the cumulative impacts with the Sainsbury’s development, in the long term it is considered the Proposals will assist in relieving any congestion from deliveries and further demand for car parking that may be created by the store. In transport terms the cumulative effects have been considered and are set out in Chapter 6.
- 5.44 Cumulative impacts associated with any future phases of the regeneration Masterplan are considered to be positive for Gourock but cannot be quantified as details are not yet known.

Impact Assessment Summary

Construction

- 5.45 Overall the impact throughout the construction phase is considered to be negligible. This is due to the disruptions being temporary in nature and there also being some positive impacts associated with construction. This includes direct and indirect job creation associated with the usage of facilities in the town by those employees and the effects on the construction supply chain.

Operation

- 5.46 The overall economic impacts of the proposed development are considered to be moderate beneficial. However, it is difficult to quantify this in the absence of a quantitative economic assessment. The increased use of the facilities on Kempock Street and in the town and the economic benefits this will bring is as a direct result of the improvements to the environment, character and sense of place.

- 5.47 The social impacts associated with an improvement in the local environment, public realm and linkage to the river frontage through access are considered to have a major beneficial impact.

Mitigation

- 5.48 Measures to mitigate the impact of the Proposals on the character of the area are set out elsewhere in this ES. At this stage, it is not considered that socio-economic issues warrant mitigation measures beyond these.

Limitations

- 5.49 As previously stated, a quantitative assessment was not undertaken to assess socio-economic impacts; however, the Scoping process confirmed that a qualitative assessment was acceptable. Therefore, it is not considered that this is a limitation to the assessment.

Conclusion and Residual Impacts

- 5.50 As no mitigation measures are proposed over and above those set out elsewhere in the ES. The residual impacts are as set out in paragraphs 5.45 to 5.47.

Summary

- 5.51 The Socio-Economic Chapter investigates and assesses the current socio-economic baseline for Gourock and the site area, summarises the social and economic impacts that the Proposals are expected to generate, and considers whether mitigation measures over and above those covered in other Chapters of the ES are required.
- 5.52 The baseline is characterised by a poor pedestrian environment, poor public realm and links to river frontage which has played an important role as a popular visitor destination. The site is transport dominated within the car parks but also on Kempock Street.
- 5.53 Measures to mitigate the impact of the Proposals on the character of the area are set out elsewhere in this ES. It is not considered that socio-economic issues warrant mitigation measures beyond these.
- 5.54 Overall the impact throughout the construction phase is considered to be negligible. This is due to the disruption being temporary in nature and there also being some positive impacts associated with construction such as the direct, indirect and induced job creation associated with the usage of facilities in the town by those employees and positive effects on the construction supply chain.
- 5.55 The overall economic impacts of the proposed development are considered to be moderate beneficial. The increased use of the facilities on Kempock Street and in the town and the economic benefits this will bring is as a direct result of the improvements to the environment, character and sense of place.

- 5.56 The social impacts associated with an improvement in the local environment, public realm and linkage to the river frontage through access are considered to have a major beneficial impact.

6.0 Transport and Access

Introduction

- 6.1 This Chapter will assess the impact of the Proposals using national guidance for the assessment of Environmental Impacts developed by the Chartered Institution of Highways and Transportation (CIHT) and the Institute of Environmental Management and Assessment (IEMA). The chapter will also refer to findings of the Transport Assessment (TA) which forms a separate report which is presented at Appendix 6.1.

Development Proposals

- 6.3 Proposals are for the provision of an eastbound Relief Road in Gourock Town as part of a scheme of public realm and car park improvements identified below as:

- Streetscape improvements along the south side of Kempock Street;
- Realigned pedestrian and vehicular access junctions to the railway station and Kempock Street car parks;
- A new vehicular access junction to the station car park at the south east edge of the site;
- Environmental improvements, soft landscaping and hard landscaping throughout the site;
- Reconfiguration of the two car parks;
- A new area of open space / public realm at the northern corner of the station car park;
- A new road (referred to as a Relief Road throughout this chapter) on 'reclaimed land' across the existing beach area, supported by rock revetments, joining the two car parks, creating a one way traffic movement system through the town centre and extending the Kempock Street car park; and
- A new slipway for recreational access to the sea.

Key Issues

- Impacts on existing pedestrian and cycle routes;
- Impacts on existing public transport services;
- Impacts of revised traffic circulation arrangements on proposed junction arrangements; and
- Impacts of scheme on existing journey times through the Study Area. (The Study Area is defined as the road network under consideration and is identified at paragraph 6.28).

Scoping

- 6.4 Scoping discussions with the Council in respect of the ES have not identified a requirement for detailed assessment of traffic impacts. Comments received have limited reporting requirements to qualitative assessment, given that impacts of the scheme are restricted to

alterations to the existing traffic circulation patterns as a result of the introduction of a one-way system.

- 6.5 Initial Scoping discussions on the TA were held with Inverclyde Council (the Council) in August 2011 in the context of earlier linked car park scheme proposals. Further dialogue following the Public Consultation process (set out within the planning application) and the finalisation of the Proposals to provide an eastbound Relief Road as part of a one way system confirmed requirements for detailed traffic assessment of revised circulation proposals.
- 6.6 The TA also considers predicted impacts of the Phase II development on a small area of the former Bay Hotel site but as these are anticipated to be the subject of a further Planning Application, will not be considered as part of the EIA.

Relevant Legislation and Planning Policy Context

National Policy Context

- 6.8 National Policy Context for the proposed development is largely defined by Scottish Planning Policy (SPP). The Proposals are consistent with SPP Paragraph 169 which notes that:

‘Improvements to active transport networks, such as paths and cycle routes, in urban and rural areas will support more sustainable travel choices. The aim is for urban areas to be made more attractive and safer for pedestrians and cyclists, including people with mobility difficulties’.

Regional Policy Context

- 6.9 Regional Policy Context for the Proposals is contained within the undernoted documents:
- Glasgow and Clyde Valley Joint Structure Plan 2006; and
 - Strathclyde’s Partnership for Transport a Catalyst for Change – The Regional Transport Strategy for the west of Scotland 2008 – 2021.

Glasgow and Clyde Valley Joint Structure Plan 2006 (GCVJSP)

- 6.12 Gourock is identified within the GCVJSP as one of three Strategic Development Areas requiring prioritised investment. The Proposals seek to prioritise significant capital investment of approximately £4 million to central Gourock.

Regional Transport Strategy (RTS)

- 6.13 The RTS is a strategic document which identifies high level transport objectives. The Proposals for the provision of the Relief Road to improve traffic flow through the centre of Gourock will support Strategy Objective 4 ‘Effectiveness and Efficiency’ which aims ‘to

ensure the provision of effective and efficient transport infrastructure and services to improve connectivity for people and freight’.

- 6.14 The Proposals provide significant public realm improvements designed to further encourage the use of sustainable modes of travel in the area as identified at RTS Strategy Objective 2 ‘Modal Shift’ which aims ‘to increase the proportion of trips undertaken by walking, cycling and public transport’.

Local Policy Context

- 6.15 Local Policy Context for the Proposals is largely defined by:

- Inverclyde Local Plan 2005;
- Inverclyde Local Development Plan Main Issues Report May 2011; and
- Inverclyde Local Transport Strategy 2011-2014.

- 6.16 The Proposals are located within the Central Coastal Gourock Special Development Area and the Council produced the Central Gourock Development Strategy in 1999 which identified the requirement for the provision of a new road to remove traffic from Kempock Street.

Inverclyde Local Plan

- 6.17 The provision of a Relief Road for Kempock Street is identified in Local Plan Policy TA13 Safeguarding Land for New Road Proposals:

‘Inverclyde Council, as Planning Authority, will support the development of, and safeguard the land necessary for, the following road schemes:

- (i) Greenock Town Centre Relief Road; and
- (ii) Gourock (Kempock Street) Relief Road’.

Inverclyde Local Development Plan Main Issues Report (MIR)

- 6.18 The MIR acknowledges that the Kempock Street Relief Road is featured in the Local Transport Strategy Action Plan as a Medium Term Objective.

Inverclyde Local Transport Strategy

- 6.19 The Inverclyde Local Transport Strategy (ILTS) notes that proposals for a public transport interchange at Gourock to provide improved access to rail, bus, ferry and taxi services will need to be revisited in light of Network Rail’s refurbishment of Gourock railway station.
- 6.20 The Proposals are consistent with ILTS Action AWalk6 which identifies that the Council should ‘work with all interested parties and stakeholders to ensure the provision of appropriate infrastructure to link the Waterfront with the town centres - Gourock, Greenock & Port Glasgow’.

- 6.21 The scheme supports ILTS Action ASafe 37 which identifies 'Gourock Town Centre: Construction of Kempock Street Relief Road north of existing Kempock Street'.
- 6.22 The provision of a Relief Road will assist with addressing the issue identified in the ILTS in relation to ferry related congestion, which states that 'congestion occurs in Gourock at Ferry arrival times and in Kempock Street when shop deliveries are being made'.
- 6.23 The scheme is consistent with ILTS Action ASafe 63 which proposes to 'review the existing parking provision along Gourock Waterfront'.

Summary

- 6.24 The provision of a Relief Road for Kempock Street and the improvements to pedestrian and cycle facilities as part of the Proposals are strongly supported by Policy Context, at Local, Regional and National levels.

Assessment Methodology

Approach to Assessment of Significance

Impact Assessment Methodology

- 6.25 The methodology employed in this assessment has been developed from guidance provided in CIHT's 'Guidelines for Traffic Impact Assessments' and IEMA's 'Guidelines for the Environmental Assessment of Road Traffic'. Methodologies detailed in the CIHT guidelines recommend that EIA for large developments should be assessed in accordance with IEMA guidelines. This guidance requires the assessment of Sensitivity, Magnitude and Significance, and a brief synopsis of each type of assessment is provided below.

Impact Sensitivity

- 6.26 The sensitivity of roads to increased severance of communities and pedestrian delay and intimidation is conventionally evaluated based on the proximity and size of residential populations to each road section, in accordance with the IEMA guidelines. The IEMA guidelines do not provide specific criteria for evaluating sensitivity, however, for the purposes of this assessment, the sensitivity of road sections to changes in traffic levels will be evaluated on a scale of 'low', 'medium' and 'high', based on their usage by pedestrians and cyclists and the size of communities through which the road section passes.

Impact Magnitude

- 6.27 The magnitude of traffic effects is a function of existing traffic volumes, percentage increase due to the Proposals, and changes in type of traffic. IEMA guidelines identify thresholds for impact magnitude based on percentage changes in traffic levels applicable to severance and intimidation effects. The magnitude of effects arising from the increase in traffic volumes (taken as being either the traffic flow including all vehicles or the HGV traffic flow, whichever is higher) is categorised as follows:

- Substantial: above 90% increase in existing traffic levels;
- Moderate: between 60% and 90% increase in existing traffic levels;
- Slight: between 30% and 60% increase in existing traffic levels; and
- Negligible: under 30% increase in existing traffic levels.

- 6.28 The determination of the magnitude of the effects will be undertaken by reviewing the Proposals, establishing the parameters of the road traffic that have the potential to cause an effect (e.g. additional circulating traffic), and quantifying these effects against the criteria set out above.
- 6.29 Consideration has been given to the changes in movement patterns of the traffic on the road network under both existing and revised road network conditions, and to the impacts on pedestrian flows influenced by the relocation of public transport boarding points.

Significance of Impact

Impact Significance

- 6.30 Significance of effects will be assessed based on the categories of sensitivity and magnitude (identified in accordance with the approach outlined above) as shown in Table 6.1 below.

Table 6.1 Assessment of Significance for Effects on Road Sections

	Sensitivity		
<i>Level of Magnitude</i>	High	Medium	Low
Substantial	Major	Major	Moderate
Moderate	Major	Moderate	Minor
Slight	Moderate	Minor	Minor
Negligible	Negligible	Negligible	Negligible

- 6.31 For the purposes of the Regulations, effects will be considered to be significant where the effect is classified as being of 'major' or 'moderate' significance.

Baseline Conditions

- 6.32 A site visit and route assessment including a full visual route inspection was undertaken to assess existing road and pedestrian networks, car parking provision and traffic conditions within the study area.

Study Area

- 6.33 The Study Area is defined as the following roads and locations

- A770 Kempock Street;
- A770 Shore Street;
- Gourock station car park; and
- Kempock Street car park.

Baseline Traffic Flows

6.34 Baseline Traffic Data has been obtained from the Council and from Detailed Traffic Counts performed on Tuesday 7 February 2012. A summary of traffic flows is provided in Table 6.2 below. Data provided by the Council for flows on Shore Street in 2011 is provided for comparison purposes. Between the counts in March 2011 and February 2012, the CalMac vehicle ferry service from Gourock Pierhead, which was accessed via Tarbet Street and located to the east of the Study Area, was discontinued. This resulted in a potential increase in vehicle movements through Kempock Street to and from McInroy's Point which is located 3km to the west of Gourock town centre.

Table 6.2 Peak Hour Traffic Flows through Study Area

7 February 2012 Detailed Junction Count Data				
Link	East	West	East	West
Shore Street	692	304	473	514
Kempock Street	648	275	385	515
Albert Road	651	230	327	516
March 2011 Automatic Traffic Counter 5 Day Data averaged				
March 2011	East	West	East	West
Shore Street	612	283	445	557

6.35 Whilst the AM peak hour traffic figures have increased, it is unlikely that all the additional eastbound peak flow can be attributed to ferry traffic pattern changes, as the hourly increase is 80 vehicles, twice the vehicle capacity of the CalMac ferry which ran hourly in each direction.

Planned Changes to Road Network

6.36 The Council have confirmed that there are no planned alterations to the road network in the vicinity of the Proposals at present.

Committed Development

6.37 The Scottish Government in January 2012 overturned a refusal of Planning Permission for a new 375m² Sainsbury's store, warehousing and associated office space at 32-36 Kempock Street, in replacement for an existing retail outlet which currently occupies the site. The

impacts of this development in traffic and parking terms are predicted to be extremely modest, given the scale of proposals which suggest a "Metro" scale of outlet providing convenience shopping as part of a linked trip rather than a larger location which would provide an attraction for new trips.

Impact Assessment

Summary of Assumptions

- 6.38 All observed turning movements at the existing car park entrances will be reassigned to the revised road network in order to confirm levels of additional circulating traffic arising from the proposed changes.

Potential Impacts

Bus Passengers

- 6.39 Bus passengers alighting on the Relief Road from eastbound bus services from Dunoon and Largs will be required to walk further and ascend steps to reach Kempock Street.

Vehicle Movements

- 6.40 Revised access arrangements for access to Kempock Street car park from the eastbound Relief Road rather than A770 Kempock Street will result in vehicles originating from and returning to McInroy's Point travelling further than at present.
- 6.41 Vehicles accessing the Kempock Street car park from Shore Street are likely to experience a reduction in distance travelled as they will no longer be required to travel westwards on departure towards the existing car park entrance at the west end of Kempock Street to return eastwards.
- 6.42 Existing one-way circulation to and from the single entry and exit point at the Kempock Street car park will be replaced by separate entry and exit points which are envisaged to reduce circulating distance travelled in the car park overall.
- 6.43 Revised junction arrangements at Gourock Station car park exit will require all vehicles exiting from Kempock Place to travel eastwards via A770 Shore Street or towards Gourock Station to travel via the one way system as a right turn movement can no longer be provided.
- 6.44 Vehicles travelling eastbound along Kempock Street which currently park for short periods for the purpose of convenience shopping are envisaged to utilise the new parking bays to be provided on-street to both sides of the eastbound Relief Road. Some vehicles may circulate in a loop via Kempock Street to park if no on-street spaces are available but these movements are envisaged to be modest in nature.

Vehicle Journey Times

- 6.45 The provision of an eastbound Relief Road is expected to improve the reliability of vehicle flows through the centre of Gourock as delays arising from parked service vehicles and buses waiting on the carriageway preventing the free flow of traffic will be reduced or eliminated, allowing vehicles to flow with greater ease in both directions. This improvement in flow is expected to be of particular benefit for eastbound traffic which can arrive at Gourock Town Centre in platoons following the arrival of a Western Ferries service at McInroy's Point and be delayed, for example, by a bus which has travelled on the same service.

Assessment of Impacts

Pedestrians and Cyclists

- 6.46 The Proposals provide for improvements to the Public Realm which includes an extension to existing pedestrian linkages, continuing the Coastal Path. Impacts of the Proposals for pedestrians and cyclists are considered to be beneficial.

Bus Passengers

- 6.47 Bus passengers choosing to alight at the new eastbound bus stop on the Relief Road will be required to walk approximately 40m and ascend one flight of steps to reach the centre of Kempock Street. Currently, eastbound bus services call at a stop at the west end of the main shopping area at Kempock Street rather than the more central point which will be accessed within a shorter walk distance from the relief road than the existing bus stop. Recognising that there may be issues with the use of this stepped route for non-able bodied passengers as they may require to use an alternative stop on Shore Street, nevertheless the relocation of the Kempock Street eastbound bus stop is considered as a negligible impact.

Vehicle Movements

- 6.48 The additional distance travelled to and from the Kempock Street car park by vehicles from origin points to the west of Kempock Street is estimated at 300m. Although the full travel distance using the one way system is approximately 550m, an allowance for distance currently travelled within the car park on entry and exit (a full circuit being required for all drivers as a result of the one way system which is approximately 250m in length) would suggest that the additional distance travelled is likely to be less than the total distance.
- 6.49 The distance travelled to and from the Kempock Street car park from origin points to the east of Kempock Street is, however, anticipated to reduce by approximately 250m on average. These vehicles will no longer have to "double back" to the west end of Kempock Street to travel eastwards on departure, thus eliminating the distance travelled within the car park as it is equivalent to the return section of the journey.
- 6.50 The additional distance travelled by vehicles with origin points in the west is envisaged to be largely compensated by the reduction in distance travelled by vehicles using the Kempock

Street car park with origin points in the east, and accordingly this is considered as a negligible impact.

- 6.51 The loss of the right turn from Kempock Place eastwards to A770 Shore Street will result in vehicles having to travel an additional 550m via Kempock Street and the Relief Road. This additional distance will only apply to vehicles in the northern section of Kempock Place as those in the southern section of Kempock Place are able to route via Bath Street, Adelaide Street and St John's Road with an additional distance of approximately 75m. Local knowledge is likely to influence where vehicles park on Kempock Place to avoid the additional distance via the Relief Road. Vehicles performing the current right turn manoeuvre are relatively limited in number, (less than 3% of total eastbound peak flows on A770) and accordingly this is considered as a negligible impact.
- 6.52 Impacts of the scheme on improving journey time reliability and reducing journey times through the Study Area have not been quantified in this chapter, as the Scope of the Assessment is qualitative. It is anticipated that the provision of a one-way system will reduce delays arising from service vehicles and buses waiting on Kempock Street and restricting the free flow of traffic, as vehicles will be able to negotiate parked vehicles more easily. The removal of the source of delays is expected to significantly improve journey time reliability in both directions.
- 6.53 Assessment of performance of the revised junction arrangements using industry standard junction modelling software confirms that there are no issues with the performance of these junctions.

Mitigation

Pedestrians and Cyclists

- 6.54 No requirements for mitigation are identified as the Proposals focus on improving the environment for pedestrians and cyclists.

Bus Passengers

- 6.55 Retaining the eastbound bus stop on A770 Albert Road at the swimming pool will allow bus passengers to access Kempock Street at grade within a 100m walk distance of the existing bus stop close to the west end of the retail area on Kempock Street.

Vehicle Movements

- 6.56 The revised circulation and car parking arrangements for vehicles in Gourock Town Centre will have appropriate directional signage provided to assist drivers.
- 6.57 The provision of appropriate directional signage for vehicle movements from Kempock Place to A770 east indicating the routes via Bath Street/Adelaide Street/St John's Road, and via the Relief Road loop for vehicles north of the Bath Street junction should assist in minimising the number of trips via the longer Relief Road route.

Limitations

- 6.58 No limitations to the preparation of this Traffic and Access Chapter have been identified.

Conclusion and Residual Impacts

- 6.59 This Traffic and Access Chapter has assessed the likely significance of the effects of changes to traffic patterns associated with the Gourock Environmental and Public Realm Improvements. The overall effect of the changes in traffic terms is noted as largely compensating, with possible minor impacts for less able pedestrians who may have a very short additional distance to walk.

Summary of Effects

- 6.60 The provision of a new pedestrian and cycle link from Albert Street to Shore Street alongside the Relief Road will provide a more attractive environment for users of this section of the coastal path.
- 6.61 The requirement to relocate the existing eastbound bus stop from Kempock Street to the relief road will require passengers to use a stepped route to reach Kempock Street from this stop. The provision of an additional eastbound bus stop at the swimming pool which will allow at-grade access to Kempock Street to be retained within 100m walk distance of the existing stop will mitigate this issue.
- 6.62 The proposed changes to vehicle circulation arrangements as a result of the provision of the eastbound Relief Road are envisaged to result in minor increases and decreases in distance travelled dependent on vehicle origin point. These distances are expected to be largely compensating with no material overall increase in distance travelled by comparison with vehicles using the existing road network. A small number of vehicles exiting Kempock Place may require to travel approximately 500m further to return eastwards but this can be avoided by routeing via Bath Street.
- 6.63 No issues with performance of the revised junction arrangements have been identified during the preparation of the TA.

Statement of Significance

- 6.64 This assessment concludes that there may be a very modest increase in overall vehicle distances travelled as a consequence of the completion of the scheme, although it is expected that these will be largely compensating, and minor changes to existing walk routes on Kempock Street to eastbound bus stops. In accordance with the IEMA Guidelines these increases are considered to be Negligible and not significant.

7.0 Marine Ecology

Introduction

- 7.1 This chapter provides an assessment of the potential impacts on marine ecology associated with the Proposals. Developments such as that proposed have the potential to impact upon marine ecology through direct and indirect impacts including the effects on habitats and species of importance, for example protected species or those with scientific interest.
- 7.2 The Proposals extend into a small rocky intertidal foreshore on the water front at Gourock (Grid reference at foreshore centre NS241779). Due to the nature of the works, this is the only area of the Proposals that is considered to have the potential for an impact on marine ecology. As such, and in line with the agreed scope of the EIA, a detailed intertidal survey was undertaken across this area, in order to record all visible plant and animal species (Please see Appendix 7.1). The recorded plants/species were identified and assessed for significance in relation to conservation requirements, in order to make recommendations in respect of the proposed development.

Relevant Legislation and Planning Policy

- 7.3 In order to undertake a comprehensive assessment, it has been necessary to take into consideration a range of International, National, Regional and Local Legislation and Policy.
- 7.4 The following have been taken into account in this review due to the potential impact of the Proposals on species (protected and un-protected), ecosystems, marine biodiversity, protected or designated habitats, and the achievement of objectives set at different governance levels for each of these. In addition, regional and local planning policy was reviewed to determine the extent to which the Proposals are in accordance with these policies.

International Legislation:

- The Convention on Biological Diversity 1992; and
- The Oslo Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR).

European Legislation:

- EC Directive on the Conservation of Wild Birds (2009/147/EC) (Birds Directive);
- EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) (Habitats Directive);
- The Water Framework Directive (2000/60EC); and
- EU Marine Strategy Framework Directive.

UK and Scottish Legislation:

- Water Environment and Water Services (Scotland) Act 2003 (WEWS);
- Conservation of Habitats and Species Regulations (2010);
- Wildlife and Countryside Act 1981 (as amended);
- Nature Conservation (Scotland) Act 2004; and
- Marine (Scotland) Act 2009.

National Policy:

- Scottish Planning Policy (SPP); and
- UK Biodiversity Action Plan (BAP).

Regional Policy:

- Glasgow and the Clyde Valley Joint Structure Plan (adopted 2006).

Local Policy:

- Inverclyde Local Plan (adopted 2006).

7.5 The Shellfish Waters Directive (2006/113/EC) aims to protect and, where necessary, improve the quality of shellfish growing waters and to contribute to the high quality of directly edible shellfish products. The survey area and the area surrounding the proposed development is not designated as shellfish growing waters and as such, the Shellfish Waters Directive is deemed as not relevant to this ES.

7.6 Further details relating to the legislation and policy outlined above is provided in the Macaulay Scientific Consulting (MSC) Gourock Pierhead, Intertidal Survey Report in Appendix 7.2.

Assessment Methodology

Assessment of Nature Conservation

7.7 An assessment of the nature conservation value of the site (sensitivity) was made following the criteria suggested by the Institute of Ecology and Environmental Management (IEEM) (2006) as detailed in Table 7.1 below.

Table 7.1 Nature Conservation Value of Features

Level of Value	Examples
International	<p>An internationally designated site or candidate site (SPA, pSPA, SAC, cSAC, Ramsar site, Biogenetic Reserve) or an area which meets the published selection criteria for such designation, irrespective of whether or not it has yet been notified.</p> <p>A viable area of a habitat type listed in Annex I of the Habitats Directive or smaller areas of such habitat which are essential to maintain the viability of a larger whole.</p> <p>Any regularly occurring population of an internationally important species, which is threatened or rare in the UK (i.e. it is a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP)) or of uncertain conservation status or of global conservation concern in the UK BAP.</p> <p>A regularly occurring, nationally significant population/number of any internationally important species.</p>
National	<p>A nationally designated site (SSSI, NNR, Marine Nature Reserve) or a discrete area, which meets the published selection criteria for national designation (e.g. SSSI selection guidelines) irrespective of whether or not it has yet been notified.</p> <p>A viable area of a priority habitat identified in the UK BAP or smaller areas of such habitat which are essential to maintain the viability of a larger whole.</p> <p>Any regularly occurring population of a nationally important species which is threatened or rare in the region or county (Local BAP).</p> <p>A regularly occurring, regionally or county significant population/number of any nationally important species.</p> <p>A feature identified as of critical importance in the UK BAP.</p>

Level of Value	Examples
Regional	<p>Viable areas of key habitat identified in the Regional BAP or smaller areas of such habitat which are essential to maintain the viability of a larger whole.</p> <p>Viable areas of key habitat identified as being of Regional value in the appropriate Natural Area profile.</p> <p>Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant Natural Area on account of its regional rarity or localisation.</p> <p>A regularly occurring, locally significant number of a regionally important species.</p> <p>Sites which exceed the County-level designations but fall short of SSSI selection guidelines, where these occur.</p>
County / Metropolitan	<p>Semi-natural ancient woodland greater than 0.25 ha.</p> <p>County/Metropolitan sites and other sites which the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves selected on County / Metropolitan ecological criteria (County/Metropolitan sites will often have been identified in local plans).</p> <p>A viable area of habitat identified in County BAP.</p> <p>Any regularly occurring, locally significant population of a species which is listed in a County/Metropolitan "red data book" or BAP on account of its regional rarity or localisation.</p> <p>A regularly occurring, locally significant number of a County/Metropolitan important species.</p>

Level of Value	Examples
District / Borough	<p>Semi-natural ancient woodland smaller than 0.25 ha.</p> <p>Areas of habitat identified in a sub-County (District/Borough) BAP or in the relevant Natural Area profile.</p> <p>District sites that meet the published ecological selection criteria for designation, including Local Nature Reserves selected on District/ Borough ecological criteria (District sites, where they exist, will often have been identified in local plans).</p> <p>Sites/features that are scarce within the District/Borough or which appreciably enrich the District/Borough habitat resource.</p> <p>A diverse and/ or ecologically valuable hedgerow network.</p> <p>A population of a species that is listed in a District/Borough BAP because of its rarity in the locality or in the relevant Natural Area profile because of its regional rarity or localisation.</p> <p>A regularly occurring, locally significant number of a District / Borough important species during a critical phase of its life cycle.</p>
Parish or Neighbourhood	<p>Areas of habitat considered to appreciably enrich the habitat resource within the context of the Parish or neighbourhood (e.g. species-rich hedgerows).</p> <p>Local Nature Reserves selected on Parish ecological criteria.</p>

7.8 Magnitude and types of impacts have also been defined following the IEEM guidelines. Both direct and indirect impacts have been considered and are detailed in Table 7.2 along with a description of the impact magnitude in Table 7.3.

Table 7.2 Direct and Indirect Effects

Direct ecological effects:

Direct impacts are changes directly attributable to a defined action such as the physical loss of a habitat or the immediate mortality of individual species (and/or communities of species) crushed by working machines.

Indirect ecological effects:

Indirect impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process or receptor.

Table 7.3 Description of Impact Magnitude

Impact Description	Criteria
Major negative	The change is likely to cause a permanent adverse effect on the integrity of an ecological receptor.
Negative	The change adversely affects the valued ecological receptor, but there will probably be no permanent effect on its integrity.
Neutral	No measurable effect.
Positive	The change is likely to benefit the receptor in terms of its conservation status, but not so far as to achieve favourable conservation status.
Major positive	The change is likely to restore an ecological receptor to favourable conservation status, or to create a feature of recognisable value.

Table 7.4 Impact Significance Matrix

Impact Magnitude	Value of Features					
	International	National	Regional	County / Metropolitan	District / Borough	Parish / Neighbourhood
Major negative	Critical	Critical	Critical-moderate	Major-moderate	Moderate-minor	Minor-moderate
Negative	Major-minor	Major-minor	Major-minor	Moderate-minor	Moderate-minor	Minor
Neutral	No impact					
Positive	Major-minor	Major-minor	Major-minor	Moderate-minor	Moderate-minor	Minor
Major positive	Critical	Critical	Critical-moderate	Major-moderate	Moderate-minor	Minor-moderate

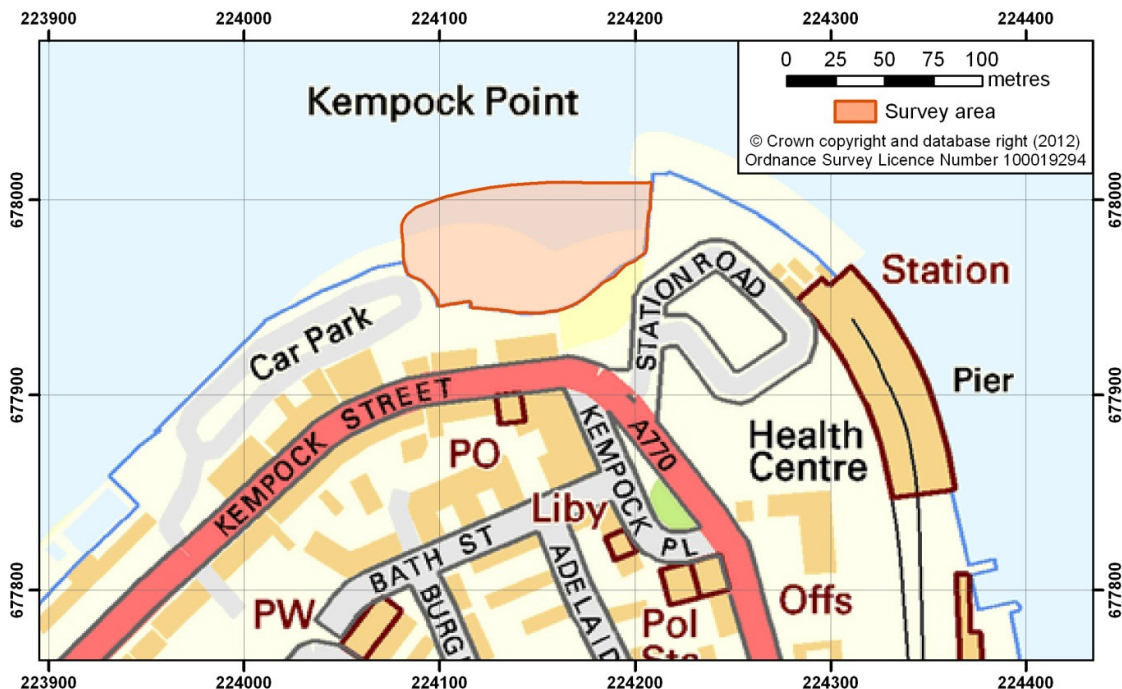
Baseline Conditions

- 7.9 The baseline marine ecology conditions at the survey area (Figure 7.1) have been determined through a desk based review of available information and the findings of Intertidal Survey carried out on 30 January 2012. Further details relating to the scope, methodologies and detailed results of the above are presented in MSC Gourock Pierhead, Intertidal Survey Report (Appendix 7.2).

7.10 The aims were as follows:

- To record the habitats occurring in the intertidal zone and splash zone;
- To establish the zonation patterns of plant and animal species in these zones;
- To record the abundance of these species using standard techniques;
- To sample any soft sediments for macrofauna living therein; and
- To assign the habitats and species found to appropriate intertidal biotopes according to the current Joint Nature Conservation Committee classification.

Fig. 7.1. Survey area (red shading)



7.11 A summary of the findings outlined in the MSC Gourock Pierhead, Intertidal Survey Report (Appendix 7.2) is presented below.

7.12 The survey site shows features that are typical of relatively unstable boulders on the lower and mid shore, possibly with variable salinity. Such sites are species poor, the lack of algal cover preventing the colonisation of the habitat by shade-loving species. The absence of any rock pools prevents the incursion of species that normally live below the low water mark. Shores with these features are common in the inner Clyde Basin. The most stable substrate, apart from the sea wall, is the line of large boulders high on the west and central transects. At this level, environmental conditions are relatively extreme, limiting the range of species that can colonise this habitat. Normally, the black lichen *Verrucaria maura* colonises rock and boulders at this level. Its absence suggests that the boulders have not been in place for very long.

7.13 The two intertidal biotopes identified are both widely distributed around the British coast, and have previous records from the Clyde area. All algal and invertebrate species recorded are common and widespread on British shores, and none are listed on Habitats Directive Annex II, or covered by the UK or Scottish Biodiversity Action Plans. No marine habitats or species of conservation importance were observed.

Impact Assessment

Nature Conservation Evaluation

7.14 An assessment of the nature conservation value of the site (sensitivity) was made following the criteria suggested by the IEEM (2006) as detailed in Table 7.1. Nature conservation value is considered not to reach even the lowest level (Parish/Neighbourhood) set by the table, and is, therefore, rated here as negligible. However, in order to comply with the IEEM assessment criteria, the Parish/Neighbourhood level of value has been used in the impact assessment.

Impacts

Table 7.5 – Impacts

Item	Actual Impact	Magnitude
Community on intertidal stones/gravel	Removal or burial of part of intertidal zone under sloped embankment	Major negative. Existing biota will be destroyed by burial or removal of stony substratum.
Community on intertidal stones/gravel	Harm caused to biota through direct and/or indirect contact with potentially contaminated leachates, surface waters, groundwaters and disturbed soils and dust from wider construction site	Negative. Remaining biota may be harmed by potentially contaminative substances.

7.15 The significance of the impact is determined by comparing the impact magnitude against the nature conservation value of the feature under consideration as shown in the impact significance matrix shown in Table 7.6. The significance is assessed assuming no mitigation measures are undertaken.

Significance of Impacts

Table 7.6 – Impact Significance

Item	Impact Significance
Removal or burial of community on intertidal stones	Minor - moderate. Habitats and species affected are of negligible conservation value, even at parish/neighbourhood level.
Harm caused to biota through direct and/or indirect contact with potentially contaminated leachates, surface waters, groundwaters and disturbed soils and dust from wider construction site	Minor. Habitats and species affected of negligible conservation value, even at parish/neighbourhood level.

7.16 Notes: In accordance with the IEEM criteria, the Parish/Neighbourhood level of value was adopted. This, therefore, requires a minor – moderate impact significance to be assigned based on the Impact Significance Matrix. MSC considers that the significance is likely to be negligible.

Cumulative Impact Assessment

7.17 Although the impact of the proposed development is considered to be negligible, MSC accepts that where multiple separate developments are planned in an area, cumulative impacts may result in an increase in the overall impact significance.

7.18 Consequently, as part of an assessment of potential cumulative impacts, MSC undertook a review of available online information relating to an EIA for the proposed construction of a rock-armoured revetment submitted on behalf of Network Rail (Inverclyde Planning Application Ref: 11/0225/IC). It is understood that this application has been granted although the Decision Notice was not available for online review at the time of writing.

7.19 The proposed development site associated with the above application is situated approximately 100m to the east of the survey area.

7.20 Within Chapter 5 of the above ES, it is stated that *'no semi-natural habitats will be lost through construction activities in the development area. Effects on habitats during the construction phase are considered to be neutral in magnitude and are therefore considered to be of no impact on habitats.'*

7.21 The survey area subject to this chapter and as outlined in Figure 7.1 is isolated in terms of sediment transport from the adjacent coastlines. In addition, no species or habitats of conservation value were recorded at the site.

7.22 Based on the above, the cumulative impact has been assessed as follows:

Impacts (Cumulative)

Table 7.7 – Impacts

Item	Actual Impact	Magnitude
Community on intertidal stones/gravel	Cumulative impact from arising from the proposed development and Network Rail proposals.	Neutral. There is unlikely to be any cumulative impact associated with the proposed developments due to the isolated nature of the intertidal area and low value of both sites for habitat and conservation.

Significance of Impacts (Cumulative)

Table 7.8 – Impact Significance

Item	Impact Significance
Cumulative impact from arising from the proposed development and Network Rail proposals.	No Impact. The intertidal area is isolated from surrounding coastlines and both sites have low habitat and conservation value.

7.23 Based on the above, it is considered that the cumulative impacts will have no effect on the impacts as presented in Table 7.6.

Mitigation

7.24 Given the negligible conservation value of the affected community, no mitigation measures specific to the marine ecology are considered necessary. The impact of potentially contaminated leachates, waters, soils and dusts, which may be released during ground works on intertidal species/habitats could be mitigated against by following the recommendations outlined by Fairhurst in the 30 January 2012 Interpretative Ground Investigation Report (Appendix 10.2). The construction contractor should be made aware of the potential risk from contamination to remaining biota within the intertidal zone and measures should be taken during construction works to manage the release of potentially contaminative substances from the construction site.

Limitations

7.25 There was a lack of accessible soft sediments to recover representative samples within the scope of the survey, due to the difficult ground conditions i.e. high cobble and boulder content. The survey was carried at the lowest tide within the contract window. It may be possible during lower tidal conditions that soft sediment may be available for sampling, however based on the low conservation and habitat value of the site, it is unlikely that

analysis of soft sediment samples would have a significant effect on the level of impact outlined above. As such, the assessment is considered to be suitable and in line with the agreed scope of the EIA.

Conclusion and Residual Impacts

- 7.26 Although the proposed works will have a localised major negative impact on the intertidal community currently found on the stony shore, no species or habitats of conservation value will be affected. The level of impact is expected to be temporary (less than one year). Where washed by the tide, the newly-constructed revetment will be quickly colonised by macroalgae and/or sessile invertebrates such as barnacles. In effect, an extended sloping stony shore will be replaced by a smaller expanse of hard substratum functionally equivalent to a rocky shoreline. Sediment disturbed or left on the shore during the construction process will be quickly removed by the tides and no residual effects are to be expected.
- 7.27 The impact of potentially contaminated materials on remaining biota, would be mitigated against by appropriate site management.

Summary

- 7.28 The observed community consists of a small number of common and widespread intertidal species, none of which are considered to be of conservation importance.
- 7.29 No habitats of conservation value are present in the survey area. In areas directly affected by construction of a platform and revetment existing biota will be buried or removed, but newly-constructed surfaces will be rapidly re-colonised.
- 7.30 The highest impact rating was **Minor-moderate** and related to the impact associated with the removal or burial of community on intertidal stones; however, it is considered by MSC, that realistically, the impact would be negligible. No mitigation is required.
- 7.31 The impact associated with potentially contaminated soils, dusts and waters has been assessed at **Minor**, and MSC consider that this impact could be mitigated against by appropriate site management.
- 7.32 The level of impact is expected to be temporary. No long-term negative impacts on marine ecology are predicted at the parish/neighbourhood level.
- 7.33 The cumulative impacts associated with the proposed development and the development proposed by Network Rail 100m to the east are unlikely to have significant impact due to the survey area being isolated and disconnected from adjacent coastlines and both sites having a low habitat and conservation value. Consequently an impact rating of **No-impact** has been assigned.

- 7.34 Taking into account the findings of the desk top study and site survey, the proposed works from a marine ecology perspective could be undertaken with no significant negative impacts.

8.0 Water Environment

Introduction

- 8.1 This Chapter presents an impact assessment of the Proposals on coastal and sedimentary processes at the site and on the adjacent shorelines in the Firth of Clyde. Water quality effects associated with the Proposals have also been considered.

Relevant Legislation and Planning Policy Context

- 8.2 An overview of relevant legislation and planning policy that have been consulted is provided below:
- From 6 April 2011, coastal and marine developments within 12 nautical miles (nm) of the Scottish inshore region of UK waters are regulated through the Marine (Scotland) Act 2010. Activities including deposits to the sea, removal of substances and objects from the seabed, construction works, dredging the seabed, deposit or use of explosives and incineration require to be licensed with a view to promoting economic and social benefits while minimising adverse effects on the environment, human health and other users of the sea;
 - Discharge to surface waters, including transitional and coastal waters, is regulated under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) which came into force on 31 March 2011. CAR authorisation is intended to control impacts on the water environment, including mitigating the effects on other water users; and
 - Under the Water Environment and Water Services (Scotland) Act 2003, SEPA are responsible for producing and implementing River Basin Management Plans (RBMPs) for the Scotland and the Solway Tweed River Basin Districts (RBDs). River basins comprise all surface waters (including coastal waters) extending to three nm seaward from the Scottish territorial baseline. Any proposed development within these waters must have regard to the requirements of the Water Framework Directive (WFD) to ensure that all surface water bodies achieve 'Good Ecological Status (GES)' and that there is no deterioration in status.

Assessment Methodology

Approach to Assessment of Significance

- 8.3 In order to assess the significance of the impact of the Proposals on coastal and sedimentary processes, and water quality, the importance of the receptor (i.e. the coastal resource or water body) will be classified and an assessment of the potential magnitude of the effect on that receptor will be made. Significance will be determined by merging these two criteria.

Coastal and Sedimentary Processes

8.4 There are two receptors; the beach/intertidal area at the site itself; and any shorelines adjacent to the site, which could be affected by the Proposals, by changes to the sediment transport regime. The importance of the receptor is defined according to Table 8.1 below and is based on the designation of protected areas for marine and/or coastal interest. Coastal and marine sites are designated either to meet the needs of international directives and treaties, national legislation and policies or more local needs and interests.

Table 8.1: Importance of Receptor

Importance	Features
International/National	Special Areas of Conservation Special Protection Areas SSSIs (Sites of Special Scientific Interest) National Nature Reserves Marine Protected Areas Marine Consultation Areas
Regional/Local	Regional Parks Local Nature Reserves Local Nature Conservation Sites Community Marine Conservation Area
Lesser	Undesignated sites Sites of limited importance

8.5 The level of magnitude of the effect is assessed based on the criteria below:

Table 8.2: Level of Magnitude

Level of Magnitude	Definition
High	Major effects fundamentally changing the baseline condition of the receptor, leading to total or major alteration of character or setting.
Medium	Moderate effects changing the baseline condition of the receptor materially, but not fundamentally, leading to partial alteration of character or setting.
Low	Minor detectable effects which do not alter the baseline condition of the receptor materially.
Imperceptible	A very slight and barely distinguishable change from baseline conditions, approximating to the 'no change' situation.
None	No discernible change to the baseline condition of the character or setting of the receptor.

8.6 The significance of the impact is calculated by merging the importance of the receptor and the level of magnitude of effect on that receptor resulting from the Proposals, as set out in Table 8.3 below:

Table 8.3: Significance of Impact

Level of Magnitude	Importance of Coastal Resource		
	Lesser	Local/Regional	International/National
High	Slight	Major	Major
Medium	Negligible	Moderate	Major
Low	Negligible	Slight	Moderate
Imperceptible	Negligible	Negligible	Slight
None	Negligible	Negligible	Negligible

8.7 The assessment will be carried out for the construction phase of the works and during the operation period of the Proposals (i.e. with the development in place and operational).

Water Quality

- 8.8 In consideration of water quality, there are no surface watercourses within the development site. However, elements of the Proposals lie on the margins or within the Clyde Estuary. The Estuary is, therefore, the only surface water body receptor in relation to the Proposals. Potential groundwater receptors are addressed in the Soils, Contamination and Geology Chapter (Chapter 10).
- 8.9 The sensitivity of the Clyde Estuary as a receptor is defined in terms of its existing water quality, dilution potential and local designations in accordance with Table 8.4 below:

Table 8.4: Sensitivity of Receptor

Sensitivity	Features
High	- High or moderate water quality with low dilution potential or - Designation of international or national importance
Medium	- Moderate water quality and high dilution potential or - Poor water quality with low dilution potential or - Designation of regional or local importance
Low	- Poor water quality with high dilution potential and - Undesignated

- 8.10 The magnitude of impacts has been considered in terms of scale and duration:

Table 8.5: Level of Magnitude

Level of Magnitude	Definition
High	Permanent, fundamental change to the baseline condition of the receptor, leading to total or major alteration of character or setting.
Medium	Permanent moderate effect, changing the baseline condition of the receptor materially, but not fundamentally, leading to partial alteration of character or setting OR temporary fundamental effect.
Low	Minor detectable permanent effects which do not alter the baseline condition of the receptor materially OR temporary moderate effects
Imperceptible	A very slight and barely distinguishable permanent change in the baseline conditions, approximating to the 'no change' situation OR minor temporary effect.
None	No discernible change to the baseline condition of the character or setting of the receptor.

- 8.11 The significance of the impact is determined by merging the sensitivity of the receptor and the level of magnitude of effect on that receptor resulting from the Proposals. This approach generates the following assessment matrix:

Table 8.6: Significance of Impact

	Sensitivity		
Level of Magnitude	High	Medium	Low
High	Major	Major	Moderate
Medium	Major	Moderate	Moderate
Low	Moderate	Slight	Slight
Imperceptible	Slight	Negligible	Negligible
None	Negligible	Negligible	Negligible

Baseline Conditions

Coastal and Sedimentary Processes

- 8.12 The assessment of baseline coastal and sedimentary processes was carried out through a review of the available literature, collation and review of historical Ordnance Survey maps and aerial photographs, and a site visit carried out during low tide on 31 January 2012. The results of this assessment are presented below.
- 8.13 The site of the proposed new road is an approximately 120m long section of existing beach and intertidal area on the southern shore of the Firth of Clyde. The area is to the west of Kempock Point, Gourock (Appendix 8.1). On the landward side of the beach/intertidal area there is some rough ground, backed by the buildings at the east end of Kempock Street.
- 8.14 Most of this stretch of urban coastline has already been developed and there are very few undeveloped intertidal areas along the Port Glasgow to Gourock coastline. The 120m long beach/intertidal area within the site is bounded on both sides with hard development extending out to approximately Mean Low Water Springs (MLWS); on the east side is Gourock Pier and the train station car park; and on the west side the Kempock Street car park. From a review of historical maps and aerial photographs, Gourock Pier has been developed since at least 1897. At this time the entire intertidal area to the west of Gourock Pier was undeveloped and the 1897 map shows a long stretch of beach extending to the west, right along Gourock's West Bay. Later map editions show the construction of the Bathing Pool on this beach by at least 1914, extending out onto the beach and inter-tidal area. Development of West Bay continued, with the Kempock Street car park area to the west of the site constructed in c. 1970. Hence, the site has been constrained by hard coastal defences on both sides for many years and the short section of remaining beach has essentially been isolated from long-shore sediment transport processes for some time.

Review of Coastal and Sedimentary Processes in the Inner Firth of Clyde

- 8.15 The most comprehensive review of coastal and sedimentary processes in the area is contained within the Scottish Natural Heritage (SNH) report: Ramsay and Brampton (2000) Coastal Cells in Scotland: Cell 6 – Mull of Kintyre to the Mull of Galloway. The Gourock coastline is located within Cell 6b – Inner Firth of Clyde to Farland Head and a summary of the key findings of the report is presented below.
- 8.16 The tidal cycle in the Inner Firth of Clyde has a period of approximately 12.4 hours at Greenock, approximately three miles to the east of Gourock. The mean spring tidal range at Greenock is 3.1m, falling to 1.8m on neaps (Table 8.7).

Table 8.7: Predicted Tidal Levels and Ranges at Greenock

MHWS (m OD)	MLWS (m OD)	Spring Range (m)	MHWN (m OD)	MLWN (m OD)	Neap Range (m)
1.78	-1.32	3.1	1.18	-0.62	1.8

(Source: Ramsay and Brampton, 2000)

- 8.17 Strong winds from the south and west can result in an increase in sea levels in the Firth of Clyde. At Gourock this has resulted in increases of up to 1.2m (Ramsay and Brampton, 2000). Conversely, winds from the north and east can decrease water levels by as much as 0.9m at Gourock.
- 8.18 In the Inner Firth of Clyde, tidal streams are dependent on river flows, with the main stream following the main river channel. In general, tidal streams are relatively weak in the main channel and barely perceptible at the coastline (Ramsay and Brampton, 2000). During high river flows and during periods with winds from the north and east, the rate and duration of the outgoing tidal streams are much increased. Similarly, during low river flows and winds from the south and west, the rate and duration of the incoming tidal streams increase.
- 8.19 All wave energy in the Inner Firth of Clyde is locally generated (Ramsay and Brampton, 2000). Due to the shape of the coastline, fetch lengths are restricted in all directions resulting in limited wave heights. An assessment of wave conditions at Greenock by HR Wallingford (1990) indicated that the most severe wave conditions would be experienced from 300 to 330 °N, with a 1:50 year significant wave height of 1.16m. From inspection of maps and during the site visit, the largest fetch lengths at the site were observed to be from this sector.
- 8.20 Ramsay and Brampton (2000) note that there are very few beach areas in Cell 6b, with most of the coastline along this frontage being low and rocky with a mixture of mud, sands, gravels and boulders occurring over the flat foreshore. Although there is evidence for dominant northward movement of beach material in places, Ramsay and Brampton (2000) suggest there is unlikely to be any present day long-shore sediment movements along this coastline, due to a lack of sediment and the restriction in wave heights due to short fetch lengths. There is also limited fresh erosion, given the rocky nature of the coast and the large amount of coastline protected by hard defences. The build-up of sediment on the

western side of groynes on West Bay beach indicates some historic littoral transport at West Bay to the north-east (see Figure 1 in Appendix 8.1).

- 8.21 Most of the coastline of the southern Inner Firth of Clyde from Port Glasgow to Gourock is protected by hard defences, mainly vertical sea-walls and there is little natural coastline remaining. In general, given the lack of beach sediments and as many of these coastal defences have been in place for a long period of time, they have little present day influence on beach sediments along the coast (Ramsay and Brampton, 2000).

Detailed Description of Site

- 8.22 Figure 1 in Appendix 8.1 shows the key features of the site, as assessed during the site visit on 31st January 2012. In general, the intertidal area has a relatively steep gradient (approximately 0.12) and is made up of a mix of natural beach sediment (shingle and boulders) with a large amount of debris (bricks, rocks, rubble and rubbish) which have been dumped on the beach over the years (Photo 1 in Appendix 8.1).
- 8.23 On the western side of the site the foreshore is comprised of mainly boulders and gravel, many of which were covered in barnacles, and there was a lack of fine shingle material and sand at the surface on this part of the beach (refer to Photograph 2 in Appendix 8.1). At the rear of the beach towards Kempock Street, large rocks and boulders have been placed along an approximate 70m stretch of concrete blocks. It is assumed that this is to act as a form of coastal defence to protect the buildings of Kempock Street as there is evidence of past erosion here (refer to Photograph 3 in Appendix 8.1). The lack of fine sediment on the surface and the fact that most of the boulders and sediment on the foreshore are densely covered in barnacles, suggests that there is little present day sediment movement at the western side of the site.
- 8.24 Detailed sediment analysis was carried out at the site during the geotechnical site investigations (see Appendix 10.1). Three boreholes (BH01, BH02 and BH03) and four trial pits (TP01, TP02, TP03 and TP05) were carried out on the intertidal area and detailed sediment size data is reported by Fairhurst (refer to Appendix 10.1). Sediment from 0.5m depth at TP01 on the foreshore on the western side of the site was found to be 2.7% silt and clay, 34% sand and 63.3% gravel, with a D60 (grain size) of 22.15mm. At 1.5m depth from the same pit, the proportion of sand was increased with 3.2% silt and clay, 82% sand and 14.8% gravel, with a D60 of 0.41mm. The other intertidal trial pits show similar sediment characteristics, with a mix of mainly sand and gravel, with the proportion of sand increasing with depth.
- 8.25 On the eastern side of the site, there is a short, approximately 40m section of shingle beach (Photograph 4 in Appendix 8.1). Here the sediment consists of shingle sized sediment and the beach shows some evidence of sediment sorting, with a gradation of sediment with larger sizes of shingle and cobbles at the back of the beach, near the beach crest, grading down to finer shingle towards the sea (Photograph 5 in Appendix 8.1). There is also some evidence of sediment build up on the western side of the Pier. The lower foreshore consists of cobbles and boulders and there was no sand visible at the surface during the site visit. This part of the site is the most active in terms of coastal processes and there is evidence of

limited localised sediment movement and re-working of sediment by waves. There is also some evidence of erosion at the back of the beach on the eastern side of the site (see Photograph 4 in Appendix 8.1).

- 8.26 Beach profiles at three locations along the site are shown in Figure 2. These were extracted from the site topographical survey; the profiles extend right to the back of the site. All profiles indicate the steepness of the foreshore and the shingle beach can be identified in Cross Section 1; the beach crest is at 3.13m OD and the beach gradient here is 0.13. Sections 2 and 3 cross the rock rubble and concrete blocks at an elevation of approximately 2m AOD.
- 8.27 Based on the site visit, literature review and information collated from historic maps and aerial photographs, it is concluded that the site is not connected in terms of gravel sediment transport to the adjacent coastline. This is mainly due to the fact that construction of hard coastal defences on either side of this short intertidal area, have effectively cut it off from sediment supply from the west (i.e. West Bay). Similarly, there is no littoral sediment transport to the east, due to the Gourock Pier, which will block any long-shore sediment movement. Sand sized sediment transport is also likely to be limited, as there was negligible sand observed on the surface of the beach and the hard defences on either side of the intertidal area will also limit most of the sand movement. However, there may be some sand-sized sediment transport further offshore.
- 8.28 Local coastal processes operate within the site itself, with localised re-organisation of sediment within the short section of beach. It would appear that there has been historic sediment transport from west to east, and, as there is no gravel-sized supply of sediment into the site, the west side of the site is now sediment starved (Figure 2 in Appendix 8.1). All available sediment has been deposited on the eastern side of the site and is reworked by wave action to form the shingle beach. Wave action will rework the sediment within the beach, creating active beach crests, which will vary in location and elevation in response to different storm events, and will act to sort the sediment based on particle size, with the larger sizes generally higher up the beach.
- 8.29 Sediment quality sampling during ground investigations (Appendix 10.1) indicated potentially contaminated fine grained sediments at depth on the foreshore.

Water Quality

- 8.30 The Clyde Estuary is a baseline water body in terms of the Scotland River Basin Management Plan. SEPA's Water Body Information Sheet for the Clyde Estuary - Outer records that it is classified as having an overall Moderate status. The overall classification of status is determined from many different tiers of classification data including chemistry, ecology and hydromorphology. In this regard, water quality is also recorded as being of moderate status. The overall status classification has high confidence attached to it whilst the water quality does not have a confidence entry recorded against it.
- 8.31 The information sheet confirms that SEPA have set environmental objectives for the water body to enable sustainable improvements to the status or to allow for the local environment

to be managed so that no deterioration occurs unless this is caused by a new activity providing specified benefits to society or the wider environment. Specific objectives are outlined in relation to pollution and morphological alterations with a view to achieving Good status by 2015.

- 8.32 A number of point source discharges are identified as existing pressures on the Clyde Estuary Information Sheet. These are allocated as owned by Scottish Water and, although no specific details are given, are thought to relate to Combined Sewer Overflows (CSO) and untreated or inadequately treated sewage discharges to the Estuary.
- 8.33 Review of Scottish Water records for the area suggests there are no raw sewage outfalls in the vicinity of the site. However, a CSO is shown to outfall within the intertidal zone on the western edge of the existing beach. No outfall or evidence of a pipeline is apparent from site observation. It is, therefore, assumed that the CSO pipeline is buried under the beach and outfalls below the MLWS level.
- 8.34 There are a number of minor surface water outfalls from the existing car park and properties. These are thought to be untreated.
- 8.35 The dilution potential of the Clyde Estuary at the site is high although dispersal may be influenced by tidal currents.
- 8.36 In terms of environmental designations, the western boundary of the Inner Clyde Estuary Site of Special Scientific Interest (SSSI) and Special Protection Area (SPA) is approximately 3.2 miles to the south east of the site. There are no environmental designations covering the site itself.
- 8.37 In summary, the Clyde Estuary at this location has a moderate water quality classification, high dilution potential and there are no environmental designations in the vicinity. In terms of its status as a receptor, the Estuary is considered to be of **Medium** sensitivity.

Impact Assessment

- 8.38 Drawing 1194/40 'Split Carriageway Option Sketch Design' shows the proposed land reclamation and new road, and a detailed description of the works is given in Chapter 2. The work comprises constructing a road and car park extension on this intertidal area to a level of approximately 4.5m AOD. A wall of 1.2 metre in height will be incorporated into the design of the new road and the car park extension. The road and car park will be protected by primary and secondary rock armour to create a revetment, which will also incorporate geotextile material. In addition, a new slipway is proposed at the eastern end of the new link road. There will be no alterations to existing sea walls other than cosmetic connections and interfaces at street level. The Proposals will not extend beyond the MLWS level.

Potential Impacts

- 8.39 As shown on Drawing 1194/40, the Proposals will directly impact upon most of the existing beach area/intertidal area, as approximately 70% of the area will be reclaimed and

developed. This will have a direct and permanent impact on this short part of the coastline. Other potential impacts may include the effects of the development, during construction and operation, on adjacent shorelines and the wider Firth of Clyde area. These potential impacts are assessed below in terms of water quality.

Coastal and Sedimentary Processes

Assessment of Impacts

- 8.40 The intertidal area and beach at the Proposals site has no natural heritage designations and is of limited natural heritage value. The active natural beach is limited in extent and much of the intertidal area is degraded, with large amounts of rubble, debris and rubbish dumped around the site. At present, the site is effectively isolated from the adjacent coast in terms of coastal processes and sediment transport, as it is constrained by hard coastal defences/sea walls on either side. Localised coastal processes are operating within the site itself, which has led to local reorganisation of sediment. The site receptor is defined as of **Lesser** importance, using the criteria in Table 8.1.
- 8.41 The reclamation of this intertidal area will have a direct and permanent impact on the coast at the site and the magnitude of the effect is assessed to be **High** (Table 8.8), as reclamation and construction will completely alter the natural coastal and sedimentary processes and this part of the shoreline will effectively become a hard shoreline with a small intertidal area at the toe of the revetment. Using the assessment methodology outlined above, the significance of the impact is assessed to be **Slight** (Table 8.8). Given the degraded nature and limited value of the intertidal area at present and the fact that it is already protected by hard defences on either side, the loss of this short section of intertidal area is considered to be of **Slight** significance in terms of coastal processes.
- 8.42 The adjacent shorelines of Gourock and Greenock are mainly urban and protected with hard defences. The western boundary of the Inner Clyde Estuary SSSI, SPA and RAMSAR site is located approximately three miles to the east of the site, offshore at Greenock and along the northern coast of the Firth of Clyde at Ardmore. This is an internationally important site for several species of birds and as well as salt-marsh habitat. Thus, the Firth of Clyde and adjacent shoreline receptor is of **International/National** importance.
- 8.43 As discussed above, there is unlikely to be any present day long-shore sediment movements along this coastline and coastal processes at the site area are effectively isolated from the rest of the coast due to the hard defences on either side of the site. Therefore, it is considered that the Proposals will have no effect on the adjacent shoreline and Firth of Clyde area and there will be no discernible change to the character of the adjacent shorelines (i.e. magnitude of effect is **None**). Merging the importance of the receptor with magnitude of effect, means the significance of the impact of the Proposals on this receptor is assessed to be **Negligible** (Table 8.8).
- 8.44 During construction, there may be some localised disturbance of fine sediment; however it is considered that the magnitude of this effect will be **Imperceptible** on adjacent shorelines. Therefore, during construction, there is the potential for some impact on adjacent shorelines

from fine sediment transport. However, this will be temporary and short-lived and is assessed to be of **Slight** significance to adjacent shorelines. Mitigation measures will be employed during construction to minimise the disturbance of fine material. In addition, sediment control measures such as silt curtains will be utilised to limit the risk of any sediments disturbed by construction work to be transported out of the site. A Pollution Prevention Statement has been prepared and is enclosed in Appendix 1.5.

Table 8.8: Assessment of Significance on Coastal Resources

Receptor	Timing	Importance of Receptor	Magnitude of Effect	Significance
Site	Construction	Lesser	High	Slight
Site	Operation	Lesser	High	Slight
Adjacent shorelines / Firth of Clyde	Construction	International / National	Imperceptible	Slight
Adjacent shorelines / Firth of Clyde	Operation	International / National	None	Negligible

Water Quality

- 8.45 The potential water quality impacts of the Proposals relate to both construction and operational phases. Whether the effects are short or long term will also influence their relative significance. The potential impacts identified are outlined below.

Deposition of Rock and Bulk Fill Material to Form Car Park Extension and Revetment

- 8.46 The proposed extent of the infilling and revetment works has been dictated by the level of the MLWS and the development footprint lies outwith this tidal envelope. Through careful programming, construction can, therefore, be undertaken in the dry.
- 8.47 In terms of construction sequence, the bulk fill material will need to be laid before the revetment stone can be set against it. In the interim, there is potential for washout of finer particles from the bulk fill materials at high tides and through wave action until the revetment is completed. The magnitude of the potential impact without mitigation is considered to be low with a moderate temporary effect. However, it is anticipated that this risk can be managed effectively by a contractor.
- 8.48 Some disturbance of beach sediment is anticipated during the construction of the toe of the revetment. Disturbed sediment may be more likely to enter suspension in the next high tide, affecting water quality locally in terms of turbidity. Contaminants entrained in the beach sediments could also enter the water. However, environmental testing confirmed that although a moderate level of contamination is present on site, a relatively small number of determinants were found at concentrations exceeding assessment criteria. In addition, the beach sediments are already subject to coastal processes and natural migration of

sediment is on-going. In view of the anticipated minor temporary effect, the magnitude of the potential impact is considered **Imperceptible**.

- 8.49 The placing of quarried material for the revetment during the construction phase also has the potential to release amounts of fine material that may be carried away from the dump location by the local tidal currents. Such material is likely to be uncontaminated as it will consist of rock flour or fine sediment created by the quarrying process. The magnitude of the potential impact is therefore considered **Imperceptible**.

Surface Water Runoff

- 8.50 Surface water runoff has the potential to impact on the water quality in the Clyde at both construction and operational phases. Large quantities of silt can be generated through construction works and there is a risk of leakage or spillage incidents. In the operational phase surface water runoff from trafficked areas can contain a variety of contaminants.
- 8.51 SEPA adopt a risk-based approach to the regulation of surface water discharges. In their Regulatory Guidance (WAT-RM-08), Sustainable Urban Drainage Systems (SUDS or SUD Systems), the SUDS matrix outlines the anticipated treatment response in terms of proposed developments discharging to water bodies of varying sensitivity. Preliminary discussions with SEPA indicate that no SUDS are required at this particular location due to the large dilution potential in the receiving environment.
- 8.52 The relatively short duration of any construction effects and the dilution capacity of the Clyde Estuary in terms of the operational discharge of potentially poor quality surface water runoff, mean that the magnitude of this impact is considered **Low**.

Concrete Slipway

- 8.53 The proposed slipway will be constructed from concrete within the intertidal zone. The concrete will be largely contained by shuttering although there is potential for some seepage. Placing of the concrete can be programmed for low tide. However, the curing time could mean that there is potential for cement washout when water levels next rise. The impact would be temporary and local although possibly with moderate effect. The magnitude is therefore considered to be **Low**.

CSO Discharge

- 8.54 The existing CSO outfall is outwith the development boundary and there will be no direct construction impact on the infrastructure. However, the land reclamation will result in permanent alteration of the coastal profile in this area and there is potential for local tidal currents to be affected and effective dispersal of effluent could be compromised. However, the extent of the infilling and revetment into the estuary is only marginally beyond the limits of the existing sea walls. These are already thought to limit water movement to some extent and the increased footprint is unlikely to increase this effect appreciably. The magnitude of the potential impact is therefore considered **Imperceptible**.

Mitigation

Coastal and Sedimentary Processes

- 8.55 Mitigation measures to reduce the amount of sediment disturbance in the near-shore area during the construction works will be employed. This includes ensuring that the revetment will be properly tied in and protected at the toe of the structure in order to reduce the potential of scouring and undercutting at the toe of the revetment. In addition, sediment control measures such as silt curtains will be utilised to limit the risk of any sediments disturbed by construction work to be transported out of the site. It is also important to tie in the new development and coastal defences with the existing sea-walls in order to minimise any erosion at the flanks of the new defences.

Water Quality

- 8.56 Prior to commencement of the works, a Construction Environmental Management Plan (CEMP) will be produced to outline how best practice will be adopted during the construction phase. This will include construction method statements and details of proposed environmental mitigation.
- 8.57 On the basis of the negative impacts identified above, specific mitigation will be employed. As far as possible, stone will be washed prior to placement to remove any fines. In addition, the construction programme will be designed to avoid underwater operations. The construction method statement will also detail placing methods to minimise possible release of sediment and incorporate provision for monitoring water quality to confirm the acceptability of the impact of the work. The works will require to be licensed under the Marine (Scotland) Act 2010, placing a legal obligation on the contractor to comply with any conditions imposed.
- 8.58 Construction method statements will outline appropriate measures to isolate potentially contaminated runoff from entering the Estuary. Measures adopted might include: silt traps, bunds, filtration or proprietary systems such as Siltbusters. Fuel storage and refuelling facilities will comply with relevant Pollution Prevention Guidance and spillage kits should be available to all operatives. Vehicle wheel wash facilities should also be considered. In terms of the operational phase of the Proposals, the approach to treatment of runoff from all roof, roads and areas of hard standing will be discussed and agreed with SEPA.
- 8.59 The risk of surface water contamination through washout of cementitious material can be largely mitigated through careful design of the concrete mix. In particular, anti-washout admixtures can be considered to increase the cohesion of the concrete and reduce washout of finer particles. Alternatively the contractor could choose to implement barrier mechanisms to effectively isolate the concrete until the risk of washout has passed.

Limitations

- 8.60 The coastal and sedimentary processes assessment was carried out based on a desk-top study and a site visit by a coastal geomorphologist. Given the site location and setting, it is considered that this level of detail is sufficient for this assessment and the conclusions

made are based on existing data and expert opinion. No field measurements or modelling of sediment transport was undertaken.

- 8.61 The scope of the assessment of water quality impacts has been limited to a desk study with no quantitative analysis of baseline conditions or impacts. This approach is considered appropriate for the scale and nature of the Proposals.

Conclusion and Residual Impacts

- 8.62 The Proposals will have a direct and permanent effect on coastal processes at the site itself, as most of the existing intertidal area and beach will be reclaimed and developed. As the site is of no natural heritage value or coastal resource value and is degraded at present, the overall impact in terms of coastal resource was assessed to be **Slight**.
- 8.63 Any effect on coastal processes will be limited to within the site itself, as the site is not connected to the adjacent coast and is protected by hard defences on either side. As the site is effectively isolated from the adjacent shoreline in terms of coastal processes and sediment transport, the effect of the Proposals on adjacent shorelines and the Firth of Clyde was assessed to be **Negligible**.
- 8.64 During the construction works, mitigation measures will be employed to reduce the amount of sediment disturbance. However, there may be some short-term, imperceptible effect to sedimentation on adjacent shorelines during construction. It is considered that there will be no discernible effect at the Inner Clyde Estuary SSSI, SPA and RAMSAR site, the western boundary of which is three miles to the east of the site. The residual impact on adjacent shorelines/Firth of Clyde during construction was assessed to be of **Slight** significance.
- 8.65 On the basis of the desk study, it is concluded that the Proposals can be designed, constructed and operated so that it is unlikely that any measurable impact on water quality will occur. Overall, the impact on water quality can be classified as of **Negligible** significance.
- 8.66 The majority of impacts can be mitigated through design or compliance with legislation, guidance and best practice during construction and operation of the Proposals. Any residual effects are considered to be of imperceptible magnitude and therefore of **Negligible** significance.

Cumulative Effects

- 8.67 The Inverclyde Council planning portal provides access to a database of planning applications within the local authority boundary. A search was undertaken against key impacts associated with the Proposals to identify any potential cumulative development effects. Given its nature and location, the Gourock Station Revetment Works (GSRW) were identified as having the potential to contribute to a cumulative impact when considered against the Proposals.

- 8.68 As noted in the baseline assessment for the present study, long-shore sediment movements along this part of the Inner Firth have ceased due to existing developments and the fragmentation of the coastline. The GSRW development is located adjacent to an existing development and does not result in the loss of any existing beach or foreshore. In terms of water quality, the ES for GSRW concludes that the majority of impacts can be mitigated to the extent that they are of negligible significance. The disturbance of possibly contaminated sediments during revetment construction is noted as having potential for a minor negative short-term effect. The assessment is based on identification of potentially contaminating historical land use and it appears that no sediment sampling and analysis was undertaken. In addition, construction of the GSRW is already underway and it is unlikely that any construction works will coincide with those associated with the Proposals.
- 8.69 Environmental testing associated with the Proposals identified a moderate level of contamination. However, a relatively small number of determinants were found at concentrations exceeding assessment criteria. In addition, the design has been developed to allow construction to take place outwith the water environment. The impacts of the Proposals on water quality have therefore been assessed as being of negligible significance, with no contribution to a cumulative impact when considered against relevant other committed development.

Summary

- 8.70 A desk study investigation into existing coastal and sedimentary process of the study area and potential impacts of Proposals has been undertaken. Overall the Proposals will result in negligible changes to coastal processes in the Firth of Clyde as long-shore movements of sediment along this part of the Inner Firth have already effectively ceased due to existing developments. Impacts of construction activities on coastal processes and sediment transport can be mitigated through design and effective construction management. However, Proposals will remove a small, existing intertidal area, the impact of which is considered Slight due to the current degraded nature and limited value of the intertidal area. Following a review of local committed development, cumulative impacts are considered to be of negligible significance.
- 8.71 A desk study investigation into the existing water quality of the Clyde Estuary and potential impacts of the Proposals has been undertaken. On the basis of the findings of the desk study, the Proposals can be designed, constructed and managed so that it is unlikely that any measurable impact on water quality will occur. Overall, the impact on water quality can be classified as of negligible significance. Following review of local committed development, cumulative impacts are considered of negligible significance.

References

- Fairhurst (2012) Gourock Pierhead Regeneration: Ground investigation. Interpretative Report, January 2012;
- Fairhurst (2010) Gourock Pierhead Masterplan, Geotechnical and Geo-environmental Desk Study, Ref 85160, June 2010;
- Ramsay, DL and Brampton, AH (2000) Coastal Cells in Scotland: Cell 6 – Mull of Kintyre to the Mull of Galloway, Scottish Natural Heritage, RSM No. 148; and
- SEPA (2010) RBMP Water body information sheet for water body 200320 in Clyde, Clyde Estuary – Outer.

9.0 Hydrology and Flood Risk

Introduction

- 9.1 This Chapter outlines the assessment undertaken to determine the potential impacts on hydrology and flood risk associated with the Proposals. The Proposals include the construction of a slipway, areas of open space, new road on reclaimed land and improved streetscape with reconfigured car parking areas.
- 9.2 The development of any site has the potential to impact upon the hydrology and flood risk of an area through direct and indirect impacts on catchments, watercourses and coastlines.

Relevant Legislation and Planning Policy Context

- 9.3 The relevant planning policy is contained within the following documents:
- Scottish Planning Policy, February 2010; and
 - Inverclyde Local Plan, January 2006.
- 9.4 In consideration of planning applications, Planning Authorities need to be satisfied that due account has been taken of Scottish Planning Policy (SPP) and Planning Advice Note 69 (PAN69): Planning and Building Standards Advice on Flooding. It is necessary to show that adequate protection against flooding exists or can be provided for the proposed development and that the development does not increase any existing flood risk to persons or property upstream and downstream.
- 9.5 Chapter 3 contains further details on planning policy, as does the Flood Risk Assessment (FRA) provided in Appendix 9.1.

Assessment Methodology

Scoping Report and Opinion

- 9.6 The Fairhurst Scoping Report (Appendix 1.3) did not propose a chapter on Hydrology and Flood Risk in the ES. It was proposed at that stage to provide a separate FRA. A separate FRA has been produced in addition to this EIA and is provided in Appendix 9.1.
- 9.7 The Council's Scoping Opinion (Appendix 1.4) advised that a number of comments had been received from SEPA which were appended to the Scoping Opinion. The Council made reference to detailed guidance provided by SEPA in its consultation response and indicated that the points raised should be addressed within the Environmental Statement.
- 9.8 In response to the Fairhurst Scoping Report, SEPA provided a consultation response which included the following points in relation to flood risk:

- “The ES should include a section on the appraisal process and justification for the preferred defence option. The feasibility of soft engineering techniques should always be considered in the appraisal process. Any coastal defence scheme should be appropriate in scale and type for the area”;
- “The application will also have to demonstrate that the works will not increase the risk of flooding in other locations”;
- “The onshore components of the development should be assessed for flood risk from all sources in line with Scottish Planning Policy (Paragraphs 196-211)”;
- “Our Indicative River & Coastal Flood Map (Scotland) is also available to view online. If a flood risk is identified then a flood risk assessment (FRA) should be carried out following the guidance set out in the Annex to the SEPA Planning Authority flood risk protocol”; and
- “Coastal processes should be assessed as part of the ES. This should include a baseline assessment to identify the coastal and sedimentary processes operating in the area. The baseline assessment should identify the following features and processes in the environment..” “... Hydrodynamics (waves and tidal flows)”.

Approach to Baseline Conditions Assessment

- 9.9 Baseline flood risk conditions at the site have been assessed using standard hydrological and hydraulic analysis methods.
- 9.10 In relation to potential for fluvial flooding, no surface watercourses have been identified within the site.
- 9.11 In relation to potential for coastal flooding, predictions of extreme still water sea levels have been made. In addition, wave modelling has been carried out to assess wave overtopping. An assessment of the joint probability of extreme sea levels and waves has been made to provide a combined probability of coastal flood risk.
- 9.12 Potential for flooding from other sources has been considered in the FRA. Other potential sources include sewer flooding, overland flow from pluvial events, infrastructure failure and groundwater flooding.
- 9.13 An assessment has been made of the potential effect of future climate change on coastal flood risk over the life of the development.

Approach to Assessment of Impacts

- 9.14 Potential impacts of the development are:
- Potential changes to wave climate caused by changes to the local topography, and construction of the rock armour; and
 - The construction of potentially vulnerable flood receptors such as buildings, access roads and other infrastructure within the coastal zone.

- 9.15 A FRA has been carried out to provide recommended minimum levels for facilities to be constructed as part of the development to reduce flood risk to acceptable levels in accordance with national planning policy.

Approach to Assessment of Significance

- 9.15 Significance has been assessed by considering the importance of the receptor in relation to its type combined with the level of magnitude of the change resulting from the development.

Table 9.1 Importance of Receptor

Consequences of Flooding to Receptor	Types of Receptor
High	<ul style="list-style-type: none"> ▪ Hospitals; ▪ Schools; ▪ Care Homes; and ▪ Fire/ambulance stations.
Moderate	<ul style="list-style-type: none"> ▪ Residential areas; ▪ Main roads; ▪ Major bus/railway stations; ▪ Airports; ▪ Shopping centres; and ▪ Warehouses and light industry.
Minor	<ul style="list-style-type: none"> ▪ Minor roads; ▪ Minor bus stops/railway stations; and ▪ Car parks.
Negligible	<ul style="list-style-type: none"> ▪ Parks and open areas; ▪ Rarely used roads/footpaths; and ▪ Abandoned and empty structures.

Table 9.2 Level of Magnitude

Level of Magnitude	Definition
High	Environment is subject to major risk of flooding from the sea or fluvial action often, or the development is particularly vulnerable (e.g. hospitals, care homes etc.).
Medium	Environment is subject to flood risk more than once every 200 years.
Low	Environment is subject to flood risk once in every 200 years.
Imperceptible	Environment is subject to flood risk only during the most extreme events (less than once every 200 years).
None	No discernible change to the baseline condition of the character or setting of the receptor.

Significance of Impact

9.17 The significance of the impact is determined by considering the importance of the receptor and the level of magnitude of effect on that receptor resulting from the development. The impact is assessed in this case based upon the change in level of risk in flooding which the development will cause. Significance levels are presented in a matrix in Table 9.3 below. Findings of significance are a matter of professional judgement and may differ from results suggested by the matrix. In general, an impact determined to be of moderate significance or above represents a 'significant impact'.

Table 9.3 Significance of Impact

Consequences to Receptor				
Level of Magnitude	High	Moderate	Minor	Negligible
High	Slight	Moderate	Major	Major
Medium	Negligible	Slight	Moderate	Major
Low	Negligible	Negligible	Slight	Moderate
Imperceptible	Negligible	Negligible	Negligible	Slight

Baseline Conditions

Potential sources of flood risk

- 9.18 The following potential sources of flooding have been considered:
- Coastal flooding: The site is potentially at risk from extreme still water sea levels. Wave action could also result in inundation of the waterfront in combination with either moderate or extreme still water levels. A joint probability assessment has been carried out to confirm the critical situation;
 - Sewer flooding: If capacity of sewers is exceeded in an extreme event or a blockage occurs, surcharging of the network can result in surface flooding. With the exception of the area of reclaimed land, the site is within an urban zone and has an existing network of sewers present. Areas of the site lying below surrounding road levels are potentially vulnerable to sewer flooding in the event of a blockage or if the capacity of the sewers is exceeded; and
 - Overland flow: In times of heavy rainfall it is possible for the infiltration capacity of the ground to be exceeded, the result being water travelling as sheet flow overland or ponding in depressions.

9.19 The following potential sources of flood risk have been considered and discounted:

- *Infrastructure failure:* No existing flood defence infrastructure or watercourse structures; such as culverts, the failure of which could affect flood risk to the site, have been identified;
- *Fluvial flows:* There are no surface watercourses within the development site; and
- *Groundwater:* By nature of its coastal location the site is not considered to be vulnerable to groundwater flooding. Impacts on groundwater are considered within the Soils, Geology and Contamination Chapter (Chapter 10).

Coastal Flooding – Extreme Sea Levels

9.20 A FRA of extreme sea levels and waves in existing site conditions was undertaken for a 1 in 200yr return period design event. Please see the FRA in Appendix 9.1 for further details. This reflects local and national planning policy. The assessment considered coastal flooding in the existing situation along with the predicted future effects of climate change.

9.21 Extreme still-water levels comprise an astronomic component (tide) and a meteorologically induced surge component. Predictions of extreme sea level around Scotland are made using the outcomes from the joint SEPA and Environment Agency (EA) study “Coastal Flood Boundary Conditions for UK Mainland and Islands”. Prior to this study, prediction of extreme sea level around the UK was carried out using Proudman Oceanographic Laboratory Report 112 (POL 112 Method). The Coastal Flood Boundary Conditions study improves upon the POL 112 Method by using up-to-date (for a longer time period than was available when the POL study was carried out) and applying a consistent method at all locations incorporating the best available statistical techniques.

9.22 SEPA/EA have provided the results of the study in GIS format for all of Scotland, and this has been used to obtain extreme sea level data for Gourock Pierhead. In addition to the extreme sea levels at various return periods, the output from the study provides confidence intervals at each return period, and also a graphical output showing estuary boundaries (upstream of which the data in the study is no longer valid). Gourock Pierhead lies just outwith an estuary boundary, with the nearest data point for extreme sea levels being approximately 4.5km away. This data point happens to be the last point before the estuary boundary, however, it is considered acceptable as the distance between the points is generally around 4km across the country, and the predicted sea level values change very little throughout the remainder of the estuary. Furthermore, the difference in levels between the last two points along the coast is zero, and at the 3rd last point the difference is still only 0.01m which is within the error margin associated with the research which produced the data.

9.23 Predicted extreme still water sea levels at Gourock Pierhead for various return periods are provided in Table 9.4 below.

Table 9.4 Predicted Extreme Still Water Levels at Gourock

Return Period (yrs)	Extreme Sea Level (mAOD)	Confidence Interval (+/- m)
2	2.78	0.1
5	2.94	0.1
10	3.08	0.2
25	3.26	0.2
50	3.40	0.3
100	3.54	0.4
200	3.69	0.5

Coastal Flooding – Wave Action

- 9.24 Waves impinging on coastal defences can result in the defences being overtopped by wave run-up or spray. Wave overtopping can endanger pedestrians and moving vehicles, and in severe cases pose a flood risk to property. The volumes of water overtopping coastal defences depend on the local defence level and profile as well as the coincident water levels and wave height. The hazard to persons and property is influenced by proximity to the defence as well as overtopping rate.
- 9.25 Waves are generated as a result of wind action on the surface of water, and their size is dependent on the wind speed (input of energy into the system) and bottom profile of the body of water (which determines water depth and thus wave characteristics). A full analysis has been carried out to predict the effects of wave action on the proposed development, the methodology of which is detailed in the FRA provided in Appendix 9.1.
- 9.26 In accordance with SPP and local planning policy, a joint probability design standard of 1 in 200 years has been used for the assessment of flood risk. Predicted overtopping rates from the analysis for the 200 year joint probability return period (combined extreme sea level and wind action) are presented below in Table 9.5.

Table 9.5 – Predicted Overtopping Rates (200 Year Storm)

Site Location	Overtopping Rate (l/s/m)
Point 1	0.69
Point 2	0.69
Point 3	0.08

- 9.27 The three different locations which have been analysed were spread across the development site, and their locations are further detailed in the FRA. The predicted worst-case overtopping rate for the development site from the analysis is therefore 1.69l/s/m.
Coastal Flooding – Climate Change
- 9.28 The design life of the development has been taken as 50 years in line with the design life of the revetment. Other parts of the development may have a shorter design life, and thus the approach which has been taken is considered conservative. The effects of potential future climate change on extreme still water levels and significant wave heights have therefore been considered up to the year 2062.
- 9.29 The UK Climate Impacts Programme (UKCIP) is funded by the Department of the Environment to investigate the potential impacts of climate change in the United Kingdom. The UKCIP has produced assessments of the potential impacts based on rates of increase in global greenhouse gas emissions consistent with the projections of the Intergovernmental Panel on Climate Change (IPCC).
- 9.30 UKCP09 provides relative sea level changes at a 25km grid resolution. The relative sea level changes combine absolute sea levels rise together with estimate of future land level change. For year 2062 under a high emission scenario, 50%ile figure, the relative sea level change for Gourock Pierhead is +0.166m (relative to the 2011 value).
- 9.31 This provides an estimate of the 200 year extreme still water level in 2062 of 3.86m AOD.
- 9.32 Changes in expected peak wind speed are also considered with regards to potential future climate change. The UKCIP has produced an assessment of possible future wind speed along with a report which outlines the methodology employed. This report explains that there are several different models by different organisations which have produced varying results. These results vary so widely that it is considered the models are either missing a key element that describes climate, or an inaccurate assumption has been made in order to produce model results. The range of results which the UKCIP have published in their report for the area around Gourock Pierhead predict a change of between -0.1 and +0.1m/s by 2062. Given that the average of these values is zero, and that the uncertainties are so great in the results it is considered sensible to assume zero change in wind speed due to climate change until further studies indicate otherwise.
- 9.33 Using the future value of 200 year return period extreme sea level, the analysis has been re-run and Table 9.6 shows the results of overtopping analysis with climate change taken into account.

Table 9.6 – Overtopping Analysis Results Including Climate Change

Site Location	Overtopping Rate (l/s/m)
Point 1	0.72
Point 2	0.93
Point 3	0.18

Summary – Coastal Flood Risk

- 9.34 The predicted 200yr still water level including for possible future effects of climate change to year 2062 is 3.86m AOD.

Impact Assessment

Potential Impacts

- 9.35 The significant potential impact of the development that requires assessment is changes to wave climate caused by changes to the local topography. In this context, the proposed construction of potentially vulnerable flood receptors such as buildings, access roads and other infrastructure within the coastal zone needs to be taken into account, as well as the impact on flood risk to the surrounding area.

Assessment of Impacts

- 9.36 The results from the coastal overtopping analysis provide data on the risk to the development site at various points across the area.
- 9.37 Waves impinging on coastal defences can result in the defences being overtopped by wave run-up or spray. Wave overtopping can endanger pedestrians and moving vehicles, and in severe cases poses a flood risk to property. The volumes of water overtopping coastal defences depend on the local defence level and profile as well as the coincident water levels and wave height. The hazard to persons and property is influenced by proximity to the defence as well as overtopping rate.
- 9.38 The most exposed parts of the site to wave action are the car parking areas which are situated at the top of the revetment slopes. Due to the ground level at this location, it is not at risk from extreme sea levels for the 200 year return period, but it is at risk from wave overtopping during a 200 year joint probability event. The predicted overtopping rate of 1.69l/s/m is considered hazardous to pedestrians according to the manual for the EurOtop overtopping calculation tool (www.overtopping-manual.com), but is well within the limits for driving at moderate speed and for the presence of trained personnel.
- 9.39 While the proposed development is potentially at risk from flooding, it may also impact on flood risk elsewhere. An assessment of the effects of the development on flood levels has been carried out.

- 9.40 The construction of the revetment and reclaimed land will not impact on extreme event still water levels because the associated loss of coastal flood volume is insignificant relative to the volume of water in a tidal event. The reclaimed land is small in area and will not affect wave effects elsewhere in the Clyde estuary as the effects of the development on the processes of reflection and refraction are small due to the relatively small change in outline of the coast.
- 9.41 The Proposals can be considered as having a 'slight' impact with regards to flood risk, as the consequences of flooding to the receptor (the development itself and surrounding areas) are 'minor' and the level of magnitude (as set out in the FRA provided in Appendix 9.1) is 'low'.

Mitigation

- 9.42 The Proposals comprise the construction of a new road on reclaimed land, slipway, open space and streetscape improvements. There are also proposals to realign car parks and access roads around the area. This assessment specifically addresses flood risk with regard to the Proposals, but general flood risk guidance is provided for any future development within these areas.
- 9.43 In the Proposals there are no buildings along the waterfront, but in some cases it may be necessary to temporarily close the access road if certain weather conditions, such as high winds, that will cause excessive wave overtopping occur. These areas will be suitable for most development, assuming that it is set back from the waterfront, with the exception of essential civil infrastructure. The low to medium risk area of the Risk Framework of SPP is considered to be applicable. Access during flood events, including by emergency services, is a matter that should be taken into account in development proposals under Paragraph 204 of SPP.
- 9.44 It is recommended that the access roads are designed to provide safe access up to the 1 in 200 year coastal flood event including climate change allowance to the year 2062. All parts of the access road and new car park (situated on reclaimed land) should be set above the 1 in 200 year still water level including climate change allowance to the year 2062 of 3.86m AOD. The proposed levels are shown on Drawing Number 87097/7201.
- 9.45 In addition to the above, there are proposals to construct a revetment with rock armour to provide a level of protection to the development site. The wave overtopping analysis has been carried out taking this new revetment into account.

Future Development Proposals

- 9.46 It is recommended that the minimum finished floor level for any future new development that is set back from the waterfront and not subject to additional risk from wave overtopping, should be 4.46m AOD. This provides a freeboard of 600mm above the predicted 1 in 200 year sea level including climate change allowance to year 2062. Any future development that is adjacent to the waterfront and potentially subject to additional risk from wave

overtopping should be considered separately on a site specific basis to take account of wave action at that particular location.

Sewer Flooding

- 9.47 Any risk associated with this source of flooding can be mitigated through setting floor levels above existing ground levels and/or by profiling ground levels to route water around and away from buildings.

Overland Flow

- 9.48 Any risk associated with this source of flooding can be mitigated through setting floor levels above existing ground levels and/or by profiling ground levels to route water around and away from buildings.

Limitations

- 9.49 Flood risk has been assessed for the 1 in 200 year return period (0.5% annual probability) event. This is in line with local and national planning policy. There has been no consideration of wave overtopping for more extreme events, which have longer return periods. Should a situation arise where a development on the site requires a level of protection greater than the 0.5% annual probability then a further site FRA should be carried out.

Cumulative Effects

- 9.50 The location of other proposed developments within the area are such that cumulative impacts, when considered alongside the project, are not anticipated to have any effects. The nearest development is revetment work at Gourock Railway Station. The EIA for this development states that flood risk is scoped out of the detailed assessment within the EIA process as a result of findings in the separate FRA for the site. Therefore, no impacts arise as a result of nearby development.

Conclusion and Residual Impacts

- 9.51 The FRA has shown that the Proposals can be protected to the 1 in 200 year standard required by national and local planning policy with an additional allowance for climate change over the life of the development.
- 9.52 A freeboard allowance of 600mm has been made above predicted flood levels to address uncertainties in prediction of flood levels and wave climate.
- 9.53 A residual risk remains of flooding in an event exceeding the design standard. In view of the climate change allowance and freeboard incorporated into the Proposals the risk is considered to be very low.

Summary

- 9.54 By virtue of its location, the site is potentially at risk from coastal flooding. Levels at the top of the revetment slope are above the 1 in 200 year extreme water level and, therefore, affords a level of protection to the proposed development. Wave action could result in inundation of the waterfront in combination with either moderate or extreme still water levels. A joint probability assessment has been carried out to confirm the critical situation.
- 9.55 The predicted 1 in 200 year still water level, including allowance for possible future effects of climate change to year is 3.86m AOD.
- 9.56 It is recommended that the new access road and car parking facilities are designed to provide safe access up to the 1 in 200 year coastal flood event including climate change allowance to at least the year 2050.
- 9.57 The recommended minimum level for buildings is 3.86m AOD. Any buildings or other facilities set below a level of 4.46m AOD should be of water resistant construction. It is also recommended that any future development should be set back from the waterfront, and not subject to additional risk from wave overtopping. The minimum finished floor level on any new development should be 4.46m AOD, providing 600mm freeboard above the predicted 1 in 200 year sea level including climate change allowance 50 years into the future.

10.0 Soils, Contamination and Geology

Introduction

- 10.1 This chapter provides an assessment of the potential effects on geology and ground conditions associated with the Proposals. Building development sites have the potential to impact upon the geology and ground conditions of an area through direct and indirect impacts including the effects on sites of importance or scientific interest, loss or sterilisation of mineral deposits or soil resources, disturbance of contaminated land or surcharging of ground which may accelerate erosion and subsidence.
- 10.2 It should be noted that this section does not discuss the value of the soil resources in terms of agriculture or other potential land uses. Impacts associated with contamination being disturbed in the vicinity of the Clyde have been assessed within the Water Environment Chapter.

Relevant Legislation and Planning Policy Context

- 10.3 The following relevant documentation has been considered in the preparation of this chapter:
- *Scottish Planning Policy, February 2012;*
 - *Planning Advice Note 58, Environmental Impact Assessment, September 1999, Scottish Executive Development Department; and*
 - *European Council Directive on Environmental Assessment (85/337/EEC), 1988.*

Methodology

- 10.4 The Fairhurst Scoping Report (Appendix 1.3) concluded that the following project activities had the potential to impact the soils, contamination and geology at the site:
- *Construction activities; and*
 - *Permanent change in land use of beach and foreshore to link road and revetment.*
- 10.5 The following environmental characteristics were recognised to be potentially affected by the Proposals:
- *Water quality and marine environment;*
 - *Human receptors;*
 - *Non-human receptors (i.e. buildings, materials placed in the ground etc); and*
 - *Soils and geology.*
- 10.6 A ground investigation carried out on the site has provided information to inform the assessment of these issues, please see Appendix 10.2.
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- 10.7 In response to the Fairhurst Scoping Report, SEPA stated that “on shore components of the development should be designed wherever possible to avoid engineering activities in the water environment. The water environment includes burns, rivers, lochs, wetlands, groundwater and reservoirs.”
- 10.8 The assessment of surface water bodies is given elsewhere in this report and comments on groundwater are given in the Hydrogeology / Groundwater Section below.

Baseline Assessment Methodology

- 10.9 The baseline geological conditions have been determined through the desk based review of published information (Gourock Pierhead Masterplan, Geotechnical and Geo-environmental Desk Study Report, Reference 85160, Dated 18/06/10 – Appendix 10.1) and the findings of an intrusive ground investigation (Gourock Pierhead Ground Investigation, Interpretative Report, Reference 87097, Dated 30/01/12 – Appendix 10.2).

Impact Significance Methodology

- 10.10 In order to determine the impact that the development would have on the geology and ground conditions, a hierarchy of importance and magnitude has been devised for the site and impacts respectively. Significant geological sites may be classified into those of national importance/value, regional importance/value and those not considered worthy of protection (refer to Table 10.1). The magnitude of the impact may be determined by predicting the extent of the change in baseline conditions resulting from the development (refer to Table 10.2). Each potential impact is assessed in order to establish its overall significance by drawing a comparison of the magnitude of impact against the importance/value of the affected site as shown in Table 10.3.

Table 10.1: Criteria to Assess the Geology and Ground Conditions Sensitivity

Sensitivity	Criteria
High	Areas containing geological or geomorphological features considered to be of national interest, for example, Sites of Special Scientific Interest (SSSI). Designated sites of nature conservation importance dependent on groundwater. Presence of extensive areas of economically important minerals, valuable as a national resource.
Medium	Areas containing geological features of designated regional importance, for example; geological SSSI or Regionally Important Geological Sites (RIGS), considered worthy of protection for their educational, research, historic or aesthetic importance. Exploitation of local groundwater is not extensive and/or local areas of nature conservation known to be sensitive to groundwater impacts. Presence of areas of economically important minerals of regional value.

Low	Geological features not currently protected and not considered worthy of protection. Poor groundwater quality and/or very low permeability make exploitation of the aquifer(s) unfeasible. Changes to groundwater not expected to impact on local ecology. Absence of mineral areas or minimal areas of local economical value only.
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Table 10.2: Criteria to Assess the Magnitude of the Predicted Impact on Geology and Ground Conditions

Magnitude of Impact	Criteria
Major	Partial (greater than 50%) or total loss of a geological site, or where there would be complete severance of a site such as to significantly affect the value of the site. Major permanent or long term change to groundwater quality or available yield. Existing resource use is irreparably impacted upon. Changes to quality or water table level will impact upon local ecology.
Moderate	Loss of part (between approximately 15% to 50%) of a geological site, considerable severance, considerable effects to the setting, or disturbance such that the value of the site would be reduced. Changes to the local groundwater regime are predicted to impact slightly on resource use but not rule out any existing supplies. Minor impacts on local ecology may result.
Slight	Minimal effect on the geological site (up to 15%) or a medium effect on its setting, or where there would be a minor severance or disturbance such that the value of the site would not be affected. Changes to groundwater quality, levels or yields do not represent a risk to existing resource use or ecology.
Negligible	Very slight change from baseline condition. Change hardly discernible, approximating to a 'no change' condition.

Table 10.3: Criteria to Assess the Significance of the Predicted Impact on Geology and Ground Conditions

Magnitude	Sensitivity		
	High	Medium	Low
Major	Major	Major - Moderate	Moderate
Moderate	Major - Moderate	Moderate - Slight	Slight
Slight	Moderate	Slight	Slight
Negligible	Negligible	Negligible	Negligible

- 10.11 The significance of the impact is calculated by merging the importance of the receptor and the level of magnitude of effect on that receptor resulting from the development.

Baseline Conditions

Topography and Geomorphology

- 10.12 The site location is shown on Drawing Number 87097/8001 and is at approximate national Grid Reference 224100E, 677950N. The site is around three hectares in size and is situated on the seaward boundary of the headland between West Bay and Gourock Bay. Topographical information has been obtained from on-site surveys as well as more general information from the Desk Study Report (Appendix 10.1).
- 10.13 The site generally lies between sea level and 10m AOD. In general the topography gently rises away from the sea. Areas of the site, such as the car parks are relatively flat with development forming platforms into the natural fall of the land. The beach area slopes from Kempock Street at around 8m AOD down towards the sea.
- 10.14 Within the study area no geomorphological features were identified that are considered worthy of protection. This baseline condition in terms of topography and geomorphology resources is, therefore, of **low sensitivity**.

Geology

- 10.15 Information on the geology at the site has been derived from the results of the recent ground investigation and Interpretative Report (Appendix 10.2).

Drift Geology

- 10.16 Made Ground was encountered in all but one of the exploratory holes during the ground investigation. Made Ground was generally found to be granular in nature. Extraneous material including but not limited to concrete, brick, ash, tarmac, glass, wood and cable were commonly found within the Made Ground across the whole site. The extent of the Made Ground was recorded up to maximum depths of 4.6m below ground level (bgl); window samples generally terminated within the Made Ground deposits at depths of approximately 3m bgl.
- 10.17 Natural superficial deposits were generally encountered within the deeper penetrating boreholes. Granular and then Cohesive deposits were recorded beneath the Made Ground.
- 10.18 Granular deposits were typically recorded as medium dense reddish brown or brown silty, gravelly fine to coarse sand, sometimes mixed with layers of sandy fine to coarse gravel. The gravel is noted to be of mixed lithologies but is sometimes described as dolerite, basalt or quartz. The natural Granular soils on the beach have been encountered from a minimum depth of 0.6m bgl and extend to a maximum recorded depth of 12m bgl where they give way to Cohesive soils. These deposits are likely to represent raised marine or beach deposits.
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- 10.19 Natural Cohesive soils were encountered beneath the granular soils on the beach and also immediately beneath made ground in more inland parts of the site. The Cohesive soils have been consistently described in the exploratory hole logs as slightly sandy, slightly gravelly clay and are likely to represent a deposit of glacial till. The till is usually stiff, but was recorded as being soft between 11m and 22m bgl at one location on the beach.
- 10.20 No drift deposits of economic importance have been identified within the study area and the soils are, therefore, classified as **low sensitivity**.

Solid Geology

- 10.21 Bedrock was encountered from between 18.7m and 20.7m bgl on the shore and proved to be very hard red Basalt for several metres. One borehole within the shore area did not encounter bedrock after 27m of drilling and at one location a thin (1m) horizon of sandstone was found.
- 10.22 Further inland the rock was noted to be medium strong or strong, grey, medium grained trachyte. Some slight weathering was visible in fracture zones and two discontinuity sets were detailed – one sub horizontal, close to medium spaced and one sub vertical, medium to widely spaced. Discontinuities are noted to be rough, undulating and sometimes planar. In this area rockhead was encountered at depths ranging from 5.6m to 6.3m bgl.
- 10.23 The Ordnance Survey maps for the area record disused sinkings located around 600m south of the site at Craigmushat Quarry where the Feldspathic Trachyte igneous rock in the area was extracted. The Envirocheck Report obtained during the Desk Study confirms that the quarry is a Local Authority registered landfill site and the historical maps confirm the infilling of the area.
- 10.24 It is considered that in the past the local geology was of local economic importance for a short period of time. Extraction was from the surface and any extraction today would be impossible with the extensive urbanisation of the area. Furthermore, exploitation of any minerals or deposits along the coastline is unfeasible due to the extent of existing development and the depth of the rock beneath the surface.
- 10.25 The solid geology has no current sensitivity issues and the solid geology is, therefore, classified as **low sensitivity**.

Ground Surface Stability

- 10.26 A historical mapping review as part of a Desk Study Report did not identify any mining or quarrying activity within the site boundaries, and the site walkover did not identify any ground at the surface susceptible to instability. Therefore, it is considered that the study area is currently stable and at equilibrium with the current geomorphological regime.
- 10.27 In terms of the value of a site for development, stable ground is critical and for the purposes of this assessment ground stability may be termed of **high sensitivity**.
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Hydrogeology/Groundwater

- 10.28 The recent ground investigation found that groundwater strikes within soils were rare and at variable depths and the Interpretative Report concluded that an extensive superficial groundwater aquifer did not exist at the site.
- 10.29 The findings of the ground investigation confirm that igneous rocks including basalt and trachyte typically underlie the site. Groundwater storage within crystalline rocks such as these is usually restricted to cracks or fissures meaning that yields are likely to be low. Furthermore, due to the proximity to seawater, any aquifer at this location is unlikely to be exploited for drinking water purposes.
- 10.30 In accordance with the criteria set out in Table 10.1, the hydrogeology within the survey area is considered to be of low importance and the **groundwater is, therefore, classified as low sensitivity**.

Sensitive Land Issues/Designated Site

- 10.31 The Scottish Natural Heritage (SNH) website indicates that there are none of the following designated sites on or proximal to the study area, which have the potential to be affected by development:
- Sites of Special Scientific Interest;
 - Special Areas of Conservation;
 - Special Protection Areas;
 - RAMSAR;
 - National Scenic Areas;
 - National Nature Reserves;
 - National Parks; and
 - Local Nature Reserves.
- 10.32 The western boundary of the Inner Clyde Site of Special Scientific Interest, Special Protection Area and RAMSAR is approximately 3.5 miles to the south east of the site and it considered to be sufficiently distant from the study area to be unaffected by development.
- 10.33 No sensitive land issues or designated sites have been identified on or adjacent to the survey area and, therefore, sensitive land issues or designated sites are classified as **low sensitivity**.

Contamination

- 10.34 A preliminary qualitative environmental risk assessment was carried out during the Desk Study phase with a quantitative environmental risk assessment completed during the intrusive ground investigation. The following sections provide further details of the contamination of the site and the risk assessment.
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Potential Contamination Sources

- 10.35 The Desk Study identified four potential sources of contamination that could affect the quality of the ground at the site. Made Ground and Railway Sidings were identified on-site and a Gas Works and Infilled Quarry (registered landfill which closed in 1999) were identified off-site at 60m and 450m due south respectively.
- 10.36 An array of environmental testing was specifically scheduled during the recent ground investigation to determine the concentration of Contaminants of Concern (CoC) across the site. In the following sections, potential pollutant linkages are summarised.

Receptors

- 10.37 On site receptors include the following:

Property:	Buildings and Services; Water Supply Pipes;
Water Environment:	Surface Water (Firth of Clyde);
Human Health:	Future Site Users (residents and users of public open space); and
Human Health:	Construction and Maintenance Workers.

Pollutant linkages

- 10.38 The findings of the ground investigation, including the results of laboratory contamination testing have been reviewed and potential pollutant linkages are assessed below:
- Site end users – exposure to contaminated soil via inhalation, ingestion or dermal contact. Soft landscaping areas are proposed in parts of the Network Rail car park and the currently vacant land immediately west of the car park. This introduces a pathway from contaminated made ground to site end users. The Interpretative Report recommended that a layer of clean cover be introduced in areas of soft landscaping to effectively break this pathway and remove the pollutant linkage. Elsewhere, hardstanding or buildings will break the pathway from contaminated made ground to site end users;
 - Site end users – ingestion of contaminated drinking water. The risk may be mitigated by selection of appropriate water supply pipe material. Based on the chemical results obtained, barrier pipes should be specified to reduce the risk posed by the substances encountered;
 - Buildings and services – potential for ground to be aggressive to buried concrete. The risks may be mitigated through specification of appropriate concrete. Chemical results obtained by laboratory testing generally indicate that concrete to Design Sulphate Class DS-1 and Aggressive Chemical Environment for Concrete (ACEC) Class AC-1 should be specified. A local result leading to Design Sulphate Class DS-2 and ACEC Class AC-2 was obtained from one location;
 - Construction and maintenance workers may be exposed to potentially contaminated soil and groundwater via inhalation, ingestion and dermal
-

contact. However, the risks posed to construction and maintenance workers may be mitigated through the adoption of safe systems of work including the wearing of appropriate PPE;

- Construction and maintenance workers – potential for build up of ground gas in confined spaces such as excavations and service trenches, posing an asphyxiation or explosion risk. The findings of the intrusive ground investigation indicate that the potential for generation of significant levels of ground gas is low. However, entry to confined spaces should be carried out in accordance with best practice; and
- No risk to the water environment was identified due to the discontinuous nature of superficial groundwater and the likely low yield of any bedrock aquifer as discussed in previous sections. However, during construction of the revetment / sea wall, soil particles will be disturbed near the shoreline. This will increase the likelihood of potentially contaminated soils entering the Firth of Clyde over the construction phase. The construction Contractor should be alerted to this potential pollutant linkage in order that it be addressed in the construction phase method statement and risk assessments. The impacts associated with this are addressed in the Water Environment Chapter.

Risk Assessment

- 10.39 Environmental testing confirmed that a low level of contamination is present on site with a relatively small number of determinants found at concentrations exceeding assessment criteria. The proposed development and mitigation will typically reduce the likelihood of contamination on-site reaching end users and receptors. However, care must be taken during construction particularly where the introduction of the revetment / sea wall may increase the likelihood of contaminated soils entering the Firth of Clyde.
- 10.40 It has been confirmed by ground investigation that contamination is present within the survey area and this baseline condition is, therefore, classified as **medium sensitivity**.

Loss of Economic Deposits

- 10.41 It was identified within the Desk Study that a former trachyte quarry was present 600m to the south of the study area, within the same rock type that is present beneath the site. The quarry was active in the past and was mined from the surface. It is considered that the area is now extensively built up and the rock as an economic resource is no longer viable.
- 10.42 It is considered that the local geology was in the past of local economic importance but it is no longer viable and this baseline condition has been classified as **low sensitivity**.

Summary of Baseline Assessments

- 10.43 In accordance with the criteria set out in Table 10.1, the sensitivity / importance of the geological baseline conditions can be summarised as follows.
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Table 10.4: Summary of Baseline Conditions

Baseline Condition	Sensitivity of Geological Interest
Topography and Geomorphology	Low Sensitivity
Drift Geology	Low Sensitivity
Solid Geology	Low Sensitivity
Ground Surface Stability	High Sensitivity
Hydrogeology / Groundwater	Low Sensitivity
Sensitive Land Uses / Designated Sites	Low Sensitivity
Contamination	Medium Sensitivity
Loss of Economic Deposits	Low Sensitivity

Impact Assessment

10.44 This section discusses the potential impacts on baseline geology and soil conditions that may result from development of the site without any mitigation measures. Only those geological conditions that have been identified as being of a sensitive nature within the Assessment of Baseline Conditions have been considered in the following section. The potential impact has been assessed for two possible scenarios, described below.

Do Nothing Scenario.

10.45 Under the conditions of a do-nothing scenario, i.e. the Proposals do not go ahead, baseline conditions would only be affected by the occurrence of natural geological processes over time and would, therefore, in reasonable timescales, remain largely unchanged. Other development may occur in the area with potential implications on geological and soil resources, however, no such significant development has been identified as part of this study.

Development Scenario.

10.46 The development option being considered includes the extension or alteration of existing sea front structures including coastal revetment, and promenade as well as new areas of development encompassing roads, car parking and hard / soft landscaping areas. The impact of this type of development on each of the sensitive / important geological conditions identified above is assessed below.

Potential Impacts on Ground Surface Stability

- 10.47 The stability of the ground is critical to the value of the site. Under a do-nothing scenario, the ground stability would be affected only by natural processes and would be expected to remain largely unchanged over time. The baseline condition would remain the same.
- 10.48 Under a development scenario, additional load is added to the ground surface and can initiate or accelerate any incipient ground instability. No historical mine voids are expected to exist beneath the site, and the possibility of natural voids (e.g. dissolution cavities) being present is very low due to the geology of the area. The development of the site would, therefore, be expected to have a **negligible impact** on ground surface stability. The baseline condition through development would also remain the same with no need of any mitigation.

Potential Impacts on Contamination

- 10.49 Under a do-nothing scenario, the contamination baseline condition would remain the same. The contamination within the study area would neither improve nor worsen. It is considered that of the pollutant linkages identified through development, there is the risk of the pollutant linkage between site end users and exposure to contaminated soil via inhalation, ingestion or dermal contact to currently exist with respect to open grass areas which may be used recreationally.
- 10.50 If the site follows a development scenario in line with the Proposals there is the potential for all the identified pollutant linkages above to be realised regarding existing contaminants on site. In addition, contamination may be introduced through standard construction procedures such as accidental spillages and leakages of fuels, oils and lubricants.
- 10.51 Development without the implementation of mitigation measures to prevent the identified pollutant linkages and introduction of contamination through construction will have a major impact and would classify development of the site as a major significance. However, following mitigation recommendations and practices (outlined below), the impact of the development is likely to have a **negligible impact** on the level of contamination present at the site. It is considered that the development will have a beneficial impact in terms of containing existing contaminated soils.

Summary of Predicted Impacts

- 10.52 In accordance with Tables 10.2 and 10.3, the significance of predicted impacts on the baseline conditions, should the Proposals go ahead, is summarised in the Table below, given that any mitigation outline below is adhered to.
-

Table 10.5: Criteria to Assess the Significance of the Predicted Impact on Geology and Ground Conditions

Baseline Condition	Sensitivity of Geological Interest	Magnitude of Impact	Significance of Impact
Ground Surface Stability	High	Negligible	Negligible
Contamination	Medium	Negligible	Negligible

Mitigation

- 10.53 The assessment above concluded that of the geological conditions identified as being sensitive, contamination would require the implementation of mitigation measures for the development to have a negligible impact and, therefore, negligible significance. The following mitigation measures are required to address each of the pollutant linkages summarised.

Site end users – exposure to contaminated soil via inhalation, ingestion or dermal contact.

- 10.54 A 600mm thick layer of clean soils is introduced to all areas of soft landscaping. The clean cover should comprise a geotextile separator at the base overlain by a 300mm granular deposit of clean crushed stone to act as a capillary break layer. Above this a further 200mm of subsoil and 100mm of topsoil will provide a plant growing medium. This has been designed with reference to the BRE Document, Cover Systems for Land Regeneration.

Site end users – ingestion of contaminated drinking water.

- 10.55 The soils tested contained levels of corrosive substances, organic contaminants and toxic substances which exceed the Water Regulations Advisory Scheme (WRAS) criteria. The guidance states that where these types of substances are recorded, barrier pipes may be specified. Specific barrier pipes should be selected for new water pipes when proposed routes are known.

Buildings and services – potential for ground to be aggressive to buried concrete.

- 10.56 Buried concrete in contact with the range of materials tested should be of design sulphate class DS-1 and ACEC Class AC-1. Locally at TP08 (beach area), 2m depth the laboratory test result indicates that buried concrete here should be of design sulphate class DS-2 and ACEC class AC-2.

Construction and maintenance workers – exposure to contaminated soil and groundwater via inhalation, ingestion and dermal contact.

- 10.57 The selected contractor should provide a risk assessment to address Construction (Design and Management) Regulations 2007. This should include (but not limited to) the

following practices: use of appropriately qualified staff; use of PPE; provision of washing facilities to be used at the end of each working period; no eating or smoking on-site; reporting of ill health; and reporting of unexpected contamination or ground conditions.

Construction and maintenance workers – potential for build up of ground gas in confined spaces such as excavations and service trenches, posing an asphyxiation or explosion risk.

- 10.58 The risk assessment determined the potential risk as low and therefore no special gas protection precautions are considered to be necessary. However, the selected contractor should provide a risk assessment to address Construction (Design and Management) Regulations 2007, which should include (but not limited to) the careful entry into necessary confined spaces and the reporting of any unusual smells.

Firth of Clyde - contaminated soils entering water body during construction of the revetment/ sea wall.

- 10.59 The selected contractor should produce a risk assessment and method statement (Construction Environmental Management Plan) outlining their proposals to prevent any contamination reaching the Firth of Clyde. The risk assessment and method statement should include measures (but not limited to) the segregation, chemical testing and stockpiling of excavated material away from the water body that is sealed; the transfer of excess material to an appropriate waste facility and the preventive measures to inhibit contamination arising from construction procedures (further detailed below).

- 10.60 The selected contractor should provide risk assessments and method statements outlining their procedures and construction methods to mitigate and prevent the introduction of contamination into the site as well as the Firth of Clyde. These documents and the site works should be in line with CIRIA guidance 'C532 – Control of Pollution for Construction Sites'. It is considered that the following best practice construction measures or similar should be incorporated:

- Provision of fuel emergency spill kits strategically located across the site;
- Designated safe areas for storage of waste materials that are covered and clearly labelled;
- Regular maintenance of all machinery and plant to minimise the risk of spills and leakages; and
- Adequate environmental training to all workers.

Limitations

- 10.61 There have been no limitations in undertaking this assessment.
-

Conclusion and Residual Impacts

- 10.62 Provided that construction activities are performed in compliance with relevant legislation, guidance and best practice, the effect of the proposed development on geological features of value/sensitivity will be negligible.

Cumulative Effects

- 10.63 The assessment carried out so far assesses the impact of the Proposals. In this section, an assessment considering the impacts anticipated from other current or proposed developments are considered to determine the cumulative effect on the surrounding environment.
- 10.64 A review of available information through the Inverclyde Council Planning website currently identifies one significant development for which an EIA was carried out. The development known as 'Gourock Station Revetments Works' is immediately adjacent to the east of the site. The works involve the construction of a new 0.4 hectare sea revetment, along the shoreline, to replace the outdated seawall. The assessment only identified contamination issues to be sensitive to development. A summary of the assessment concerning identified impacts on the soils, contamination and geology is provided below:
- Constructions workers (site users) were identified as moderate sensitivity regarding contamination existing at site. It concluded that the impact and significance was negligible with the contractor's site works conforming to the Considerate Contractors Scheme and Construction (Design and Management) Regulations;
 - The Firth of Clyde (water environment) was identified as moderate sensitivity with respect to the disturbance of contaminated soil in construction of the revetment. It was concluded that the impact was low with or without development, with the significance being minor negative. Development would only involve the careful placement of armour stone onto the sea bed to minimise disturbance and cover the soils. The impact is considered to be temporary and short term;
 - The Firth of Clyde (water environment) was identified as moderate sensitivity regarding the introduction of contamination from the construction phase. It concluded that the impact and significance was negligible with the contractor's site works conforming to the Considerate Contractors Scheme and Construction (Design and Management) Regulations; and
 - The Firth of Clyde (water environment) was identified as moderate sensitivity with respect to the increase in sediment loading from construction (e.g. concrete and fines). It concluded that the impact and significance was negligible with the contractor's site works conforming to revetment specification regarding material types etc.
- 10.65 The significance of the impacts determined for the above development are either negligible or minor negative. The negligible significances are considered to be of no
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concern regarding the overall environmental impact of the area considering negligible significances were determined for this site.

- 10.66 The significance determined as minor negative relates to the disturbance of contaminated soil in the construction of the sea revetment. This was also identified as an impact for this development, and to be of negligible significance. It considered that the small size of the adjacent development and the classification of the same significance as negligible for this site, the overall environmental impact from both sites is negligible.

Summary

- 10.67 This chapter outlines the assessment undertaken to determine the potential impacts of the Proposals on the geology and ground conditions in the area. The assessment identified that the baseline conditions of ground surface stability and contamination to be highly and moderately sensitive to development respectively: The impact of development for each of the identified sensitive issues was then assessed considering a 'do-nothing scenario' and a 'development scenario'.
- 10.68 It was concluded that development would have negligible impact on the ground surface stability and in fact the baseline condition would remain the same with or without development.
- 10.69 It was determined that the contamination at site would neither improve nor worsen and the baseline condition would remain the same in a 'do-nothing scenario'. If the 'development scenario' was adopted with the Proposals, then a number mitigation measures would need to be adopted to address identified pollutant linkages (between contamination sources and receptors) and potential introduction of contamination through construction for negligible impact. The following mitigation measures are required to prevent pollutant linkages associated with the contamination already at site:
- A full protective capping layer in landscaped areas meeting BRE design;
 - Installation of water pipelines meeting WRAS criteria against specific contamination exceedences where appropriate;
 - The use of buried concrete to design sulphate class DS-1 and ACEC Class AC-1 or design sulphate class DS-2 and ACEC class AC-2 where appropriate;
 - Construction workers wearing appropriate PPE;
 - Construction workers working carefully in confined spaces as to not get asphyxiation or cause an explosion risk; and
 - Designed and adopted construction methods for the installation of the sea revetment to prevent contaminated soil reaching the Firth of Clyde.
- 10.70 Best practice construction methods adhering to CIRIA guidance 'C532 – Control of Pollution for Construction Sites' should be adopted to prevent general contamination of the site from construction.
-

- 10.71 In conclusion, if all mitigation measures are adopted and construction activities are compliant with regulations, the proposed development will have negligible impact on the soils, contamination and geology of the Gourock site.
- 10.72 A cumulative assessment was undertaken which identified one other development in the area and it was determined that the overall environment is not at risk from this development or surrounding developments.
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Appendix 1.1
Screening Request



Appendix 1.2
Screening Opinion



Appendix 1.3
Scoping Report



Appendix 1.4
Scoping Response



Appendix 1.5
Pollution Prevention Statement



Appendix 6.1
Transport Assessment



Appendix 7.1

Phase 1 Habitat Survey and Expert Eye Survey



Appendix 7.2

MSC Pierhead Intertidal Survey Report



Appendix 8.1
Figures and Photographs



Appendix 9.1
Flood Risk Assessment



Appendix 10.1

Desk Study

(please contact Betty Arbuckle for hard copies of the appendices of this report; betty.arbuckle@fairhurst.co.uk / 0141 204 8800. The full report including appendices is enclosed on the CD)

Appendix 10.2

Interpretative Report

(please contact Betty Arbuckle for hard copies of the appendices of this report; betty.arbuckle@fairhurst.co.uk / 0141 204 8800. The full report including appendices is enclosed on the CD)

Drawings and Plans



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