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Clyde Waterfront and Renfrew Riverside Scoping Report



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CWRR City Deal: Scoping Report

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Executive Summary

The Glasgow and Clyde Valley City Deal is an agreement between the Scottish Government, UK Government, and eight West of Scotland local authorities, including Renfrewshire Council (RC). The Clyde Waterfront and Renfrew Riverside (CWRR) infrastructure project (the proposed development), is one of three City Deal projects within the RC area. The CWRR project aims to significantly improve connectivity and enhance economic development opportunities on the north and south banks of the River Clyde.

Renfrewshire Council (RC) is the applicant for the Clyde Waterfront and Renfrew Riverside (CWRR) infrastructure project, which is one of three City Deal projects within the council's area.

The Renfrewshire Council City Deal Team is seeking permission to develop a bridge crossing over the Clyde, access roads to and from the new bridge and a road that will link Ferry Road to Inchinnan Road.

It is our view that the proposed development falls within Category 10 (f) of Schedule 2 to Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 (TCP EIA Regulations) as the proposed development exceeds the stated one hectare (for roads infrastructure). Marine Scotland have screened that the development has the potential to impact upon the marine environment and therefore it also falls under the Marine Works (Environmental Impact Assessment) Regulations 2007 (MW EIA Regulations). Therefore, the planning application will need to be supported by an Environmental Impact Assessment (EIA).

Due to the location of the bridge, the proposed development will cross over a number of local authority boundaries, therefore the competent authorities for the terrestrial elements of the project will be Renfrewshire Council, West Dunbartonshire Council and Glasgow City Council. The marine elements will be determined by Marine Scotland.

This report accompanies a formal EIA scoping opinion request submitted under Section 14 of the TCP EIA Regulations and under Schedule 4 of the MW EIA Regulations. The purpose of this report is to highlight the areas and approach currently considered appropriate for inclusion within the EIA to assist with the formal scoping process and this report sets out:

- A brief description of the proposed development;
- A plan to show the location of the development;
- A description of its possible effects on the environment; and
- A proposed methodology for undertaking an EIA of the proposed development.

An EIA will be undertaken to assess any likely significant effects of the proposal and its results will be presented within the Environmental Statement (ES) that will accompany the planning application.

This report provides an assessment of predicted likely significant affects and a summary of what is proposed to be scoped in and scoped out is provided in **Chapter 14**.

1 Introduction and Approach to Scoping

1.1 Background

The Glasgow and Clyde Valley City Deal is an agreement between the Scottish Government, UK Government, and eight West of Scotland local Authorities, including Renfrewshire Council (RC).

This City Deal established a £1.13 billion Infrastructure Fund to progress 20 projects across the eight council areas. The City Deal is also to support further growth in the life science sector; provide additional business incubator and grow-on space; establish programmes to support 16-24 year olds and vulnerable adults back into employment; seek new ways to boost the incomes of people on low wages within the City Region.

Sweco is the lead consultant to the applicant for the Clyde Waterfront and Renfrew Riverside (CWRR) infrastructure project (the proposed development), which is one of three City Deal projects within the RC area. The CWRR project aims to significantly improve connectivity and enhance economic development opportunities on the north and south banks of the River Clyde between Clydebank, Yoker and Renfrew.

The proposed development will contribute to economic growth in the Glasgow and Clyde Valley City Region by regenerating Renfrew Riverside as an attractive riverside and urban area that supports high value industrial, commercial, business, retail, residential and leisure opportunities. It aims to improve connectivity for local communities, links between sites and unlock the development potential of vacant and / or derelict sites within the locality, for development opportunities.

The CWRR project is adjacent to the Glasgow Airport Investment Area (GAIA) project. The CWRR project has strong synergy with the GAIA project and potentially others. The completed project would be designed to complement the other City Deal projects and potential cumulative environmental effects would be considered in the preparation of the CWRR Environmental Statement. Please note that a separate Scoping Report has been prepared for the adjacent GAIA project.

1.2 The Applicant

Renfrewshire Council (RC) City Deal Team is the applicant for the CWRR project.

The planning application would be supported by an Environmental Statement (ES) to meet the requirements of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 ('TCP EIA Regs'). The project requires Environmental Impact Assessment (EIA) following screening determinations made by the three local authorities within which the proposed development is located (Renfrewshire, Glasgow City and West Dunbartonshire).

Consultation with Marine Scotland has confirmed that EIA is also required for the CWRR project works with the potential to affect the marine environment under the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) ('MW EIA Regs'). The EIA would therefore be undertaken with reference to both sets of EIA Regulations. **Figure 1.1**

shows the site context, **Figure 1.2** the indicative boundary¹ of the project and **Figure 1.3** presents an overview of key environmental constraints in the study area.

1.3 The EIA Team

Sweco UK is the lead consultant for the proposed development and has authored this Scoping Report with inputs from technical specialists from Sweco (Chapters 4, 5, 6, 9, 12), Energised Environments (Chapters 3, 7, 11), WSP (Chapter 10) and Headland Archaeology (Chapter 8).

1.4 Approach to Scoping

This document forms the Scoping Report for the EIA of the proposed development, to be submitted to Renfrewshire Council, Glasgow City Council, West Dunbartonshire Council and Marine Scotland (the competent authorities) in support of a request for a formal Scoping Opinion under the provisions of Regulation 13 of the TCP EIA Regulations and Schedule 4 of the MW EIA Regulations. This report presents the EIA competent authorities and consultees with information to provide consultation feedback on the proposed scope of the EIA, in particular the approach to assessment and survey methodologies. This Scoping Report includes a preliminary environmental assessment of the proposed development to identify where there is the potential for significant environmental effects and to propose the level of detail of assessment for each key topic in the EIA.

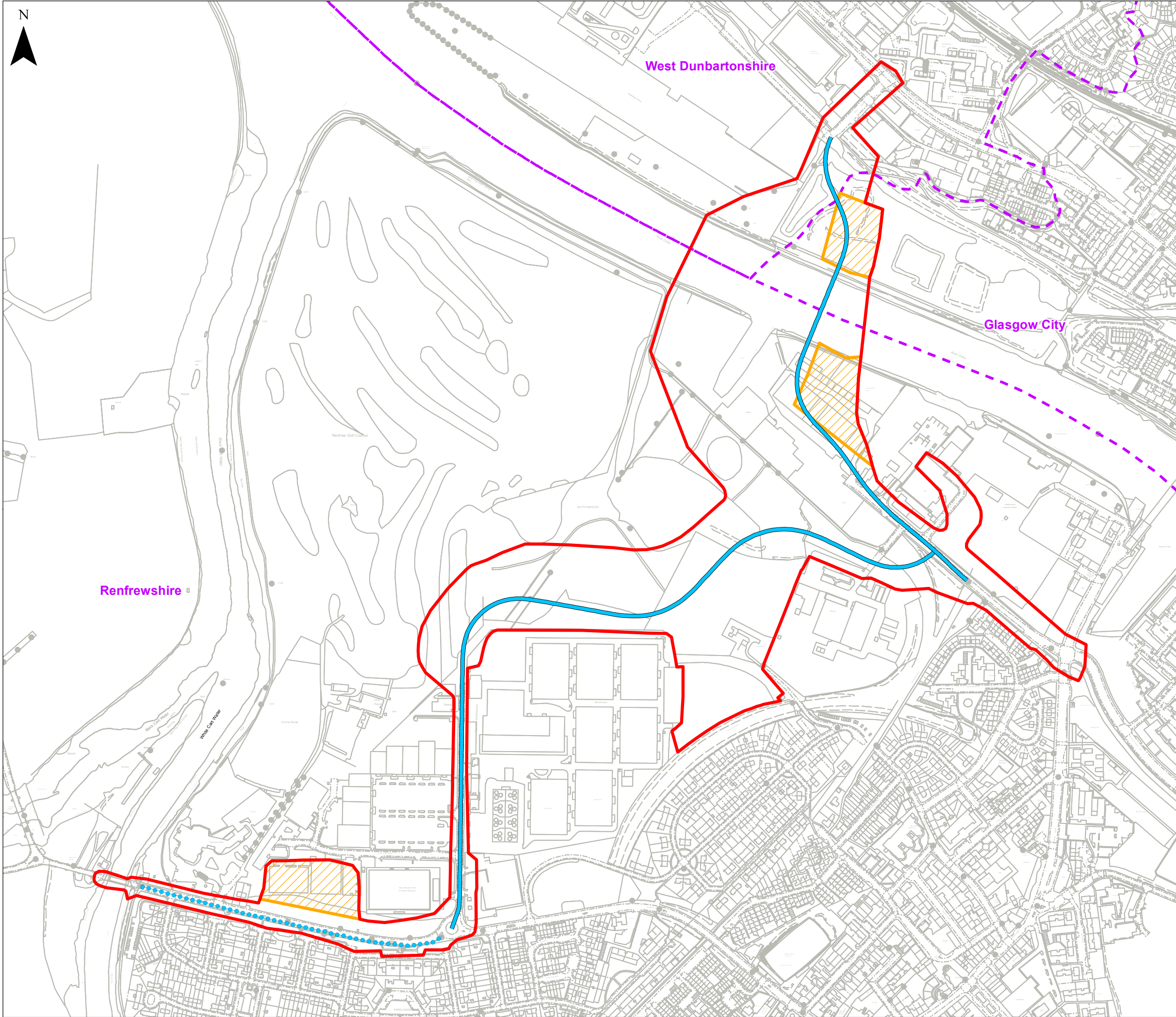
Prior to writing this report, Sweco held Scoping Interviews with each of the technical teams, who were tasked with presenting a summary of the initial baseline assessments, the likely 'significant' effects and any elements that they felt could be 'scoped out'. The reason for holding these interviews was to ensure that a pragmatic approach is adopted for this complex project and that the resulting ES is focussed and effective. The results of these interviews are provided in each of the technical chapters where it discussing the proposed scope.

EIA is an iterative process which identifies the potential environmental effects that in turn inform the design of the proposal. It seeks to avoid, reduce, offset and minimise any adverse environmental effects through careful design and mitigation. It takes into account the effects arising during the construction and operational phases. Consultation is an important part of the EIA process and assists in the identification of potential effects and mitigation measures.

The consideration of the scope of the various technical assessments has taken into account broad mitigation which has been assumed as part of the construction and design of the road and bridge interventions. The following mitigation has been assumed in the assessments:

- construction of the proposals will follow good site practice to avoid or reduce the potential for environmental effects associated with construction activities (e.g. increased sediment in surface water runoff, noise and vibration from construction plant and traffic, accidental water and soil pollution from fuel and oil spills, damage to soils, dust emissions etc.);

¹ This figure provides a 'red line' boundary around the land which is currently anticipated may be required to construct and operate the scheme (allowing space for mitigation and landscaping). The red line is indicative since project design development is not yet complete and does not necessarily represent the formal red line boundary which will be used for the planning application(s)



Notes

Key

Indicative Boundary of Proposed Development

Indicative Line of New Cycle Link

Indicative Line of New / Upgraded Road

Potential Location for Construction Compound

Council Boundary

050100200300Metres

Reference Drawings

REV	DATE	AMENDMENT DETAILS	ORIG	CHKD	APPD
-	-	-	-	-	-

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Client

RENFREWSHIRE COUNCIL

Drawing Status

BIM AUTHORISATION

Suitability

S6

Project Title

CLYDE WATERFRONT AND RENFREW RIVERSIDE

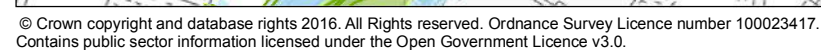
Drawing Title

Figure 1.2: Site Layout

Scale	1:6,000	Designed	FC	Drawn	FC	Checked	RM	Approved	HC
Original Size	A3	Date	07/09/2016	Date	07/09/2016	Date	07/09/2016	Date	07/09/2016

Drawing Number	Project	Originator	Volume	Location	Type	Role	Number	Project Ref. No.	Revision
117086 - SWECO - EAC - 00 - SP - EN - 00003								117086 (R09)	0A

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- new road infrastructure will be designed in accordance with relevant standards and good practice including for drainage (following SuDS principles), wildlife porosity (e.g. mammal underpasses) and to mitigate adverse effects on communities through noise reducing measures (e.g. acoustic barriers) where appropriate and through effective integration with community facilities such as core paths and cycle routes;
- new bridge designs will aim to fit aesthetically with their surrounding landscapes and townscapes, would accommodate non-motorised users and be designed wherever possible to avoid in-channel structures and works which affect the riparian zone;
- infrastructure will be designed and built to minimise intrusion in the floodplain and consideration will be given to whether any compensatory flood storage capacity will be required as part of the design and/or by other means;
- opportunities will be sought wherever possible to enhance local biodiversity through scheme design/landscaping works and habitat enhancement;
- non-invasive plant species, for example giant hogweed, will be appropriately contained and treated within the boundary of the project;
- crossings and other accommodation works for core paths and national cycling routes will be incorporated in the design to mitigate the effects of crossing these facilities for pedestrians and cyclists and to increase opportunities for accessibility;
- impacts on archaeological resources will be mitigated through avoidance and design iteration where practicable and otherwise through appropriate investigation and recording of sites; and
- infrastructure designs will be developed and specified to take account of local townscape context and conservation/heritage sensitivities and landscape designs would provide appropriate visual screening of road and traffic and to connect with areas of greenspace and local habitat networks.

Where relevant, additional mitigation measures specific to each environmental topic have been set out in the technical chapters of this report.

1.5 Description of the Site

The study area defined for the environmental assessment of the proposed development is bisected by the River Clyde running east to west. It includes the residential areas of Yoker and Clydebank to the north and Renfrew to the south, extending from beyond Ferry Road in the east to Dock Street in the west. It extends from Dumbarton Road / Glasgow Road in the north to the A8 (Inchinnan Road) in the south and is approximately 8 km to the west of Glasgow City Centre. Please refer to **Figure 1.2**.

On the north side of the River Clyde the land uses comprise a mix of new residential developments on the waterfront and more traditional housing along the A814 Dumbarton Road/Glasgow Road with a number of industrial and commercial sites in particular those associated with Rothesay Dock. There are also a number of vacant, brownfield parcels of land that relate to the previously industrial nature of the River Clyde. To the south of the River Clyde and east of the confluence of the Black Cart and White Cart waters, the land use is more varied. There are well defined areas comprising of residential, commercial and industrial developments in addition to areas of semi natural woodland and open parkland.

The River Clyde itself has a long history of commercial use and this continues today. It is used every day by large commercial vessels and leisure craft users and provides economic benefit to the commercial companies involved and to the wider communities.

The area to the south of the River Clyde is constrained on the west side by the White Cart Water, which becomes the River Cart after the confluence of the White Cart and Black Cart Waters. The terrain across the study area is generally flat with a number of locally raised embankments and cuttings remaining from previous infrastructure / transport development.

The River Clyde tidal floodplain extends mainly to the south with approximately 50 hectares (ha) of land forming part of the 1 in 200 year floodplain. Further information on the land uses of the study area are provided in **Chapter 3: Land Use and Communities**.

1.6 Structure of this Report

Following this introductory chapter, Chapter 2 sets out the project objectives and context, describes the options considered by the project team in reaching the outline design for the proposed development and provides further details of the proposals.

Chapters 3 to 12 then set out, for each key environmental assessment topic, the baseline conditions, initial environmental assessments, and the proposed scope of the EIA. There are figures and technical appendices where required to support these chapters. Please note on some of the figures there are study area boundaries that were set during the original optioneering phases, these are specific to those topics.

The following topics are considered:

- Chapter 3: Land use and communities;
- Chapter 4: Geology, hydrogeology, soils and contaminated land;
- Chapter 5: Water quality, drainage and flood defence;
- Chapter 6: Landscape and visual effects;
- Chapter 7: Ecology and nature conservation;
- Chapter 8: Archaeology and cultural heritage;
- Chapter 9: Traffic and transport;
- Chapter 10: Noise and vibration;
- Chapter 11: Air quality; and
- Chapter 12: Climate Change Mitigation & Adaption

Chapter 13 outlines the overall approach to the EIA, by providing an overview of the approach to securing the required planning and other consents for the project. It highlights the overall methodology for the prediction and assessment of environmental impacts including cumulative effects and how the significance of environmental effects would be evaluated. **Chapter 14** presents a summary of the scope of the EIA and sets out the structure of the proposed ES.

2 The City Deals Proposals and Context

2.1 Introduction

Glasgow and Clyde Valley comprises the largest city region in Scotland and one of the largest in the United Kingdom, with a population of over 1.75 million people. Glasgow and Clyde Valley is a key area for economic growth for both the Scottish and UK economies, generating around 32% of Scotland's Gross Value Added, 33% of Scottish jobs and is home to over 29% of all businesses in Scotland.

2.2 Overall Project Need and Objectives

The City Deal agreement aims to transform the Glasgow Clyde Valley strengthening its position as a major centre for economic growth in the UK. The delivery of the new transport infrastructure will open up large areas of derelict and underused land for development and act as a catalyst for a transformational change in this area, which has the potential to be a very attractive business and residential destination. The overall key aim and objective of the City Deal is to provide opportunity for private sector investment creating employment, education and other key benefits. Over the lifetime it is estimated that the City Deal will:

- Support an overall increase in the economy of around 29,000 jobs in the city region;
- Work with 19,000 unemployed residents and support over 5,500 back into sustained employment;
- Greatly improve the local transport network (in terms of roads and public transport);
- Deliver key regeneration and development projects;
- Encourage private sector investment into the area;
- Ultimately provide an enormous boost to the city region's economy; and
- Secure £1 billion of Scottish Government and UK Government capital funding to support the proposed infrastructure.

2.3 Alternatives Considered

This section details the generation of the corridors, routes and Clyde crossing options, which have been considered during the option development stages of the project which could achieve the objectives in Section 2.3. The long list of initial options considered are briefly outlined in Table 2.1. These were evaluated against the project objectives and using technical information gathered during the project progression and also feedback from stakeholders and the public.

Table 2.1 Initial Options Appraisal

Option	Description	Reason for taking forward or discounting
Option 1 - Do nothing	This option assumes no additional capital investment is available for infrastructure works aimed at increasing GVA generating activity.	This option assumes a decision is taken not to invest City Deal funding in this Project. Without this investment, the commercial development sites in the three local authority areas are likely to remain undeveloped due to poor connectivity with the consequence that there is no uplift in GVA either in Renfrewshire or as a contribution to the wider City Region available. This option is therefore discounted.
Option 2 – Do Minimum	This option assumes minimal spend on existing infrastructure endeavouring to address some of the existing constraints to economic growth.	This option assumes a decision is taken to invest minimal City Deal funding in this Project. The funds expended would seek to make minor changes to existing road layouts and junctions to improve traffic flow and public transport access. These works would be unlikely to significantly influence the constraints in the area which restrict economic growth. The commercial development sites in the three local authority areas are likely to remain undeveloped due to poor connectivity with the consequence that there is no uplift in GVA either in Renfrewshire or as a contribution to the wider City Region available. This option is therefore discounted.
Option 3 – Improved Ferry Link	This option would reintroduce the previously suspended vehicular ferry with a modern equivalent.	This option assumes that the existing passenger ferry is enhanced to provide a vehicular ferry on frequent service across the River Clyde. A vehicular ferry previously operated on this route, however required significant public subsidy due to the operational and maintenance costs involved, compared to passenger numbers. With other existing route options, the need to wait between ferries at peak times and the interruption to journey times makes this a lower choice option for commuters. The requirement for long term subsidy and ongoing maintenance and upgrade costs is little changed since the removal of the previously service. This option is therefore discounted.
Option 4 – Renfrew Northern Development Road Only	This option considers the impact of constructing the Renfrew Northern Development road only with no further capital investment for infrastructure works.	This option assumes only the Renfrew Northern Development Road is constructed. Whilst this will alleviate some of the traffic pressures currently existing in Renfrew Town Centre this option alone will not provide any increase in connectivity north and south of the River and therefore resulting GVA impact is likely to be minimal. This option has therefore been discounted.
Option 5 – River Clyde Crossing by way of a Tunnel Only	This option considers the potential for creating a north/south link across the River Clyde in the vicinity of Renfrew / Yoker by way of a tunnel.	Providing the transport link between the north and south areas of the River Clyde crossing by way of a tunnel has been considered. Technical evaluation of the vertical alignments required to gain access and egress from the tunnel identify considerable adverse effects within the areas local to the new tunnel. The significant areas sterilised by the tunnel construction and future

Option	Description	Reason for taking forward or discounting
		<p>maintenance requirements would impact on future development potential and conflict with aspects of the project objectives. Whole life costs, due to the significant long term operation and maintenance requirements, make this option extremely unattractive. Technical evaluation also identified potentially unaffordable and significant irresolvable technical issues due to ground conditions and land constraints. Additionally the detrimental effect on local residential housing and local communities make this option largely undeliverable. This option has therefore been ruled out at this stage and not be considered further in the detailed options appraisal.</p>
Option 6 – River Clyde Crossing by way of a Bridge Only	<p>This option considers the impact of constructing a north / south connection across the River Clyde in the vicinity of Renfrew and Yoker by way of a bridge.</p>	<p>This option assumes only a Bridge is designed and constructed with no additional improvements in roads infrastructure on either side of the crossing. As this bridge will significantly improve connectivity between the north and south of the River, the current poor connectivity on the south side of the river will result in the increased traffic adding to current traffic problems in and around Renfrew Town Centre.</p> <p>Transport modelling indicates traffic in the order of 4000 movements in each direction, each day, across the new bridge. Without the RNDR a large proportion of this traffic will seek to move through Renfrew Town Centre considerably exacerbating an already congested area. The resulting adverse effect on the local area and its implications for businesses, air quality and environment make this option unworkable. In summary the GVA impact provided by a bridge crossing alone is unlikely to maximise the potential GVA uplift. This option has therefore been discounted.</p>
Option 7: Renfrew Northern Development Road and River Clyde Bridge Crossing	<p>This option considers the impact of addressing the connectivity between Renfrew and Yoker by constructing both a north / south link over the River Clyde and connecting this to the local roads infrastructure on the south side of the River by the construction of the Renfrew Northern Development Road.</p>	<p>This option assumes both the Renfrew Northern Development Road and the Clyde Bridge are constructed. This will provide increased connectivity between the north and south of the River Clyde along with a link into the local transport network on the south side to direct traffic away from the currently congested Renfrew Town Centre area.</p> <p>At this stage in the option sifting exercise, the optimal location for the River Crossing and its form (e.g. high level bridge, opening bridge) had not been identified.</p> <p>Technical studies including, land use, masterplanning and transport modelling identifies this solution best manages traffic flows from the new bridge. The flows across the bridge confirm its effectiveness as a connection between the adjacent communities, linking key origin and destination points.</p> <p>This option is likely to provide increase in potential GVA uplift in the vicinity of the crossing itself.</p>

Option	Description	Reason for taking forward or discounting
Option 8: Renfrew Northern Development Road and River Clyde Bridge Crossing including other improvements to accessibility, walking, cycling and public transport links	This option considers the potential for addressing the significant connectivity issues between the north and south of the River Clyde between Renfrew and Yoker whilst addressing the current congestion issues in and around Renfrew Town Centre along with related improvements to walking, cycling and public transport and connectivity generally around the surrounding areas therefore enhancing the accessibility to key development sites along both sides of the River Clyde. This option assesses whether the rate of GVA uplift generated is likely to be at a higher level when option 5 is combined with these additional connectivity measures.	In addition to Option 7, the benefits of further linkages and accessibility to surrounding areas on both sides of the river crossing have been considered, including walking, cycling and public transport links along with other connectivity improvements to key sites. These associated linkages and improvements will enhance overall connectivity around the area, improve environmental aspects by improved travel choices and eased active and public transport options. This enhanced option therefore provides the potential to maximise long term GVA uplift to a wider area on both sides of the river by improving the amenity and desirability generally. This option was considered further in the detailed appraisal stage, outlined below.

With the initial optioneering completed, the generation process then identified broad corridors through the study area, which identified potential crossing locations and the possible connections to / from the existing road network (as shown in **Figure 2.1** below).

Following this early identification of potential corridors, an early options workshop was undertaken in order to sift out any of the initial corridors generated which did not meet the scheme objectives and presented any significant adverse effects on the surrounding area.

To the south of the River Clyde, Corridor D was considered to have a significant adverse impact upon the existing green space at Renfrew Golf Club and the woodland area at Blythswood. Corridor D was also considered to be located in an area which will not best serve local needs and key development sites, and would also have an adverse impact upon the West College Scotland Clydebank Campus and the operation of Rothesay Dock on the north bank of the River Clyde.



Figure 2.1 Initial Bridge Crossings and Possible Connections.

Following the pre-assessment corridor sift stage, a number of corridors were identified as being suitable for further assessment, taking into consideration the project objectives and the engineering, environmental, traffic and economic constraints identified, as shown in **Figure 2.2** below.

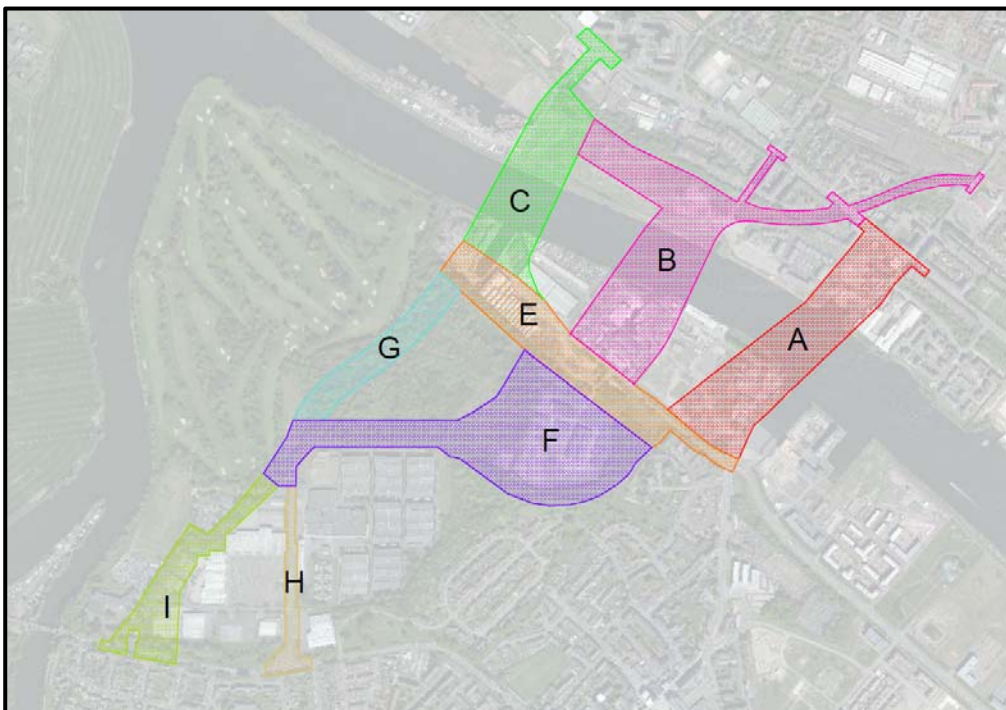


Figure 2.2 Route Corridors following initial pre-sift stage

The identification and assessment of options followed the broad principles of document TD 37/93: Scheme Assessment Reporting of the Design Manual for Roads and Bridges and Scottish Transport Appraisal Guidance (STAG). The general corridors were then refined to enable more specific route options to be developed for the new road, cycleway and bridge infrastructure. An objectives and risk workshop was then used to assess the corridors to ensure that they still achieved the project objectives. The aims of this workshop were, firstly to revisit the project objectives that the proposed routes should be assessed against and assign a prioritisation and hierarchy to those objectives, and secondly, using the agreed objectives, to remove some of the route options identified prior to more detailed assessment.

A number of route corridors (north side of Corridor B) were removed from further consideration as they did not fulfil the objectives to promote the potential connectivity to existing infrastructure, and the enhancement to, and creation of development areas within the study areas. Route option G through Blythswood was sifted out as it was deemed to have an unnecessary significant detrimental impact on existing woodland and green space.

Following conclusion of the workshop based route sifting exercise, the remaining routes were taken forward (see **Figure 2.3**) and fully assessed, prior to a preferred route options being established. The assessment was undertaken using a series of engineering, environmental, traffic and economic criteria in order to determine on balance the best performing bridge crossing and associated route options.

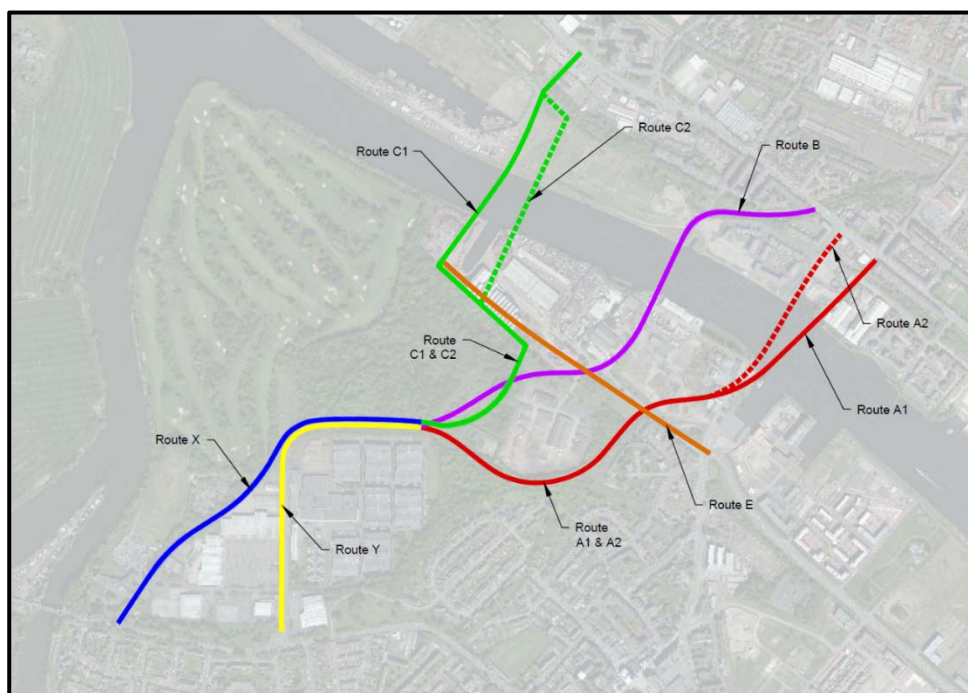


Figure 2.3 Route Options for more detailed assessment

This assessment recommended that a combination of options C1 or C2 should be adopted for the Clyde Crossing, with further work required to confirm which of these two is preferred², and route option Y and E for the roads infrastructure south of the Clyde. This ‘preferred route’ is described in more detail in Section 2.5.

2.4 Description of the Proposed Development

2.4.1 Project Proposals

The proposed development is located in the vicinity of the town of Renfrew approximately 9km west of Glasgow City Centre. The majority of the proposed scheme is located south of the River Clyde within the administrative area of Renfrewshire. The northern bridge landfall and connecting road to Glasgow Road is partly located within Glasgow City and partly within West Dunbartonshire council areas.

The proposed development comprises a number of infrastructure proposals that have been developed to meet the project aims. The main elements of the project are:

- A new opening bridge across the River Clyde (the “Bridge”). In addition to vehicular traffic/public transport, the bridge would accommodate pedestrian and cycle traffic;
- the Renfrew Northern Development Road (RNDR), a single carriageway route connecting the junction of Kings Inch Road and Ferry Road to the north of Renfrew with the A8 Inchinnan Road between Renfrew and the Bascule Bridge over the White Cart Water, including a link to the southern road approach to the new Bridge;
- new single carriageway road connections to the north of the Bridge to connect with the A814 Dumbarton Road/Glasgow Road at Dock Street, Yoker and a new road connection to the south of the bridge linking with the RNDR;
- a new combined cycleway and footway to be constructed adjacent to all new sections of road infrastructure including across the new Bridge and along the existing section of A8 Inchinnan Road between the southern connection of the RNDR at Argyll Avenue and the Bascule Bridge, linking to the proposals for non-motorised routes as part of the complementary Glasgow Airport Investment Area (GAIA) project;
- Communications strategy including Variable Message Signs (VMSs) at key decision/diversion points on routes to the new crossing (indicative locations shown in **Figure 2.4**); and
- landscaping of the proposals to integrate them with surrounding land uses including urban areas, the bridge landfall locations and an area of woodland at Blythswood.

An indicative plan showing the overall layout of the proposals and the indicative boundary of land which may be required to construct the scheme (and to allow for sufficient land for mitigation etc.) is presented in **Figure 1.2**. Further details on the scheme design at this stage are presented in the sub-sections below³.

² Design option development work is now underway to confirm the alignment and design for the roads and bridge crossing, which will lead to a Specimen Design. The EIA will assess the predicted environmental effects of this design

³ The preferred scheme is currently in the design development stage and a Specimen Design will be prepared by the end of 2016. The design will be ‘frozen’ at this stage to allow the EIA to be undertaken

2.4.1.1 Roads and NMU Facilities

A total of approximately 2km of new single carriageway road is proposed to provide transport connections to the new Bridge and to provide the development road (RNDR) to facilitate access to areas where future development is proposed in the vicinity of Meadowside Street as well as providing alternative routing for traffic which does not require to access Renfrew town centre. The key road connections are:

- Upgrading or signalising the A814 Glasgow Road and Dock Street Junction.
- Construction a new junction approximately 150m south of the junction with Glasgow Road. This new junction would provide access to the commercial sites around Rothesay Dock to the west of the road and a local access to the proposed housing developments on land immediately east of Dock Street. South of the roundabout, the new road would continue south for approximately 150m forming a connection to the new Bridge;
- the RNDR, which forms a c1.4km link from the existing roundabout on the A8 Inchinnan Road/Argyll Avenue in the south to a new junction with an upgraded Meadowside Street in the north. This route initially follows the line of the existing Argyll Avenue (which would be upgraded) between the Blythswood Retail Park and the Diageo plant, then along an alignment close to the northern edge of the Diageo plant within the area of woodland at Blythswood, before turning north and following a route close to the boundary of the industrial sites on the western edge of Renfrew before meeting Meadowside Street;
- an upgrade of the c0.25km section of existing single carriageway Meadowside Street from the new junction with the RNDR eastwards to its junction with Ferry Road and King's Inch Road;
- a new c350m section of single carriageway road from the junction of the RNDR and Meadowside Street to the southern landfall of the new Clyde crossing. This road follows a westerly route from the junction into the Meadowside Industrial Estate. At the western end of the industrial estate the new road would turn north and approach the new bridge;
- Roundabout junctions would be created north and south of the bridge crossing; and

The new roads will be designed in accordance with relevant design standards based on a carriageway width of 7.3m (see **Figure 2.4**). Combined cycleway/footways of 3m in width⁴ will be incorporated within the verges on one side of the new roads.

⁴ In some locations where local constraints prevent a 3m wide cycleway/footway on either side of the road it may be necessary to locally reduce the width to 2m on one side.

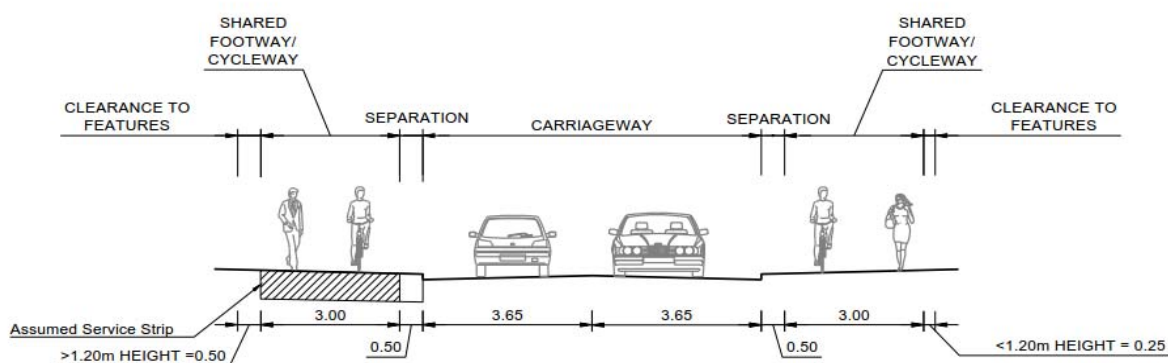


Figure 2.4 Indicative Road and Cycleway Cross Section showing cycleway on both sides of the roads*.

*Please note that the cycleways may only be located on one side or on both sides of the road, this will be finalised during detailed design.

All new roads will be drained by means of surface water systems which provide Sustainable Urban Drainage Systems (SuDS) to attenuate both surface water run-off quantity and quality. The drainage design for the roads is currently being developed and will need to take account of ground conditions, areas within the tidal floodplain and any areas of contaminated land. It is currently proposed that the SuDS will comprise a combination of control SuDS (filter drains, swales, bio-retention areas) as well as end-of-line SuDS (basins/ponds/filter drains) using the most suitable for the final detailed design.

It is assumed at this stage that the new roads and junctions will be lit by means of standard street lighting columns to facilitate safety for all users of the roads and cycleway/footways. The lighting proposals will be discussed with the appropriate local authorities and Glasgow Airport to ensure that they meet their standards and safety considerations. These will be designed to minimise light spill on adjacent areas and to incorporate low energy use fittings (e.g. LED).

The new transport infrastructure will be designed to fit sympathetically with its existing land uses through a landscape design. Sufficient land will be acquired to allow for appropriate landscaping and new tree planting in locations such as Blythswood (to integrate with the surrounding area of deciduous woodland) and to integrate the road with areas where future development is anticipated through the City Deal Masterplan (see **Section 2.6**).

2.4.1.2 New Opening Bridge

The proposed new Clyde Crossing design is expected to be a 'swing bridge'⁵ of twin leaf design which is an opening type design to allow for the uninterrupted passage of ships and other

⁵ The preferred design option for the bridge will be confirmed as part of the development of the Specimen Design for the scheme.

vessels on the river. It will be designed to allow for a clear span of 90m (when open to river traffic) for navigation on the river.

The bridge will span the navigation channel with a span(s) which will rotate through 90 degrees horizontally so that in its open position the opening span is parallel with the river. A back span acting as a counterweight to the opening span(s) will also be required. The main opening span and back spans will consist of two steel box girder decks with a spine (probably of steel trussed construction with cladding) with the counterweight behind a pivot axis within the deck construction. The bridge will be supported on piled reinforced concrete piers and abutments. A preliminary artist's impression of the aesthetic form of the swing bridge is shown in **Figure 2.5**.

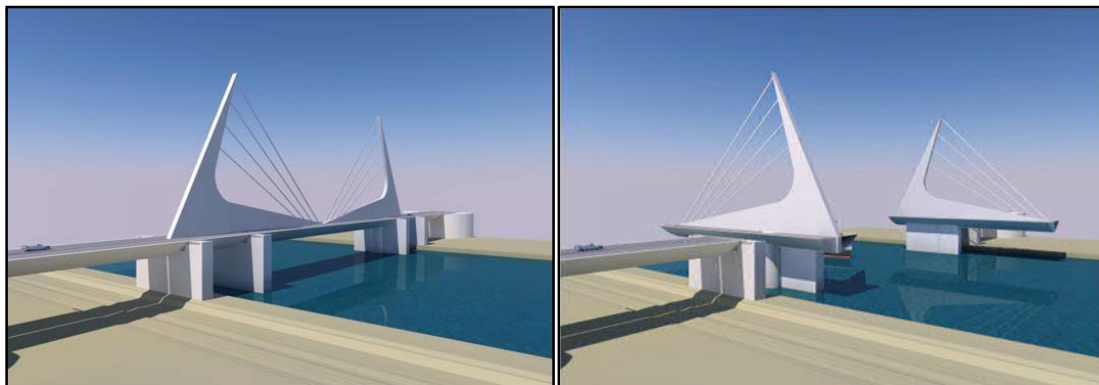


Figure 2.5 Swing Bridge Aesthetic Concept (indicative)

The total length of the bridge is approximately 184m, excluding any approach structures, and the maximum height of the towers to support the cable stays for the bridge deck leafs will comply with safeguarding requirements associated with the nearby Glasgow Airport.

The bridge will be lit with lighting columns/fittings integrated with the design of the structure. The bridge is also likely to incorporate feature lighting to highlight the aesthetic qualities of the structure.

Once operational, the bridge will require to be opened to river traffic which cannot pass under the bridge deck when the bridge is in use by road traffic (i.e. for larger vessels such as those making their way to and from facilities such as King George V dock upstream of Renfrew). A procedure will be established by the bridge operator for communication with the master of these vessels to allow for the bridge to be opened in sufficient time for the ships' journey to be unimpeded.

The operation of the opening bridge will therefore require the implementation of a strategy to manage road traffic and other road/NMU users during periods when the bridge needs to be opened to allow for navigation on the river. These periods may last for up to 2 hours each time the bridge is closed to road users⁶. This strategy will include a procedure for providing information to road/NMU users in advance of bridge closures so that they can adjust their travel plans and avoid the need for queueing to await bridge re-opening. Communication of

⁶ It is currently estimated from data provided by the ports authority that the bridge may need to be opened to river traffic on average 2 times per day, excepting periods of higher river traffic activity such as festivals, regattas etc.

information to travellers on bridge closures is expected to be delivered through various media including existing and new Variable Message Signs (VMS) on key road approaches to the bridge on both sides of the river and through radio and social media bulletins.

2.4.2 Project Construction

It is anticipated that CWRR construction will take approximately 24 months, assuming that all elements of the project are built at the same time. The sequence of construction will be determined by the future contractor(s) but for the purposes of the EIA it has been assumed that construction work on all key parts of the scheme (roads and bridge) will commence at a similar time and be undertaken concurrently. The sequence of construction activity will indicatively be:

- site clearance and tree felling;
- establishment of construction compounds, site access tracks and temporary drainage;
- diversion of services and utilities where required and protection of existing services to be maintained (particularly a sludge main and high voltage cable);
- ground works including earthworks and piling for bridge foundations;
- installation of permanent drainage;
- formation of new roads, NMU facilities and junctions (including traffic management at junctions with existing roads);
- new Clyde crossing construction;
- Construction/Installation of the VMS to aid the management of road and river traffic and NMUs using the new bridge during its opening and closing times;
- installation of lighting and mechanical and electrical services for bridge operation; and
- planting, landscaping and (if required) compensatory tree planting works.

The swing bridge design allows for construction without the need for large lifting barges in the centre of the River Clyde. The design is, however, likely to require construction of in-river piers to support the swing bridge leafs although these would be located close to the river banks. The most likely method to install the piers in the watercourse will be to install sheet piled cofferdams around the location of the piers, de-water, install a pile platform within the cofferdam and then build up the structures in these contained environments.

Further details on the potential outline construction methods for the scheme will be developed as the Specimen Design progresses and used to inform the EIA. It is assumed (and a mitigation commitment provided in the ES) that the principal contractor will undertake all works in accordance with an Environmental Management System (EMS) accredited to a relevant recognised standard and environmental issues will be overseen on site by an Environmental Clerk of Works (ECoW).

It has been assumed that construction will be undertaken on a working week based on working hours from 07.00 to 19.00 Monday to Saturday and that night time and Sunday working, should this be required due to tidal conditions or other constraints, will be permitted following prior approval of the relevant local authority environmental health departments and any other appropriate authority (e.g. Port Authority).

The exact location of construction compounds would be determined by the eventual contractors for the scheme. At this stage and for the purposes of the EIA, it has been assumed that up to three construction compounds may be required, one either side of the River Clyde to facilitate construction of the bridge and one further south to support construction of roads and NMU facilities. Compounds would be located on land without significant environmental constraints and with ready access to the road network for heavy goods vehicles (HGVs). Further details of the location and size of the indicative construction compounds would be provided in the Environmental Statement (ES) for the proposals.

2.5 Sustainability of the Proposals

This project offers a rare opportunity to facilitate large-scale sustainable development and to further the aims of the 2015 United Nation's Sustainable Development Goals (SDGs), one of which is to '*take urgent action to combat climate change and its impacts*'. The early stages of the infrastructure development offer the greatest opportunity for reducing whole-life project carbon (which is one of the guiding principles for the project), as well as measures to provide demonstrable economic, social and environmental benefits.

Opportunities for sustainable development, in line with the SDGs, have been considered against their applicability to the project to minimise the likelihood of being designed out at subsequent stages. Four key sustainability objectives were defined at the outset of the project to allow comparison between route options and ensure their inclusion throughout all stages of development. These are:

- To facilitate opportunities for *learning* through the project;
- To connect opportunities for environmental improvements with *community benefit*;
- Adopt and record sustainable *resource management* in design and construction;
- *Minimise whole life carbon* associated with the project.

A number of recent Institute of Environmental Management and Assessment (IEMA) guidance documents on climate change and EIA have been followed during this assessment and are detailed further in *Chapter 12*.

The EIA process provides an appropriate mechanism to assess the impact of the project on the receiving environment (climate change *mitigation* through whole life carbon reduction) as well as assessing the resilience of the project and receiving environment and communities to future changes in the environment (*adapting* to increased temperatures and sea level rise).

2.6 Renfrewshire City Deal Masterplan

A masterplan is being prepared to establish a framework for future land uses and developments, which would result from the implementation of the both the CWRR and GAIA City Deal proposals to ensure that development resulting from these two projects is integrated. The masterplan seeks to ensure that the road alignment, and associated planned infrastructure interventions, are suitably defined and that potential land uses in the future are identified and maximised, while demonstrating the physical and commercial regeneration of the area.

The masterplan will set a high standard for sustainable and environmentally sensitive development to occur in the future. The masterplan will demonstrate how different modes of travel would interact, set within a suitable framework of public realm and landscape. The CWRR masterplan will describe and illustrate:

- the key attributes of the site - Opportunities and Constraints;
- how the planned new bridge can be set in the physical context to the new development;
- how the new opening bridge may become a 'destination', acting as an important nodal point for active travel routes and an attraction for leisure and recreation – taking into account affordability and value for money;
- how technical constraints such as flooding and contamination can be accommodated or mitigated;
- the different character areas of the site;
- the use types and quantum of future development; and
- potential phasing for the future development.

The masterplan will create a medium-long term vision for the physical regeneration of underused locations within the study area and will demonstrate the aspiration for planned new business and residential areas to be created as a result of the Renfrewshire City Deal projects. This output will create the structure for future development in this area, providing a realistic and deliverable framework that allows for the proposed renewal and development of the areas around the planned infrastructure to take place enabling the economic growth which is envisaged as part of the wider CWRR development.

2.7 Development Planning Context

2.7.1 Development Planning Context

A summary of the key relevant development plan policy is outlined in this section. Further details on policies and plans (national, regional and local) will be reported as part of the ES which will provide a planning context for the assessment work.

2.7.2 Glasgow and Clyde Valley Strategic Development Plan 2012

The Glasgow & Clyde Valley Strategic Development Plan 2012 (SDP 2012) sets out the spatial development strategy for the region. This project is being developed to reflect the SDP's spatial development strategy and support its spatial vision and strategy. The project will support the 5 key components of the SDP's spatial vision. Clydebank Riverside is identified as a Strategic Economic Investment Location (SEIL) in the SDP and Clyde Waterfront is identified as core component of the spatial development strategy and a strategic development priority. This project will directly assist in providing increased connectivity to the waterfront and riverside zones and act as a major enabler for delivery of the vision for these areas. The proposed development and its interaction with planned and potential mixed use developments in a well-connected location will support the NPF3 vision for sustainable communities along Renfrew Riverside. Through delivery of enhanced greenspace and active travel measures the proposals will also assist in delivery of the SDP's vision for the green network and sustainable transport.

The Glasgow & Clyde Valley Strategic Development Plan January 2016 (SDP 2016) is currently being examined on behalf of Scottish Ministers, with an anticipated adoption date in Spring 2017. The plan as drafted is the settled view of the partnering authorities in relation to the spatial development strategy for the Region based on a review of the former plan, economic conditions and taking cognisance of representation during compilation of the document. The 2016 plan recognises the numerous challenges faced within the City Region for Economic Growth and Policy 3 provides support for the City Deal projects. The spatial development strategy focuses on a “*Development Corridor*” sitting parallel to the River Clyde and encompassing the project area. The focus of this corridor is to “*reconnect the adjacent communities to the River Clyde, and connections across it; recycle and reuse vacant and derelict land;...generate large –scale economic activity maximising opportunities for sustainable travel to work and home*”. This project aligns fully with this Policy document.

SDP 2016 also notes the importance of this project as an aid to ensuring the ongoing economic contribution made by the Strategic Centre at Braehead. The SEIL at Glasgow Airport its importance in accessing “*UK, European and Global markets*” is recognised in SDP 2016, this aspect together with the complimentary City Deal project at Glasgow Airport Investment Area are provided additional links to the City Region by Clyde Waterfront and Renfrew Riverside. The strategic connection of all of these areas through this project is reinforced through SDP 2016.

2.7.3 Renfrewshire Local Development Plan

The Renfrewshire Local Development Plan (LDP) sets out the spatial strategy that will facilitate investment and guide the future use of land in Renfrewshire. The LDP makes specific reference to the importance of Braehead/Renfrew Riverside as a key strategic investment area, where “better connectivity and proposed commercial facilities will benefit the area as an employment centre”. The proposed development will directly improve connectivity to these areas, maximising the impact and effectiveness of these large employment centres.

The Spatial Strategy in the LDP includes a series of key policies and proposals structured around the five themes of Economy, Centres, Infrastructure, Places and Environment. These policies guide development and aim to promote sustainable economic growth by indicating opportunities for change and supporting investment which helps to generate, create and enhance communities and places, providing high quality new development in the right location. The focus of the LDP Spatial Strategy is on the development of previously used sites.

A review of the LDP has been undertaken to identify strategically important development planning designations, constraints and other land use allocations within the study area. The project lies extensively within an area of land identified as a ‘Transition Area (E3)’ in the LDP Proposals Plan. As the proposed road corridor intersects the woodland at Blythwood, an area of trees protected by Tree Preservation Orders would be impacted. An area of Green Belt lies between Renfrew and the settlement of Inchinnan, 2km to the west. There are also a number of control of major accident hazards (COMAH) consultation zones around facilities for the storage of fuels and spirits. Key environmental constraints are shown on **Figure 1.3**.

Table 2.2 below presents an overview summary of the policies from the LDP which will be addressed as part of the EIA. The full text of each relevant policy has been summarised.

Table 2.2 Summary of Relevant LDP Planning Policies

Policy	Brief Description
Renfrewshire Council	
Policy E1: Renfrewshire's Economic Investment Locations	Support development in Strategic Economic Investment Locations (see below) and local business / industrial areas
Policy E3: Transition Areas	Locations which can support a mix of uses provided development proposals can co-exist with existing uses
Policy I1: Connecting Places	Supports development proposals which give priority to sustainable modes of travel
Policy I3: Potential Transport Improvements	Safeguards land for a number of transport proposals including (of relevance to CWRR) the Renfrew Northern Distributor Road
Policy I5: Flooding and Drainage	Development should avoid areas susceptible to flooding, incorporate sustainable drainage infrastructure (SUDS), avoid increasing flood risk and compensate for loss of flood storage capacity
Policy P7: Green Network	Supports development which safeguards existing green networks and / or has potential to contribute to an integrated green network
Policy P8: Open Space	Supports the protection of open space, recreational provision and amenity space from development
Policy ENV1: Green Belt	Green Belt maintains identity of settlements and landscape setting. Appropriate development within the green belt will be considered acceptable where it can be demonstrated that it is compatible with the provisions of the New Development Supplementary Guidance
Policy ENV2: Natural Heritage	Developments must not have an adverse effect on the integrity of sites protected for their natural conservation interest or which have potential to protect and enhance designated sites and wider biodiversity
Policy ENV5: Air Quality	Development proposals shall not individually or cumulatively have an adverse effect on air quality
West Dunbartonshire Council	
DS1 – Developing Sustainability	All development to contribute to creating successful places by having regard to the relevant criteria of the six qualities of a successful place (distinctive, adaptable, resource efficient, easy to get to/move around, safe and pleasant and welcoming)
DS3 – Sustainable Transport	Significant travel generating uses are required to locate within 400 metres of public transport network
DS4 – Air Quality	Development proposals shall not individually or cumulatively have an adverse effect on air quality and will not be permitted unless adequate mitigation measures are included

Policy	Brief Description
DS6 – Flooding	Development will not be supported on the functional flood plain and should not be located anywhere that will be susceptible to flooding or exacerbate flooding elsewhere. Where appropriate development should include SUDS and provision for long term maintenance
DS7 – Contaminated Land	Development proposals on sites which are potentially contaminated should be accompanied by sufficient information establishing the nature of the contamination on site and the proposals for dealing with it
GE1 – Opportunities for New and Expanding Business	Sites are reserved along the waterfront for business, industrial or storage and distribution uses
GE5 – Glasgow Airport	Development that would adversely impact on the operations of Glasgow Airport or would be adversely affected by aircraft noise will not be permitted
BC4 – Building our communities	Development that would significantly harm the residential amenity, character or appearance of existing neighbourhoods will not be permitted
GN2 – Green Infrastructure	Development will be required to follow the Integrating Green Infrastructure approach to design by incorporating SuDs, open space, paths and habitat enhancements at a level proportionate to the scale of development
GN4 – Landscape	Development proposals shall take into account the local landscape character of the area, and ensure that the integrity of this landscape character is maintained or enhanced
GN8 – Outdoor Access	Development that would result in the loss of a core path, right of way or other important route will not be permitted unless acceptable alternative provision can be made. The provision of paths will be expected in developments where these would enhance active travel or connectivity within the green network, and particularly where this would create routes to and along waterways
Glasgow City Council	
DEV1- Transport Infrastructure	Supports development proposals which give priority to sustainable modes of travel
DES2 – Sustainable Design and Construction	To ensure that the development and regeneration of the City is undertaken in a manner that embraces the principles of sustainable design and construction, thereby helping deliver sustainable development
DES 5 – Development and Design Guidance for the River Clyde, Forth and Clyde Canal Corridors	To protect and enhance the function and character of the River Clyde and Canal Corridors by supporting developments which, as appropriate, provide public access to, from and along the River and Canal, protect and enhance existing prominent views and promote community, leisure and recreational activities on and beside the water

Policy	Brief Description
DES4 - Landscape	The Council wishes to ensure that all developments have a strong landscape framework which improves and enhances the setting and visual impact of the development, unifies urban form and architectural styles, provides shelter, creates local identity and promotes biodiversity
TRANS1 – Transport Route Reservation	To ensure proposed transport routes are safeguarded from development that would prejudice their implementation and ensure former rail formations, with the potential for transport use, are protected
TRANS5 – Providing for pedestrians and cycling in new development	To ensure new developments are designed to facilitate and promote walking and cycling
TRANS9 – Air Quality	To ensure account is taken of air quality in new development
ENV5 - Flood Prevention and Land Drainage	To safeguard development from the risk of flooding and to ensure new development does not have an adverse impact on the water environment, does not materially increase the probability of flooding elsewhere and does not interfere detrimentally with the storage capacity of any functional flood plain (see Definition) or associated water flows
ENV10 - Access Routes and Core Path Networks	To develop a network of accessible paths for the benefit of the City's residents and visitors
ENV12 – Development of Brownfield land and Contaminated Sites	To encourage the reuse of brownfield land and ensure that redevelopment of former industrial and other potentially contaminated sites addresses any on-site contamination
ENV17 – Protecting the Water Environment	To ensure new development does not have an adverse impact on the water environment by preventing the deterioration of aquatic ecosystems and enhancing their quality, including groundwater, promoting sustainable water use, reducing pollution, and mitigating against the impact of extreme weather events

The proposed development is located almost fully within the Renfrewshire Council boundary, however as the bridge lands to the north of the River Clyde, and the road connection is made to Glasgow Road/Dumbarton Road, the development will cross through and into small areas of Glasgow City Council and West Dunbartonshire Council. Key policies of the Glasgow City Proposed LDP and the West Dunbartonshire Proposed LDP are therefore included above.

2.8 Socio Economic Context

2.8.1 Overview of Socio-Economic Profile

Glasgow and the Clyde Valley benefits from numerous economic assets, successful universities and research institutes and a skilled workforce. However the city and wider region also faces numerous challenges that have acted as barriers to economic growth. These include: high rates of long term unemployment; poor survival rates for business start-ups (when compared to similar UK cities); stalled development sites in key locations; and weaknesses in the area's transport infrastructure.

An overview of the socio-economic profile of local areas within Renfrewshire, Glasgow and West Dunbartonshire have been undertaken⁷.

- Braehead
- Inchinnan
- Paisley North and Airport
- Yoker
- Whitecrooks
- Kilbowie
- Jordanhill

In addition to looking at this more disaggregated level, data is also analysed at the local authority level for Renfrewshire compared with the equivalent figures for Glasgow City, West Dunbartonshire and the Scottish national statistics.

There are some important trends from the analysis that highlight problems in the area:

- Renfrewshire's population is growing at a much slower rate compared to both Glasgow City and to the Scottish average trends.
- The proportion of the population in working age (i.e. between 16 and 64) has been in decline since 2001 and is forecast to decline further in the period 2015 to 2030. This could be due to lack of local employment opportunities. Combined with a forecast decline in the number of people under the age of 15, this highlights potential shortages in future local labour supply.
- In recent years Renfrewshire has seen relatively low levels of workplace earnings. This can make it difficult to attract people looking for employment to the area.
- Renfrewshire has a lower rate of business start-ups compared to Glasgow City and Scotland as a whole. It has also seen a higher than average rate of business closures in recent years. The areas to the north of Paisley and around Glasgow Airport are in particular need of further investment going forward due to the higher than average unemployment rate, lower qualification and car ownership rates and a significantly decreasing population rate.

The vast majority of all travel to work in the local area is under 10km, making journeys to work by active travel modes practical. Furthermore, the Yoker, Kilbowie, Whitecrooks and Jordanhill areas show below average car ownership levels, with 46.4% of households owning no car, and 38.7%, one car, compared to 30.5% and 42.2% respectively at a national level. An above average proportion of public transport users reflects the low car ownership in the area as well as the potential for promotion of travel by active travel modes.

2.8.2 Socio Economic Impact of the CWRR Proposals

The City Deal seeks to maximise economic benefits for Glasgow, the Clyde Valley Region and Scotland through the delivery of a programme of high impact investment. In order to ensure

⁷ These are reported in more detail in a separate socio economic assessment for Renfrewshire City Deal prepared by Peter Brett Associates

this happens, Member Authorities⁸ have engaged in an exercise to identify projects which maximise the economic outputs at a project level and which deliver positive economic benefits for the region and Scotland collectively as a programme.

The CWRR project seeks to significantly improve connectivity across the River Clyde for communities in the Clydebank/Yoker area north of the river and those in Renfrew to the south. It also aims to enhance economic development opportunities at key development sites on the south bank of the river between Braehead and the confluence of the White Cart Water with the River Clyde⁹. This is an area that has suffered from industrial decline over many years, with significant areas of derelict and brownfield land, and the majority of existing industrial premises being of poor quality.

An initial high level socio-economic assessment has been undertaken¹⁰ to establish the potential gross impacts of the following elements of the future developments that would be anticipated to be facilitated by the CWRR proposed development (as shown in **Figure 2.6**):

- c.17.5ha of high density residential development (apartments);
- c.7.8ha lower density residential units (family dwellings); and
- c.9.2ha of (currently) undetermined development area.

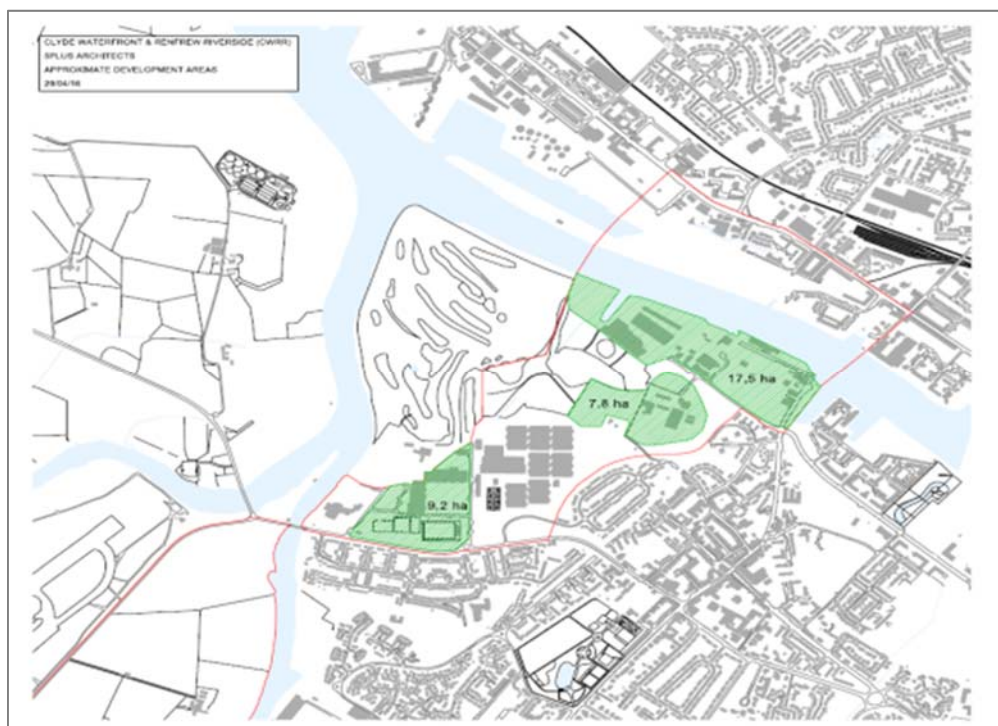


Figure 2.6 CWRR Masterplan Approximate Development Areas

⁸ East Dunbartonshire Council, East Renfrewshire Council, Glasgow City Council, Inverclyde Council, North Lanarkshire Council, Renfrewshire Council, South Lanarkshire Council, West Dunbartonshire Council

⁹ These development opportunities have been captured in a Renfrewshire City Deal Masterplan which is briefly described in Section 2.7

¹⁰ CWRR Part B – Options Generation and Assessment, Report Prepared for Renfrewshire Council, Sweco, August 2016 (currently in draft)

An Economic Impact Model has been built to establish the following indicators for the project:

- Developable floorspace;
- Residential units;
- Construction costs;
- Construction jobs (person years);
- Construction Gross Value Added (GVA)¹¹;
- Permanent Full-time Equivalent (FTE¹²) jobs;
- GVA from permanent employees;
- Estimated value of supply chain linkages; and
- Council Tax contributions.

From the work undertaken to date it has been estimated that the CWRR site would deliver around 875 apartments and 273 family homes providing some £1.2 million in annual council tax revenue. The construction phase will support approximately 750 temporary (1 year) construction jobs and provide £38.7million GVA to the local economy. A more detailed assessment of the socio-economic implications of the future developments which are anticipated¹³ as a result of the CWRR infrastructure proposals, will be set out in the Environmental Statement (ES).

The implementation of a future Clyde crossing is likely to mean that from Renfrew, destinations such as the Golden Jubilee National Hospital, Yoker Rail Station, and Clyde Shopping Centre are will be within a 30 minute cycling catchment. Other major local employers, such as Inchinnan Business Park, Glasgow Airport, and Westway; educational institutions including the University of the West of Scotland, and West College Scotland – Paisley Campus; and Braehead Shopping Centre would all be within a 30 minute cycle from Yoker.

In summary, the project and the new bridge, will provide a major step change in accessibility and provide a connection point between the local communities. Significant economic benefits are also predicted from the future development of residential and commercial sites which will be stimulated through the infrastructure measures to be delivered by the CWRR proposed development.

¹¹ Gross value added (GVA) is the measure of the value of goods and services produced in an area, industry or sector of an economy

¹² One Full Time Equivalent worker is equivalent to one worker working full-time or two workers working part-time

¹³ These developments are described further in the City Deal Masterplan which has been prepared for the proposals (see Section 2.7)

3 Land Use and Communities

3.1 Introduction

This section describes the proposed approach to the assessment of potential effects of the proposed development on land use, and on key community journeys by pedestrians, cyclists and equestrians.

Key land uses include business parks/industrial estates, residential and other properties, transport routes, woodlands and waterways. Community journeys have been defined as key journeys representative of a range of journey types made by the local communities.

The assessment focuses on a wide study area representative of local land uses and the area used by the local communities (centred over the route option) hereafter referred to as the 'study area' (see **Figure 3.1**).

The objectives of this section of the report are to:

- outline consultation undertaken regarding the predicted effects of the proposed development in relation to land use and community use;
- describe baseline conditions relevant to the proposed development;
- present an initial assessment of the potential effects on the baseline associated with construction and operation of the proposed development; and
- outline the proposed approach to the impact assessment, if further surveys are required and what will be scoped out of the assessment.

3.2 Consultation

During the initial optioneering and design exercise, the following consultees have been contacted and the information or feedback that they have provided is summarised in **Table 3.1**. Please note information on the NMU workshop that was held in April 2016 is provided in **Section 9.2**.

Table 3.1 Summary of Consultation

Consultee	Summary of Response
British Horse Society	(Email from 01.03.16) noted that the areas for development are not considered to have extensive equestrian activity.
Cycling Scotland	(Email from 01.04.16) noted that: <ul style="list-style-type: none"> • there are threats including severance of communities from the infrastructure; • there should be enhanced routes for a coherent cycling network encouraged. Where cycling linkages have already been identified in new bridges across the Clyde and White Cart, facilities for cyclists should be incorporated into the initial designs and take cycling by Design standards into consideration; • any projects in Renfrewshire should be implemented mindful that 30.6% of households in the council area have no access to a car and that cycling can provide an accessible form of transport for work, study and leisure; • any developments should incorporate a clear, evidence based focus on improving cycling infrastructure for journeys of up to 5 kilometres, the journey distance that most people would choose to cycle; and

Consultee	Summary of Response
	<ul style="list-style-type: none"> the focus should be where demand is greatest, for example to schools, major employers, retail centres, rail stations and leisure attractions.
Forestry Commission Scotland	(Letter from 15.02.16 and meeting on 5.07.16) will require direct engagement regarding any design plans that may impact on Ancient Woodlands, Native and Semi-Native woodlands, SSSI (Black Cart), Local Nature Conservation Sites and Tree Preservation Orders.
GCV Green Network Partnership	(Email from 10.03.16) has identified that the Green Network delivery should focus on improvement of walkable access to greenspace, the greening of vacant and derelict land, integrate Green Infrastructure and improve underperforming existing greenspace.
Living Streets	(Email from 11.03.16) recommends using the Scottish Government's Place Standard and noted that cycling and walking improvements are welcomed. If the overall scheme does not achieve the best outcomes for NMUs, the difficult crossing at major roads are a concern that must be addressed in the design. Attractive new bridges consist of good levels of pedestrian priority and cycle infrastructure.
Paths for All (PfA)	(Letter from 24.03.16) referred to the National Walking Strategy.
Scottish Rights of Way & Access Society	(Letter from 26.04.16) indicates that rights of way SR53-52 and to the north of the River Clyde, SCL9 (West Dunbartonshire) and SC55 (City of Glasgow) pass through the area.

3.3 Baseline

The main settlements in the area are Renfrew in the south, Glasgow (Yoker) in the north-east and Clydebank in the north-west. The study area contains land used for built up urban land such as residential, roads, commercial operations, industrial use, other artificial habitat (90%) and woodlands (10%)¹⁴ as shown on **Figure 3.1**.

3.3.1 Key Land Uses

3.3.1.1 Community Land

The Greenspace data and field work show that there are a number of pockets of land identified as open space including woodlands or amenity greenspaces. To the north of the River Clyde, woodlands have mainly been identified on linear strips along the disused railway (which runs east west through the residential area between Dock Street and Greenlaw Road). To the south of the River Clyde, there are larger woodlands including at Blythswood, around Renfrew Golf Club which are also connected to a belt of trees south of Meadowside Street. A few patches of amenity grassland have also been identified.

¹⁴Information collected with GIS from the EUNIS Land Cover Scotland raster data <https://gateway.snh.gov.uk/natural-spaces/dataset.jsp?dsid=EUNIS>

The principal areas of open space within the study area are located at:

- The **Renfrew Golf Course** founded in 1894 has an extensive landscape framed by a tree-lined parkland;
- The **Robertson Park** in Renfrew which includes a duck pond, floral gardens, BMX course, skateboard park, tennis courts, putting area, bowling green, sensory garden, cycle tracks, swing parks and a small animal enclosure; and
- **Clyde View Park** which was recently built as part of the Clyde Waterfront regeneration project and includes fountains, paths, cycleways, play areas, picnic areas, artwork, green space and a riverside walkway to encourage wildlife, and flora and fauna.

The majority of this space is used for informal access, play or recreational activities. Paterson Park Allotments has also been identified behind the newly built Renfrew Health and Social Work Centre on Ferry Road.

Three playing fields have been identified within the study area:

- **New Western Park** which is located east of the Normandy Hotel on Inchinnan Road (A8) in Renfrew and forms the grounds of Renfrew Football Club;
- **Holm Park** Located between Glasgow Road (A814) and Rothesay Dock in West Dunbartonshire and the ground of Clydebank Football Club and Yoker Athletic; and
- **Whitcrook Park** located north of Glasgow Road (A814) adjacent to the north boundary of the core study area in West Dunbartonshire and which includes football and rugby pitches and tennis courts.

There are a number of footpaths (including core paths) within the study area which provide access for the public which may be used by the local community for recreational purposes. A review of the relevant core paths has been undertaken to identify designated paths used by Non-Motorised Users (NMUs) in the area. **Table 3.2** below presents a summary of key paths in the study area.

Table 3.2 Key Designated Paths used in the Study Area

Path Name	Brief Description	Connectivity	Quality
National Cycle Route 7 (NCR7)	Links Sunderland to Inverness and runs along the north of the River Clyde in the study area.	Local links include Kelso Street and Yoker Ferry	National Cycle Route 7 (NCR7)
Core Paths 29 C29B/C29A	C29, C29B: Following the route of the National Cycle Route 7 in Yoker and partly along the disused Partick to Yoker railway (see below)	Core Paths 29 C29B/C29A	C29, C29B: Following the route of the NCR 7 in Yoker and partly along the disused Partick to Yoker railway

Core Path REN/2	White Cart walkway from the bascule bridge to Clyde walkway to Meadowside Street	*Link to REN/4 in the south, just east of the Bascule Bridge over White Cart Water *Link to REN/7 at junction of Meadowside Street and Ferry Road	Off-road path, riverside route which is mainly tarmac
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There is a proposal for a Renfrew to Paisley Cycleway that is currently being planned by Renfrewshire Council. The potential alignment of this cycleway principally follows the route of a former railway line between the two towns (see **Figure 3.1**).

3.3.1.2 Community Facilities

The majority of the key community facilities in the study area are located in the vicinity of Yoker and Renfrew town centre and include:

- **West College Scotland's** Clydebank Campus on the north bank of the River Clyde is accessible from Cart Street just off Glasgow Road (A814) in the north-west of the study area. The college serves the populations of Inverclyde, Renfrewshire and West Dunbartonshire and surrounding areas.
- **Kirklandneuk and St James Primary Schools** which are located west and south-west of the Robertson Park in Renfrew.
- **Yoker Medical Centre** is located along Dumbarton Road just north east of the Yoker to Renfrew Ferry Terminal (see Section 3.3.1.3).
- **Renfrew Health and Social Work Centre** opened in 2010, the centre is located to the north of Renfrew centre on Ferry Road.
- **Moorpark Post Office** which is located in Renfrew south west of the Robertson Park at the intersection between Paisley Road (A741) and Porterfield Road.

3.3.1.3 Private Assets

Residential land uses in the study area are concentrated in and around Renfrew town centre, and along the corridor of the Dumbarton Road on the north side of the river. There are also recently completed and 'under construction' residential properties located on the north side of the River Clyde in Yoker and along either side of King's Inch Road between Renfrew and Braehead. These developments form part of the Clyde Waterfront Development which has developed a new community of over 2,000 homes at Ferry village on the south bank of the River Clyde.

Local transport and other private assets include:

- **Yoker Station**, the only railway station in the study area, located approximately 840m from the Renfrew Ferry terminal on the north side of the River Clyde. The rail line connects to Dalmeir via Clydebank to the west and to Partick station and Glasgow to the east.
- **Yoker to Renfrew Ferry**, a passenger ferry service linking the north (Yoker) and south banks (Renfrew) of the River Clyde.

- **Rothersey Dock** located on the north bank of the River Clyde (between Yoker and Clydebank) and is an operating dock comprising a fuel depot and a boatyard and associated businesses. The site is connected to the A814 Dumbarton Road by Dock Street.
- **Meadowside Industrial Estate**, located to the immediate south of the River Clyde, to the north of Blythswood and west of Ferry Road. The site is bordered to the south by Meadowside Street which links onto Ferry Road (A741) and King's Inch Road at the south east corner of the industrial area. This site comprises a number of local businesses including Christie & Sons (Metal Merchants), various business outlets within premises owned by Peel Properties Ltd, Renfrew Car Breakers and a vehicle storage facility.
- **Diageo Blythswood**, a bonded warehouse facility owned by Diageo and located just north of Inchinnan Road, Renfrew and to the south-east of Renfrew Golf Course.
- **Blythswood Retail Park**, to the south of the golf course and to the north of Inchinnan Road. It has a high vacancy rate and many of the retail units are currently closed.
- The **Normandy Hotel**, which overlooks the White Cart Water close to its confluence with the Black Cart Water south of Renfrew Golf Course.

3.3.1.4 Waterways

The **River Clyde** crosses the study area from east to west. It is the second longest river in Scotland and has always played an important role in the history of Glasgow. After a decline of its industries in the 1960s, the River Clyde has seen a recent massive resurgence after undergoing regeneration with emerging areas of recreation, residence and business resulting in significant increased levels of traffic on the river (further information on the river including flooding and water quality is presented in **Chapter 5: Water Quality, Drainage and Flood Defence**). The River Clyde is still a very important waterway with regards to commercial operations and is considered an important resource and a busy working river.

3.3.2 Key Community Journeys

A review of the representative journeys (by destination) has been undertaken to identify a set of typical journeys within the study area by NMUs by the communities located within the study area. Five key journeys have been identified (see **Figure 3.1**):

- Key Destination 1.** **West College Scotland:** The College can be accessed via the National Cycle Route 7 (**NCR 7**) link running in an east/west direction which also includes the Clyde Shopping Centre, as well as NCR 754 at Forth and Clyde Canal. The West College can also be accessed via the core path **C29B**.
- Key Destination 2.** **Paisley Town Centre and Train Station:** The station and town centre are accessible via the REN/7 core path and the Proposed Renfrew to Paisley Cycleway links. These paths run from the River Clyde's south bank into Renfrew town centre.
- Key Destination 3.** **Yoker Train Station:** no designated link provides a direct access to Yoker train station for NMUs however the **NCR7** and core path **C29B** provide a close link leaving approximately 300m of on road access.
- Key Destination 4.** **Glasgow Airport:** Core paths **REN/2** running along Renfrew Golf course and **REN/13** along Abbotsinch Road provide a link to Glasgow Airport.

Key Destination 5. Braehead Shopping Centre: Braehead Shopping Centre is accessible via the REN/8 and REN/22 core paths links and can also be accessed via an off-road cycleway identified by Sustrans. REN/8 runs along the south bank of the River Clyde and REN/22 crosses Renfrew town centre.

Various local cycle paths run through the study area mainly via the core path network. There is also a proposal for a Renfrew to Paisley Cycleway¹⁵ being planned by Renfrewshire Council. The potential alignment of this cycleway principally follows the route of a former railway line between the two towns.

3.4 Potential Effects

3.4.1 Construction

- temporary change in land use (particularly in Blythswood) for construction compounds, and laydown areas (which would be restored after construction);
- conflicts between construction activities and users of the existing area including tracks and the road network;
- disruption effects on users of the River Clyde during bridge construction activity;
- increased hazards to users of the area from construction activities; and
- interruptions to services through interference with utilities.

3.4.2 Operation

- permanent loss of land especially around Blythswood and at the River Clyde crossing locations;
- direct and indirect impacts on properties including disruption of access especially at Rothesay Dock and Meadowside Industrial Estate;
- permanent loss of woodland at Blythswood;
- impacts on utilities in the area;
- improved access routes across the study area for local residents and recreational users; and
- increased hazards to users of the area from operational traffic and new infrastructure into the area.

3.4.3 Land Use

The road proposals south of Meadowside Street would be predicted to result in land take from Blythswood, potentially impacting upon woodlands that are designated as Semi-Natural Ancient Woodlands, within part of a Site of Importance for Nature Conservation (SINC) and which are protected under Tree Preservation Orders (TPOs). Overall, the proposed development is considered to have a minor to moderate (potentially significant) negative impact on land use due to a loss of greenspace associated with woodlands at Blythswood.

¹⁵ Renfrew to Paisley Cycle Route Feasibility Study (Aecom), Renfrewshire Council, April 2015

The development will not impact upon any of the identified community facilities, therefore, no potential impacts are predicted. There will also be no direct impact upon existing residential property, with no proposed land-take and/or housing demolition required.

Potential land-take from parts of Rothesay Dock north of the River Clyde and Meadowside Industrial Estate south of the River Clyde has been identified. Further assessment will be required to identify the potential impact on the businesses and their viability within this area. The impact has been assessed at this stage as moderate negative (and potentially significant).

The River Clyde is navigable at the location of the proposed bridge crossing and one of the most important objectives for the project is to ensure that river operations and navigation are not adversely impacted by the development. The operation and design of the bridge is currently being developed but it is recognised that without suitable mitigation, the bridge construction and operation, could have potentially significant effects on river users.

3.4.4 Community Journeys

The proposed development is predicted to reduce journey length for some communities through improved and increased access to designated paths such as the NCR7, access to transport facilities such as the Yoker Station and to destinations such as the West College Scotland, Clydebanks Campus and major employment, retail and leisure centres on both sides of the River Clyde. The creation of the new bridge crossing in particular is predicted to have significant beneficial impacts on accessibility and community journeys. Overall, it is predicted that the proposed development would result in a beneficial moderate impact as the new bridge will create a crossing point on the river for vehicles and active travel options that will connect up the existing national cycleways and local routes.

Connection to Glasgow for residents living in Renfrew and other areas, south of the River Clyde in Renfrewshire would improve and communities would be able to use the new bridge and non-motorised facilities provided, to access transport facilities north of the river including Yoker Station. The crossing would also provide a potentially shorter route for the National Cycle Route, via a link from Paisley in the South to Yoker / Clydebanks in the North.

3.5 Proposed Scope of the Assessment

3.5.1 Land Use

In the absence of specific published guidance for the determination of impacts on land use and their significance (e.g. moderate significance), each potential impact associated with land use will be informed by professional judgement and the assessment criteria in **Table 3.3**. Professional judgement will also be used to distinguish between significant and non-significant effects and may be beneficial or negative in nature.

At this stage, all community land and community group receptors are considered to be of high sensitivity for the proposed development.

The estimated land-take will be based on the finalised red line boundary for the proposed development, taking account of the footprint of the development and a suitable buffer for any land required for maintenance (as described in Section 2.5). It also includes land required for construction of infrastructure (e.g. construction compounds) and for aspects such as landscape planting or other essential mitigation.

Table 3.3 Magnitude of Impact for Assessment of Land Use

Impact Magnitude (Adverse or beneficial)	Criteria
Major	Land interests that would experience high levels of disruption to: <ul style="list-style-type: none"> • demolition of property or property becomes uninhabitable; • large scale permanent decreases in land area (greater than 7.5% of total study area); • permanent changes to access properties (private or community) and other key land uses; • substantial business operational impacts; and • permanent change on waterways.
Medium	Land interests that would experience medium levels of disruption to: <ul style="list-style-type: none"> • noticeable permanent decreases in land area (greater than 2.5% but less than 7.5% of total study area); • temporary changes to access properties (private or community) and other key land uses; • business operational impacts; and • change on waterways.
Low	Land interests that would experience only low levels of disruption to: <ul style="list-style-type: none"> • no demolition of property; • small scale permanent decreases in land area (less than or equal to 2.5% of total study area); • none or slight change to access properties (private or community) and other key land uses; • small scale business operational impacts; and • small scale change on waterways.

3.5.2 Community Journeys

All paths and facilities are considered to be of equal importance regardless of user type or level of usage. The assessment of impact significance will be informed using the indicative criteria in Table 3.4.

Table 3.4 Magnitude of Impact for Community Journeys

Impact (Adverse or beneficial)	Criteria
Major	NMUs that would experience high levels of disruption to: <ul style="list-style-type: none"> • permanent change in key journey pattern and will be increased/decreased by over 500m; • permanent change of width of path and/or no barrier between NMU from traffic; • clear signing for routes for NMUs; • permanent change in safety for NMUs; • permanent change in the quality of the landscape or townscape experience by NMUs; and • loss of community facilities resulting in fewer (or longer) journeys being required.

Impact (Adverse or beneficial)	Criteria
Medium	<p>NMUs that would experience medium levels of disruption to:</p> <ul style="list-style-type: none"> • change in journey pattern with an increase /decrease by 250-500m with possibility to use an alternative route; • temporary but noticeable change width of path and/or barrier between NMU from traffic; • signing for routes for NMUs; • temporary but noticeable change in the quality of the landscape or townscape experience by NMUs; and • change of location of community facilities may result in some residents being dissuaded from making these trips (i.e. reduction of journeys).
Low	<p>NMUs that would experience only low levels of disruption to:</p> <ul style="list-style-type: none"> • no change or temporary change in journey pattern with an increase/decrease by up to 250m; • slight change of width of path and/or barrier between NMU from traffic • no or unclear signing for NMU routes; • small scale change in the quality of the landscape or townscape experience by NMUs; and • journey pattern to community facilities will be maintained but new bridge will be need to be crossed or a subway traversed.

3.6 Remaining Surveys

No additional surveys are expected to be required to inform the land use and community journeys assessment during the EIA process.

3.7 Impacts to be Scoped Out

Based upon the baseline and initial assessment, it is proposed that the following are scoped out of the assessment.

- Impacts upon agricultural land. It is predicted that no agricultural land would be affected by this proposed development, this topic has therefore been scoped out and will not be assessed further in the EIA.
- The proposed development will not require the demolition of any residential properties, therefore this impact has been scoped out and will not be assessed further.
- With limited use of the existing infrastructure by equestrian riders, it has been predicted that there will be no direct impact on equestrians and this effect has been scoped out of the assessment.

3.8 Summary of proposed EIA Scope

- Further work to define the detailed Land Use and Community Journeys baseline through desk-based research and GIS.
- Consultation with statutory agencies and key consultees on key issues such as NMUs, Greenspaces, Access, etc.
- Assessment of predicted direct and indirect impacts (permanent, construction and operational) of the specimen design on properties and other land uses including greenspaces, recreational interests and any designated paths.
- Development of appropriate mitigation including measures to ensure continuation of existing land uses and community journeys once the proposals are completed.
- Assessment of the residual effects predicted from the proposals taking into account the developed mitigation.
- Consideration of cumulative land use and community journeys implications in combination with the GAIA proposals.

4 Geology, Hydrogeology, Soils and Contaminated land

4.1 Introduction

This section describes the proposed approach to the assessment of potential construction and operational effects on geology, hydrogeology, soils and contaminated land. It has been undertaken in accordance with the DMRB Volume 11 Section 3 Part 11 Geology and Soils and guidance on EIA by Scottish Natural Heritage (EIA Handbook).

The objectives of this section of the report are to:

- outline consultation undertaken with statutory organisations regarding the predicted effects of the proposed project, especially in relation to potential contamination;
- describe baseline conditions relevant to the proposed development;
- present an initial assessment of the potential effects of the proposals; and
- outline the proposed approach to impact assessment, including the requirement for site investigation data, and engineering and geotechnical design information to inform the design of mitigation measures.

4.2 Consultation

The feedback from relevant consultation to date is summarised below (Table 4.1), with further description of the responses provided by consultees given in the subsequent subsections.

Table 4.1 Consultation Responses

Consultee	Response/Action	Data Provided	Action Taken
Renfrewshire Council Contaminated Land Officer	Meetings confirmed that no formally designated contaminated land is located within the study area, although a number of historical potentially contaminative former uses are noted in the Councils' Contaminated Land Inspection Strategy. Some site investigation data was provided for the area around the former oil refinery in the east of the study area.	Partial	Further consultation will be undertaken as part of the Site Investigation.
Glasgow City Council Contaminated Land Officer	Meetings confirmed that no formally designated contaminated land is located within the study area, although a number of historical potentially contaminative former uses are noted in the Councils' Contaminated Land Inspection Strategy.	No	Further consultation will be undertaken as part of the Site Investigation.
West Dunbartonshire Council Contaminated Land Officer	Telephone meeting confirmed that no formally designated contaminated land is located within the study area, although a number of historical potentially contaminative former uses are noted in the Councils' Contaminated Land Inspection Strategy.	No	Further consultation will be undertaken as part of the Site Investigation.
Scottish Environment Protection Agency	A meeting identified no potential contamination issues relevant to this stage of the process. An information request provided data on the location of WML, PPC and CAR licences.	Yes	Further consultation will be undertaken as part of the Site Investigation.

4.2.1 Summary of Consultation Undertaken to Date

As part of the assessment undertaken to date the Renfrewshire Council, Glasgow City Council and West Dunbartonshire Council Contaminated Land Officers (CLOs) were consulted to request available information on potential significant contamination issues at or within the vicinity of the study area. The consultation process confirmed that no formally designated contaminated land is located within the study area. However, a number of areas of land with historical potentially contaminative former uses are noted to have been included within the Councils' Contaminated Land Inspection Strategy, though these were noted to have been identified as part of the historical map review and there are no plans to commence any investigation in relation to Part IIA.

Additionally, SEPA have been approached to request any licensed activities relating to Pollution Prevention and Control (PPC), Waste Management Licences (WML) and Controlled Activities Regulations (CAR). This identified three licences, including a CAR licence at Inchinnan Bridge in the west of the study area, and PPC permits for Nustar Terminals Ltd in the west of the study area (Rothesay Dock) and for a vehicle garage in the east (both to the north of the Clyde). None of the records are for processes in locations likely to have a significant impact on the proposed development.

4.2.2 Proposed Future Consultation

During development of the specimen design, additional consultation with the Councils' CLOs and SEPA will be required to request detailed information relating to the proposed route. This will be undertaken primarily as part of a site investigation, and the interpretative report will include consideration of any available information on historical site investigation data or remediation works. Consultation will also be undertaken with the Local Authority Petroleum Officer, to assess the potential presence of former or current above or underground fuel storage tanks, predominantly to assess the associated potential contamination risks.

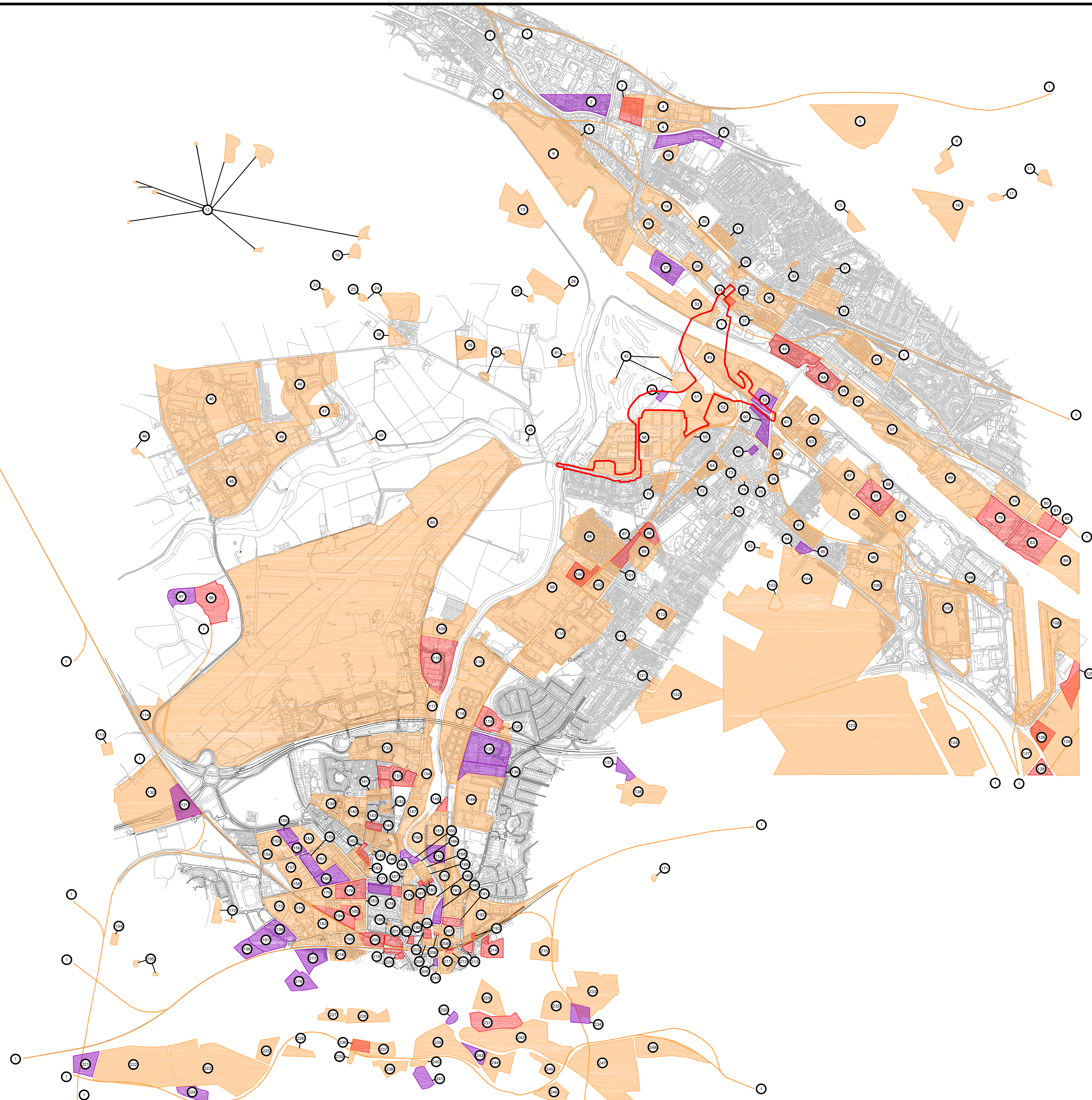
4.3 Baseline

This section provides the existing baseline conditions with regards to Geology, Hydrogeology, Soils and Contamination for the proposed development.

4.3.1 Historical Review

A review of the available historical map records, detailing the development of the study area from 1858 to the present day was undertaken, with only key developments pertinent to the CWRR study area (as shown in **Figure 4.1**) highlighted.


The earliest available historical maps (1858) show heavy industry and construction along the northern and southern banks of the River Clyde, in the vicinity of the proposed crossings, including engineering and shipbuilding yards, a power station, a metal works and the construction of Rothesay Dock. A gas works is noted adjacent east of Ferry Road and south of Meadowside Street.





Notes


1. Contains Ordnance Survey Data © Crown Copyright and database rights 2016. All Rights reserved. Ordnance Survey Licence number 100023417.
2. Accuracy of Map Image Not Guaranteed Due to Reproduction Methods.


Key to symbols

-  Indicative Boundary of Proposed Development

 Historical Potential Contamination Source Reference - refer to associated table for further details.

 Low/Moderate risk of potentially significant contamination constraints which may require some remediation depending on the sensitivity of proposed use.

 Moderate risk of potentially significant contamination constraints which may require some remediation.

 High risk of potentially significant contamination constraints which is likely to require some remediation.

Reference drawings

0	01.06.16	FOR REVIEW	RH	xxx	xxx
REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D

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Client	RENFREWSHIRE COUNCIL
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Drawing Status

BIM AUTHORISATION

Suitability	S6
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Project Title **CLYDE WATERFRONT AND
RENFREW RIVERSIDE PROJECT**

Drawing Title

Figure 4.1
Potential Contamination Constraints

-
-

Scale 1:15000	Designed RH	Drawn JS	Checked RM	Approved HC
Original Size A1	Date 01.06.16	Date 01.06.16	Date 07.09.16	Date 07.09.16
Report Number Project Originator Volume Location Type Role Number 117086 - SWECO - EAC - 00 - SP -EN- 00003				Project Ref. No. 117086
				Revision 0

In more recent years, additional industrial activities are shown in the immediate vicinity of the study area, including an oil refinery developed to the north of the previously noted gas works by the 1970s (now demolished) as well as a sewage disposal works and warehouses south of Fisher's Road¹⁶. A golf course is located west of the proposed development, at the confluence of the River Clyde and the River Cart, and a scrap yard appears in 2002 immediately north of the River Clyde, adjacent to the east of Rothesay Dock. An area to the east of the scrap yard is noted to remain as undeveloped vacant land up to the present day, and Meadowside Industrial Estate, (including a car breakers yard and scrap yard) is noted at the southern bank of the River Clyde by the 1980s and remains to the present day.

The general surroundings of the study area are noted to have undergone significant residential and commercial development over the historical period examined.

4.3.2 Potential Contamination Risks

A summary of the identified potential contamination risks associated with the historical development of the study area is provided in **Appendix 4.1** which provides a figure and schedule of historical contamination sources. A more detailed review of the historical development of the study area is included within the Preliminary Sources Study Report, which will form a technical appendix to the ES.

4.3.3 Topography & Geomorphology

The study area is generally a large, low relief area at approximately 10m above ordnance datum (AOD). Towards the north and south of the area, topography gradually increases with distance from the River Clyde.

Geological mapping illustrates the geomorphology across the proposed project, detailing a series of north-west to south-east trending back features of former river terraces, located along the northern bank of the River Clyde, and through Renfrew. A marine planated drumlin is located approximately 400m north, on the northern bank of the River Clyde.

4.3.4 Topsoil

Topsoil is known to be present in scarce, segregated areas across the proposed project, to a maximum recorded depth of 2.9mbgl at Renfrew Golf Course. Topsoil is also encountered within close proximity to the road junction between Ferry Road and Meadowside Street to a maximum recorded depth of 0.15mbgl.

4.3.5 Made Ground

BGS mapping records made ground (undivided) of man-made and natural materials across most of the proposed project, extending approximately 300m north and south of the banks of the River Clyde and along the eastern bank of the White Cart Water. Made ground deposits are considered likely across much of the area, associated with the construction and redevelopment of infrastructure and would be expected to comprise a variable mixture of demolition materials, road make up and structural soils, with potential for remnant buried structures and obstructions to be encountered.

¹⁶ Fisher's Road is the name shown on maps given to the route of a footpath which extends westwards from the western end of Meadowside Street towards the Renfrew Golf Course and which follows the southern boundary of the Meadowside Industrial Estate

Analysis of existing ground investigation and factual reports confirms that made ground is present across much of the proposed project, to a maximum recorded depth of 6.4mbgl.

4.3.6 Drift Geology

Drift deposits vary across the study area and include tidal flat deposits, sediment, undifferentiated river terrace deposits and glacial till. Raised tidal flat deposits of Flandrian Age comprise silt and clay in small segregated areas along the southern bank of the River Clyde, and eastern bank of the White Cart Water. Superficial deposits of sediment extend over the approximate area of the previously mentioned made ground, covering much of the proposed project area. It is anticipated that the sediment recorded as superficial deposits comprises the natural materials incorporated with the artificial deposits that form the made ground across this area.

Analysis of existing ground investigation and factual reports confirms that alluvial deposits are present across all of the proposed project, due to the close proximity of the River Clyde and White Cart Water. Alluvium is present to a maximum recorded depth of 34.6mbgl in the vicinity of the River Clyde.

Locally undifferentiated river terrace deposits of silt, sand and gravel extend over the southern and northern regions of the proposed development area, immediately south west and north east of the previously mentioned sediment/ made ground.

Glacial Till is known to be present within segregated areas, to a maximum recorded depth of approximately 30mbgl in the vicinity of the River Clyde. Geological mapping details three segregated areas of glacial till at or near the surface <5mbgl, located at Blythswood Retail Park, immediately north of Rothesay Dock and at the Hawick Street and Dumbarton Road junction.

Raised tidal flat deposits of Late Devensian silt, sand and gravel, are located north of the River Clyde, immediately north of the river terrace deposits.

Geological mapping notes the thickness of non-cohesive soils, soft cohesive soil and made ground/ fill generally varies from approximately 20m thick along the banks of the River Clyde, to 30m thick in Loanhead, Renfrew. Segregated areas of 10m thick drift deposits are recorded across the proposed project. Areas of particular relevance include greater than 10m thick drift deposits at the northern and southern banks of the River Clyde.

4.3.7 Solid Geology

The solid geology underlying the majority of the study area is the Limestone Coal Formation, of the parent unit Clackmannan Group, noted to comprise cyclic sequences of sandstones, siltstones, mudstones, coals, blackband and clayband ironstones and seatrocks. The Top Hosie Limestone marks the youngest, uppermost strata of the Dinantian Lower Limestone Formation, which is conformable with the Limestone Coal Formation. The beds are oriented approximately north east to south west, and encountered approximately 100m south east of the southern bank of the River Clyde, and approximately 600m north west of the northern bank of the River Clyde.

The Lower Limestone Formation, of the parent unit Clackmannan Group, is located immediately north and south, respectively, of the Top Hosie Limestone beds, along the banks of the River Clyde. The Dinantian Lower Limestone Formation comprises cyclic sequences of

mainly mudstones with sandstones, siltstones, marine limestones, thin coals and clayband ironstones.

Early Permian microgabbro sills of the Western Midland Valley Westphalian to Early Permian Sill Suite intrude the Lower Limestone Formation, and the Limestone Coal Formation. Three large north west to south east trending sills are located within the centre of the study area.

The Upper Limestone Formation, of the parent unit Clackmannan Group, is located within two fault-bound areas on the southern bank of the River Clyde. The Namurian Upper Limestone Formation comprises cyclic sequences of sandstones, siltstones, mudstones, marine limestones, coals and seatrocks. The north east-south west trending beds of the conformable Index Limestone, indicate a marker bed representing the youngest, uppermost strata of the Limestone Coal Formation.

The historical ground investigation and factual report data indicates that the bedrock is present at depths between 26mbgl and >57mbgl. Due to lack of deep exploratory holes in the existing ground investigation data, depth to rockhead cannot be accurately determined across the proposed project and results are limited to specific borehole locations. Historical boreholes and mapping indicate rockhead depth generally between 20m to 30+mbgl.

4.3.8 Hydrology

The River Clyde flows south east to north west through the centre of the study area. Along the western boundary of the proposed project, the White Cart Water flows south to north, and later meets the River Clyde at a confluence. The SEPA RBMP indicates that the Inner Clyde Estuary (which covers the Clyde and the White Cart at these locations) has been given a classification of Moderate ecological potential with medium confidence, with an overall ecological status of Bad and a chemical status of Pass. The main pressures on the water body comprise sewage disposal, air transport, morphological alterations, and diffuse pollution.

The majority of the CWRR study area comprises developed, brownfield land. It is therefore anticipated that the majority of surface water will run off to local surface water drainage systems.

4.3.9 Hydrogeology

The Groundwater Vulnerability Map of Scotland (1:625,000 scale) indicates that the study area is underlain by a moderately permeable aquifer that is noted to seldom produce large quantities of water for abstraction but is important for local supplies and in supplying base flow to rivers.

The Hydrogeological Map of Scotland (1:625,000 scale) indicates that the quaternary sands, silts and clays underlying the site form a concealed aquifer of limited or local potential, with borehole yields recorded to be typically 1 and 2l/s.

The online SEPA River Basin Management Plan interactive map records that the site is underlain by the Paisley and Rutherglen bedrock and localised sand and gravel aquifers which are classified as having an overall status of Poor with High confidence, predominantly due to chemicals production and mining and quarrying of coal. It is noted that there is no trend for pollutants for this water body. The area is also noted to be within a SEPA Drinking Water Protection Zone, which is a protected area that covers the majority of Scotland.

Groundwater strikes and seepages were encountered in a number of boreholes and trial pits from the historical records. Across the CWRR study area, groundwater strikes occurred between 0.5mbgl and 6.7mbgl. Although it is noted that level information is not included, most groundwater strikes were encountered within the superficial deposits, with a few at rockhead. Regional groundwater flow is likely to be dominated by the flow of the River Clyde and be towards the north or north west.

4.3.10 Unexploded Ordnance (UXO)

Regional unexploded bomb risk information was obtained through Zetica Ltd. who provided an indicative UXO risk map of the Glasgow region, and through BACTEC International Ltd. who provided a detailed UXO Risk Report covering the CWRR study area.

The Zetica Ltd. map details a 'moderate' bomb risk for the Renfrew area, including the study area. Renfrew is noted have been subjected to >100 tons of bombs, which included 76 high explosive bombs, four anti-personnel and two incendiary recorded. BACTEC International Ltd. confirm that the most significant UXO risks are associated with Renfrew and Abbotsinch Military Airfields (now part of Glasgow International Airport), and an explosives filling factory, located approximately 5km south east of the study area. The BACTEC International Ltd. report states that the UXO risk associated with these sites is highly dependent upon site history, which should be fully investigated.

In conclusion, there are significant potential sources of UXO recorded within the study area. The overall risk from UXO is considered to be moderate, although further investigation is required to confirm this.

4.3.11 Mining & Mineral Resources

The Coal Authority interactive mapping indicates that the CWRR study area is located within a Coal Mining Reporting area and a Surface Coal Resource Area. Two large development high risk areas are located in northern Renfrew within the study area and in close proximity to the proposed route. Coal mining related features within these development high risk areas have the potential for instability or present a degree of risk to the surface from coal mining operations. Probable shallow coal mine workings and several Abandoned Mines Catalogue records are also situated within the northern Renfrew area. A mine shaft entry is located approximately 1km south of the River Clyde.

Geological mapping shows the extent of mining across the study area. An area of known mining in more than one seam of ironstone, and an abandoned pit shaft are located at Blythswood Retail Park. The workings are indicated to be >30m below rockhead, and unrecorded shafts and adits may also occur within the vicinity of the abandoned pit shaft.

It is expected that past and present mine workings could be encountered across the study area. However, known locations of previous mining activity are not within close proximity to the proposed infrastructure development and the risk associated with historical mining is therefore considered low.

4.3.12 Structural Geology

The Paisley Ruck Fault Zone is oriented north east to south west across the CWRR study area, on the southern bank of the River Clyde. The fault zone is approximately 170m wide and comprises metamorphic fault gouge bedrock. Several north west, south east trending normal faults displace the bedrock across the study area. The direction of downthrow is predominantly south west, with only one fault downthrown to the north east.

4.4 Potential Effects

A construction impact is short term and will only occur during the construction of the proposed project (e.g. contamination risks to construction workers, dust). Operational impacts are those that could potentially occur during construction but will have a longer lasting impact (e.g. groundwater contamination, loss of geological resource). The majority of potential impacts on geology, soils, hydrogeology and contaminated land are generally considered to be long term in nature.

The main operational impacts are predicted to be the potential **dewatering and alteration of the groundwater regime** (both drift and bedrock aquifers), and **contamination of the water environment** (predominantly associated with the mobilisation of existing soil or groundwater contamination). However, a number of other potential impacts have been identified that require further consideration, which are detailed in the following subsections. It should also be noted that the EIA process may identify additional impacts once additional baseline data and design information are obtained.

Refer to Chapter 5 (Water quality, drainage and flood defence) for information on hydrology and flood risk, and for construction effects on surface water quality such as accidental construction impacts.

4.4.1 Construction

There are a number of construction effects that predominantly relate to the exposure of human or wider environment receptors to contamination. The consideration of potential construction effects takes into account the site conditions, baseline sensitivities and construction activities anticipated. The following potential construction effects have been identified:

- Accidental release, leakage or spillages of hydrocarbons, chemicals, fuel or oils from storage tanks or construction plant during construction causing contamination of groundwater.
- Localised increase in alkalinity from spillages of concrete or unset cement causing pollution of groundwater, the severity of which may be increased during times of heavy or prolonged rainfall.
- Human exposure to contamination (including ground gas) during construction.

4.4.2 Operation

Potential operational impacts on geology, soils, hydrogeology and contaminated land are impacts that will occur (or continue to occur) once the proposed project is in operation. The following subsections detail the currently identified potential effects that require consideration as part of the impact assessment.

4.4.2.1 Geology

The following potential effects on geological resources have been identified:

- Potential adverse effects on the superficial deposit geological resource from excavations or foundation construction.
- Potential adverse effects on the solid geological resource due to excavations or foundation construction.
- Effects on the use of existing or potential geological resources (including topsoil and mineral reserves).

4.4.2.2 Soils

The following potential effects associated with soil resources have been identified:

- Soil compaction associated with construction traffic may reduce soil permeability and increase surface runoff.
- Potential for increased erosion effects on topsoil (and consequently the water environment) associated with tree and vegetation removal.
- Potential for cross-contamination across ownership boundaries during investigation or construction.

4.4.2.3 Hydrogeology

The following potential effects on hydrogeology (including private water supplies) have been identified (note that risks to surface water associated with similar effects are considered further in **Chapter 5**):

- Dewatering and alteration of the groundwater regime (both drift and bedrock aquifers) caused by the development, including from excavations and the construction of foundations.
- Potential contamination of water environment by leachable contamination from imported fill materials or SUDS drainage.
- Surface runoff from the new road causing contamination of groundwater.
- Disposal of effluent and sludges during the construction phase causing an impact on groundwater quality.
- Reduction in infiltration caused by increased hardstanding cover or compaction of soils, resulting in impacts on groundwater.

4.4.2.4 Contaminated Land

The following potential effects associated with existing contamination within the site have been identified:

- Constraints on the proposed project due to contamination by previous land uses.
- Potential contamination of water environment by increased mobilisation of existing contamination, for example associated with excavations or SUDS.
- Potential contamination of the water environment due to the disturbance or disposal of contaminated sediment associated with dredging works.

- Potential introduction of contaminative pathways along drainage routes, for example leading to connectivity between historical contamination sources and sensitive receptors (e.g. water environment, humans, or buildings).
- Mobilisation of contaminants into surface water or groundwater bodies, for example due to excavation or groundwater pumping within areas of contamination or due to the excavation and stockpiling of contaminated soils.
- Human exposure to contamination (including ground gas) by users of the development, and by maintenance workers on the proposed infrastructure.
- Potential for human exposure to contamination in adjacent areas (including the redirection of ground gas caused by increased hardstanding cover).
- Potential harm to concrete due to corrosive soil conditions, or permeation of hydrocarbons into water supply pipes.
- Potential plant exposure to phytotoxic contamination in areas of soft landscaping.

4.5 Proposed Scope of Assessment

The impact assessment will be carried out in accordance with DMRB Volume 11, Section 3, Part 11: Geology and Soils, and in consideration of the most up-to-date guidance on EIA by Scottish Natural Heritage, which is presented in their EIA Handbook.

In order to inform the understanding of baseline conditions and the risk assessment process, intrusive site investigation data are required, which will be undertaken in accordance with the guidance in BS 5930:2015 Code of practice for ground investigations and BS 10175:2011+A1:2013 Investigation of potentially contaminated sites: code of practice. An interpretative report will be completed based on the findings of the site investigation, which along with the Preliminary Sources Study Report will form the technical appendix to this chapter of the ES.

4.5.1 Assumptions and Limitations

The main limitation to the risk assessment process and subsequent application of mitigation measures is an understanding of the baseline condition and the geotechnical and engineering design, so consequently to complete the EIA the following data is required:

- The *Interpretative Site Investigation Report*, which is required to inform the baseline understanding and risk assessment.
- The *proposed engineering and geotechnical designs*, which are required in order to fully consider the potential risks, identify those which require mitigation, and provide mitigation recommendations.

4.5.2 Impact Assessment

Effects are identified by predicting the changes that would be caused by the construction and operation of the development in relation to the baseline situation. The level of **effect** and significance of the proposed development will be defined by taking into account the **sensitivity** of the receiving environment and the potential probability and **magnitude** of the change.

The sensitivity of a receptor to change includes its capacity to accommodate the kinds of changes the project may bring about. **Table 4.2** provides examples of the characteristics that define receptor sensitivity. The magnitude of change includes the timing, scale, size and duration of the potential effect, which for the purposes of this assessment are defined in **Table 4.3**. The sensitivity of the receiving environment together with the magnitude of the effect defines the significance of the effect prior to application of mitigation measures as outlined in **Table 4.4**.

Table 4.2 Evaluating the sensitivity (value/importance) of receptors

Sensitivity	Definition
Very High	<p>High quality and rarity, regional or national scale and limited potential for substitution/replacement. This includes the following:</p> <ul style="list-style-type: none"> • Human health; • Site of Special Scientific Interest (SSSI) or Special Area of Conservation (SAC); • SEPA Water Quality defined as High; • Surface Water – large scale industrial abstractions >1000m³/day within 2km downstream; • Abstractions for public drinking water supply; • Private Water Supplies – Surface water abstractions within 0 – 200m and groundwater spring abstractions from 0-100m from construction activities; • Designated salmonid fishery and/or salmonid spawning grounds present; • Watercourse widely used for recreation, directly related to watercourse quality (e.g., salmon fishery) within 2km downstream; • Conveyance of flow and material, main river >10m wide; • Active floodplain area (important in relation to flood defence); • Groundwater abstractions >1000m³/day (within zone of influence from development); • Groundwater – public drinking water supply; • Groundwater aquifer vulnerability classed between 4d, 4c, 4b, 4a and 5 in the SEPA vulnerability classification scheme; and • Geology rare or of national importance as defined by SSSI or Regional Important Geological Site (RIGS).
High	<p>Receptor with a high quality and rarity, local scale and limited potential for substitution/replacement or receptor with a medium quality and rarity, regional or national scale and limited potential for substitution/replacement. This includes the following:</p> <ul style="list-style-type: none"> • SEPA Water Quality defined as Good; • Large scale industrial agricultural abstractions 500-1000m³/day within 2km downstream; • Surface water abstractions for private water supply for more than 15 people; • Private Water Supplies – Surface water abstractions within 200m – 600m, groundwater spring abstractions from 100 – 400m, and groundwater borehole abstractions from 0 – 200m from construction activities; • Designated salmonid fishery and/or cyprinid fishery (Coarse Fish, including roach, carp, chubb, bream etc); • Watercourse used for recreation, directly related to watercourse quality (e.g. swimming, salmon fishery etc); • Conveyance of flow and material, main river >10m wide; • Active floodplain area (important in relation to flood defence); • Groundwater abstractions 500-1000m³/day (within zone of influence from development); • Groundwater abstraction for private water supply >10m³/day or serves >50 people; and • Groundwater aquifer vulnerability classed as 3 in the SEPA vulnerability classification scheme.

Sensitivity	Definition
Medium	<p>Receptor with a medium quality and rarity, local scale and limited potential for substitution/replacement or receptor with a low quality and rarity, regional or national scale and limited potential for substitution/replacement. This includes the following:</p> <ul style="list-style-type: none"> • SEPA Water Quality defined as Moderate; • Industrial/agricultural abstractions 50-499m³/day within 2km downstream; • Occasional or local recreation (e.g. local angling clubs); • Conveyance of flow and material, main river <10m wide or ordinary watercourse >5m wide; • Existing flood defences; • Groundwater abstractions 50-499m³/day; • Private Water Supplies – Surface water abstractions from 600 – >800m, groundwater spring abstractions from 400m – 800m and groundwater borehole abstractions from 200m – 600m from construction; • May be subject to improvement plans by SEPA; • Designated cyprinid fishery, salmonid species may be present and catchment locally important for fisheries; • Watercourse not widely used for recreation, or recreation use not directly related to watercourse quality; and • Groundwater aquifer vulnerability classed as 2 in the SEPA vulnerability classification scheme.
Low	<p>Receptor with a low quality and rarity, local scale and limited potential for substitution/replacement. Environmental equilibrium is stable and is resilient to changes that are greater than natural fluctuations, without detriment to its present character. This includes the following:</p> <ul style="list-style-type: none"> • SEPA water quality defined as Poor or Bad; • Industrial/agricultural abstractions <50m³/day within 2km downstream; • Fish sporadically present or restricted, no designated features; • Receptors not used for recreation e.g. no clubs or access route associated with watercourse; • Watercourse <5m wide – flow conveyance capacity of watercourse low – very limited floodplain as defined by topography, historical information and SEPA flood map; • Groundwater abstractions <50m³/day; • Private Water Supplies – groundwater spring abstraction >800m and groundwater borehole abstractions from 600 - >800m from construction activities; • No public drinking water supplies; • Groundwater aquifer vulnerability classed as 1 in the SEPA vulnerability classification scheme; • Receptor heavily engineered or artificially modified and may dry up during summer months; and • Geology not designated under a SSSI or RIGS or protected by specific guidance.

Table 4.3 Impact magnitude

Magnitude	Criteria	Description and Example
Major	Results in loss of attribute	<ul style="list-style-type: none"> Fundamental (long term or permanent) changes to geology, hydrology, water quality and hydrogeology; Loss of designated Salmonid Fishery; Loss of national level designated species/habitats; Changes in Water Framework Directive (WFD) water quality status of river reach; and Pollution of potable source of abstraction compared to pre-development conditions.
Moderate	Results in effect on integrity of attribute or loss of part of attribute	<ul style="list-style-type: none"> Material but non-fundamental and short to medium term changes to the geology, hydrology, water quality and hydrogeology; Loss in productivity of a fishery; and Contribution of a significant proportion of the discharges in the receiving water, but insignificant enough to change its water quality status.
Minor	Results in minor effect on attribute	<ul style="list-style-type: none"> Detectable but non-material and transitory changes to the geology, hydrology, water quality and hydrogeology.
Negligible	Results in an effect on attribute but of insufficient magnitude to affect the use/integrity	<ul style="list-style-type: none"> No perceptible changes to the geology, hydrology, water quality and hydrogeology; Discharges to watercourse but no loss in quality, fishery productivity or biodiversity; and No significant effect on the economic value of the receptor.

Table 4.4 Effect related to sensitivity and magnitude of change

Magnitude	Very High	High	Medium	Low
Major	Major	Major	Moderate	Minor
Moderate	Moderate	Moderate	Moderate	Minor
Minor	Minor	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

5 Water Quality, Drainage and Flood Defence

5.1 Introduction

This chapter provides an assessment of the potential effects of the proposed development on hydrology and flood risk, drainage and water quality. Previous and future consultation with the consultation authorities and key stakeholders has been summarised, followed by a baseline description of the water environment and existing drainage infrastructure. The scope of assessment for the EIA is then described, including sources of information and the proposed approach and methods. The likely licensing requirements for works in the water environment authorised under the Controlled Activity Regulations (CAR) is also outlined.

5.2 Consultation

The following consultees have been contacted during the previous stages of the project and the information or feedback that they have provided is summarised in **Table 5.1** below. Future consultation to be undertaken during the EIA is also summarised.

Table 5.1 Previous and Proposed Consultation

Consultee	Response/Action	Data Provided	Action Taken
SEPA and Renfrewshire Council	<p>Stage 2 response noted planning restrictions and flood mitigation requirements for development on the functional (1 in 200 year) floodplain with respect to Scottish Planning Policy (SPP) (2014).</p> <p>Meeting with SEPA and Renfrewshire Council 21.04.16 to discuss:</p> <ul style="list-style-type: none"> design proposals with respect to flood risk and development constraints on land allocated as developed/undeveloped; and potential requirements for sustainable drainage systems (SuDS) and further water quality assessment to be included in EIA. <p>Further consultation will be undertaken during the EIA to:</p> <ul style="list-style-type: none"> obtain information on any licensed abstractions and discharges to the River Clyde and White Cart/Black Cart Waters; agree any further requirements for the flood risk assessment (FRA) and obtain feedback on the detailed FRA and mitigation included in the design; inform the number, type and sizing of SuDS features required for the proposed development; and inform the requirements for any engineering activities requiring authorisation under CAR and relevant information to be included in the Environmental Statement (ES) and CAR applications. 	No	<p>Requirements with respect to SPP have been considered within the evolving design and flood risk assessment.</p> <p>Update the existing baseline dataset, inform the detailed FRA and drainage design and requirements for CAR.</p>

Consultee	Response/Action	Data Provided	Action Taken
Marine Scotland	<p>Meeting (2.06.16) noted presence of Atlantic salmon, sea trout, river lamprey and European eel in the River Clyde and Black Cart/White Cart Waters.</p> <p>EIA screening opinion (e-mail 20.07.16) noted that Marine EIA will be required – the proposed bridge works fall under developments included in Annex II of the Marine EIA Regs, and the size and nature of the proposed development is considered likely to have significant environmental effects.</p>	Yes	<p>Assessment and mitigation of bridge to take account of species present.</p> <p>Further consultation will be undertaken to inform the requirements of the Marine EIA.</p>
Peel Ports and Renfrewshire Council	<p>Bathymetric surveying data and flood modelling data used for the North Renfrew Flood Prevention Scheme (FPS) to be supplied.</p> <p>Further consultation will be undertaken with the Council to advise if flow attenuation prior to discharge to the River Clyde is required. Any requirements for restricting flow rate could have an impact on the sizing of attenuation features, and subsequently flood compensatory storage provision, if constructed within the functional floodplain of the River Clyde.</p>	Expected soon	<p>Data will inform Stage 3 flood modelling.</p> <p>To inform the sizing of attenuation features, if required, and subsequently the flood mitigation design.</p>

5.3 Baseline Description

The proposed development will cross the River Clyde transitional waters, which are associated with the (downstream) Inner Clyde Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI) and Black Cart SPA and SSSI. Two Sites of Importance for Nature Conservation (SINCs) are present within the vicinity of the proposals; one of these SINCs is associated with semi-natural habitats along the banks of the White Cart Water. Refer to **Chapter 7** (Ecology and Nature Conservation) for further information on these ecological designations.

5.3.1 Hydrology and Flood Risk

The proposed development is within SEPA's Potentially Vulnerable Area 11/13 (White Cart Water catchment). There is a risk of coastal flooding attributed to tidal influence on the River Clyde with 16 historical instances of tidal flooding recorded between 1897 and 2006 within the area, concentrated on Ferry Road in the east of the study area.

SEPA's Flood Maps¹⁷ indicate fairly extensive inundation of land, particularly to the south of the River Clyde during a 0.5% Annual Exceedance Probability (AEP) (1 in 200 year return period) tidal event. However, works carried out as part of the North Renfrew FPS in 2008-2015 limits the extent of tidal flood risk to areas north of Meadowsides Street / King's Inch Road. Fluvial flooding is not mapped for this tidally-dominant reach of the River Clyde; however fluvial flooding from the Yoker Burn, as well as surface water (pluvial) flooding, is shown to inundate sections of the A814 Dumbarton Road to the north of the river as well as parts of Yoker further north.

¹⁷ SEPA Flood Maps: <http://map.sepa.org.uk/floodmap/map.htm>

Revised modelling undertaken during the options assessment stages of the project showed good correlation with the SEPA flood mapping in relation to tidal flood inundation extents, noting the effect of the North Renfrew FPS. Both SEPA mapping and revised modelling predict no fluvial flood risk to the proposals for the 200-year peak flow plus 20% uplift for climate change. Improvements to the representation of extreme tidal forcing in the revised modelling undertaken to date, based on guidance for tidal representation in SEPA's flood risk guidance¹⁸, have also reduced the predicted peak tidal water level relative to Glasgow City Council's River Clyde Flood Management Strategy (RCFMS) (2005) study.

5.3.2 Drainage

The topography, and subsequent overland and sub-surface drainage, in the study area south of the River Clyde runs primarily from south to north towards the river. In the west of the study area, some of the land drains from east to west towards the River Cart. The North Renfrew FPS protects residential areas in Renfrew to the south of Meadowside Street/King's Inch Road against tidal flood risk; however the FPS will subsequently impede drainage of surface waters from these areas towards the River Clyde. The areas of Renfrew to the south of the river are currently served by combined sewer drainage networks.

5.3.3 Water Quality

The reach of the River Clyde in the study area (water body name: Clyde Estuary – Inner (inc Cart; ID: 200510)) is classified by SEPA as transitional waters and is tidally influenced. It is classified as heavily modified with an overall status of "Moderate ecological potential" in 2013¹⁹. Existing pressures include pollution from sewage disposal and air transport, and morphological alterations through dredging, channelisation and impoundment. These pressures have resulted in low dissolved oxygen levels and poor morphological status, leading to an overall ecological status of "Poor". However, the water body achieves an overall chemical status of "Pass" as there is no known heavy metal contamination. With improvement measures identified to reduce these pressures, this reach of the River Clyde has been set the target to obtain overall "Good" status by 2027 and thereby achieving the aims of the 2000/60/EC Water Framework Directive (WFD).

Refer to **Chapter 4** (Geology, hydrogeology, soils and contaminated land) for information on existing groundwater quality and areas of identified contaminated land.

¹⁸ Technical Flood Risk Guidance for Stakeholders (SS-NFR-P-002) v9.1 (SEPA, 2015)

¹⁹ SEPA River Basin Management Plan (RBMP) Interactive Map: <http://gis.sepa.org.uk/rbmp/>

5.4 Potential Effects

5.4.1 Construction

5.4.1.1 Hydrology and Flood Risk

Potential temporary impacts on hydrology and flood risk could include:

- Reduced soil permeability and increased runoff from soil compaction due to works traffic, which could increase the peak runoff and intensity of runoff during a rainfall event. Due to the semi-urbanised nature of the existing area and size of the River Clyde, these impacts are considered to be minor.
- Increased flood risk from any temporary works and structures within the functional floodplain and temporary loss of tidal floodplain area within construction footprint.
- Temporary bunding in the River Clyde or on the functional floodplain to create dry working areas could restrict flows and locally increase flood risk to nearby receptors.
- Re-routing of runoff into the existing drainage network could locally increase pluvial and sewer flooding in areas immediately north and south of the River Clyde if the existing drainage network is under capacity.

5.4.1.2 Water Quality

Potential temporary impacts on water quality could include:

- Construction of the Clyde Crossing and approach roads, soil-stripping, compound preparation and other earthworks could result in sediment release and silt-laden runoff entering the River Clyde, impacting on water quality and aquatic ecology.
- A decline in water quality from accidental release/spillages of oil, fuels and chemicals from mobile or stationary plant and a localised increase in alkalinity from spillages of concrete or unset cement. Due to the size of the River Clyde and high dilution/dispersal effect, any impacts are considered to be minor. Refer to **Chapter 4** for further impacts on groundwater quality.
- Works with the potential to significantly affect water quality (eg from sediment mobilisation around bridge structures) will not be undertaken during extreme low flow conditions due to the greater magnitude of potential pollution impacts on migratory fish in the River Clyde. Refer to **Chapter 7** for further impacts on aquatic ecology and potential mitigation.
- Mobilisation of contaminants into the River Clyde due to excavation works or dewatering within contaminated land or stockpiling of contaminated soil/spoils. The potential impacts of dredging and disturbance of contaminated sediment is considered in **Chapter 4**.
- Sewage inputs from accidental/uncontrolled release from sewers through damage to pipelines or unsatisfactory disposal of sewage from site welfare facilities.

5.4.2 Operation

5.4.2.1 Hydrology and Flood Risk

Potential permanent impacts on hydrology and flood risk could include:

- Development on the functional floodplain could displace floodwaters and therefore increase flood risk to the proposed project and elsewhere. SuDS should be located outwith the functional floodplain where possible and lined if located within an area of known contamination or to protect underlying groundwater, if required.
- New impermeable areas (e.g. road embankment and SuDS features) could increase the volume and peak flow of surface runoff reaching the River Clyde due to a reduction in infiltration capacity. However due to the semi-urbanised nature of the surrounding area, impacts are considered to be minor.
- The new road and its drainage system may also act as a barrier to water movement within existing catchments, altering drainage patterns and increasing flood risk to the proposed project and upstream of the barrier.
- Abutments and piers of the Clyde Crossing could restrict flow conveyance of the River Clyde and thereby increase tidal flood risk during high/extreme flows.
- Any permanent alterations to the drainage system to the south or north of the River Clyde, including to the Yoker Burn, could increase pluvial and culvert flooding.

5.4.2.2 Water Quality

Potential permanent impacts on water quality could include:

- An increase in road traffic leading to an increase in volume and/or frequency of contaminated road runoff to the River Clyde (and possibly the River Cart, if drainage from the southern end of the route is directed westwards). Road runoff can contain suspended solids and contaminants bound to them (e.g. heavy metals), oil and hydrocarbons, biodegradable organic materials (e.g. debris and grass cuttings) and de-icing salt in winter.
- Scour around the Clyde Crossing could result in transfer of suspended sediment downstream. However due to the engineered banks and size of the River Clyde, impacts are considered to be minor.
- Potential contamination of water environment, either by increased mobilisation of existing soil or groundwater contamination, or by leachable contamination from imported fill materials or SUDS. This is considered further in Chapter 4.

5.5 Proposed Scope of Assessment

The assessment will be carried out in accordance with the 'Simple Assessment' methods prescribed within the DMRB HD 45/09²⁰, unless otherwise stated. The following legislation, policy and guidance documents will also be taken into account (any updates to guidance made between finalisation of this Report and completion of the EIA will be taken into account in the assessment):

²⁰ DMRB Volume 11, Section 3, Part 10 (HD 45/09): Road Drainage and the Water Environment (The Highways Agency et al., 2009)

- 2000/60/EC Water Framework Directive;
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended);
- The Climate Change (Scotland) Act 2009;
- The Flood Risk Management (Scotland) Act 2009;
- Scottish Planning Policy (SPP) (Scottish Government, 2014);
- Technical Flood Risk Guidance for Stakeholders (SS-NFR-P-002) v9.1 (SEPA, 2015);
- SEPA Flood Maps (SEPA, 2015);
- SEPA River Basin Management Plan (RBMP) Interactive Map (SEPA, 2011) and Water Body Information Sheets (SEPA, 2014);
- SEPA Regulatory Method (WAT-RM-08): Sustainable Urban Drainage Systems (SUDS or SUD Systems), v6.0 March 2016;
- SEPA Supporting Guidance (WAT-SG-12): General Binding Rules for Surface Water Drainage Systems, v4.1 March 2016;
- CAR: A Practical Guide (v7.3) (SEPA, 2016);
- SUDS for Roads (SCOTS and SUDS Working Party, 2015); and
- The SUDS Manual, C753 (CIRIA, 2015).

During the EIA, baseline data collected during earlier stages of options assessments will be reviewed and updated as required with further desk-based and survey information, and additional consultation responses obtained for the proposed development (see **Table 5.1**). The proposed methodologies for the hydrology/flood risk and water quality assessments are presented below, including a consideration of potential requirements for CAR.

5.5.1 Hydrology and Flood Risk

A detailed FRA is required as the proposals are located on or immediately adjacent to the functional floodplain of the River Clyde and are at 'medium to high risk' of flooding, in line with SPP. The 'functional' floodplain is defined as land which is prone to flooding up to and including the 0.5% Annual Exceedance Probability (AEP) (1 in 200 year return period) flood event.

The FRA will be undertaken in accordance with Methods E and F (Assessing Flood Impacts) of the DMRB HD 45/09 and will adhere to the requirements of SEPA's Technical Flood Risk Guidance for Stakeholders and SPP, whereby development is prevented:

- which would have a significant probability of being affected by flooding; and/or
- would increase the probability of flooding elsewhere.

Site-specific flood modelling has already been undertaken for existing (baseline) conditions via one-dimensional hydrodynamic modelling of the River Clyde, White Cart and Black Cart watercourses and adjoining floodplains based on the RCFMS (2005) ISIS model. The model will be further refined at the EIA stage to predict changes in peak runoff and water levels in the pre and post-development scenarios for the proposed development. Design flows up to the 0.5% AEP (1 in 200 year return period) event will be modelled, including a climate change allowance of +20% on the estimated 200-year peak flow. The detailed FRA will include assessment of:

- the effect of the Clyde Crossing design on water levels;
- the impact on water levels of road embankments and SuDS features constructed in the functional floodplain; and
- mitigation measures, such as provision of compensatory floodplain storage or flood relief culverts in order to achieve a neutral effect on flood risk up to the 200-year design level.

Topographic and bathymetric surveys will be undertaken upstream and downstream of the proposed Clyde Crossing to inform the flood modelling. Bathymetric survey data obtained from Peel Ports will be used to provide updated cross-sections within the river model to reflect alterations to bathymetry relative to the 2002-2003 data used to construct the RCFMS (2005) model (i.e. to account for dredging, sediment deposition and scour in the intervening period).

The potential impacts of the proposed project will be determined with reference to detailed engineering drawings of the Clyde Crossing structure and the footprint of the proposed project.

5.5.1.1 Assumptions and Limitations

The FRA is based on the RCFMS ISIS model, which was extensively developed and validated as part of the 2005 study. Updates to the model have been implemented to account for post-2005 alterations to river inflows and floodplain topography (including the North Renfrew FPS and various developments on the banks of the River Clyde). However, no further flow surveying or model validation will be conducted as part of the proposed modelling work to inform the specimen design and EIA.

5.5.2 Water Quality

No water quality surveys or water quality monitoring will be required during the EIA. Construction impacts of the proposed project on water quality will be assessed qualitatively based on valued, expert judgement and taking account of experience from similar projects in other comparable locations. Assessment of potential impacts will take into account the size and location of the construction footprint, type and nature of construction activities likely to occur in-channel or within the catchment, the potential risk from pollutant spillages and silt-laden runoff entering the River Clyde and the pollutant dilution/ dispersal capacity of the river. Methods to assess impacts on groundwater quality and disturbance of contaminated land is considered in **Chapter 4**.

To assess potential operational impacts on water quality, calculations will be undertaken to estimate the probability of an accidental spillage from a heavy good vehicle (HGV) leading to a serious pollution incident in line with DMRB HD 45/09 (Method D – Pollution Impacts from Accidental Spillages). To undertake these calculations, traffic and drainage information will be required, including:

- two-way annual average daily traffic (AADT) flow;
- %HGV;
- length of road draining to outfall(s); and
- SuDS components included in the drainage design.

Fluvial or coastal geomorphological assessment will not be a key feature of the EIA as the River Clyde is channelised or otherwise heavily modified in the study area. There is minimal morphological diversity and therefore works associated with the Clyde Crossing are not considered to result in further morphological impact on the engineered banks of the river. Impacts on the sediment regime resulting from potential inputs of silt-laden runoff and mobilisation of sediment during the construction phase will be assessed qualitatively as part of the water quality assessment and taking account of robust mitigation measures and good practice guidance for in-river construction activity.

In line with SEPA's guidance²¹, only 'minimal' SuDS treatment is required for discharges to transitional/tidal waters. This is likely to take the form of basic source control measures (e.g. filter drains, swales, filtration trenches, permeable paving). The type and density of SuDS included in the drainage design will be agreed with SEPA as design work progresses.

5.5.2.1 Assumptions and Limitations

For road schemes that propose to discharge routine runoff to non-tidal watercourses, an assessment following DMRB HD 45/09 Methods A and B (Effects of Routine Runoff on Surface Waters) would normally be undertaken. However, this assessment is based on discharges to watercourses with hydrological catchments and which exhibit one flow direction in order to calculate the low flow value, and therefore the potential dilution/dispersal capacity, of the watercourse. For the proposed CWRR development, discharge is proposed to the River Clyde which is tidal and saline in this location; a low flow value cannot be accurately determined for waters which are tidally-influenced and the estimated pollutant loadings/concentrations cannot be compared against the freshwater pollutant thresholds within the assessment tool. As a result, the assessment method is not applicable and therefore has been scoped out of the EIA. Due to the large size of the River Clyde, and implementation of SuDS, it is considered that routine runoff would have a negligible impact on the water quality of the water body.

Detailed pollutant transport modelling in line with SEPA's WAT-SG-11 Guidance²² is not required as there are no designated shellfish or bathing waters in the vicinity of the proposed project, as agreed with SEPA.

5.5.3 Controlled Activities Regulations (CAR)

CAR licence applications may be required for engineering activities which have the potential to impact on the water environment, e.g. abutments/piers of the Clyde Crossing and any associated bed/bank scour protection. It has already been agreed with SEPA that road drainage to the River Clyde will fall under CAR General Binding Rules (GBRs)²³, and as long as the conditions of the GBR are met, no further consultation with SEPA is necessary. In addition, in-river works below Mean High Water Springs (MHWS) will fall under the marine licensing process and further consultation will be undertaken with Marine Scotland to confirm potential consent requirements.

²¹ SEPA Regulatory Method (WAT-RM-08): Sustainable Urban Drainage Systems (SUDS or SUD Systems), v6.0 March 2016; SEPA Supporting Guidance (WAT-SG-12): General Binding Rules for Surface Water Drainage Systems, v4.1 March 2016

²² SEPA Supporting Guidance (WAT-SG-11): Modelling Coastal and Transitional Discharges, v3.0 April 2013

²³ SEPA (2016) CAR: A Practical Guide, v7.3 June 2016

Although CAR is a separate consenting regime to EIA, much of the information collated as part of the assessment at EIA stage will be used in the CAR applications and any marine licence applications. In the event that engineering activities are licensable under CAR, the approach and programme of delivery will be agreed with SEPA and Renfrewshire Council, and opportunities to combine efforts, e.g. baseline data collection for EIA and CAR, will be investigated.

5.5.4 Impact Assessment

Impact significance is a function of the sensitivity (value/importance) of an attribute and the magnitude of impact. **Tables 5.2 to 5.4** are based on DMRB HD 45/09 criteria and will be used in the assessment.

The significance of impacts on flood risk and water quality will be reported for residual impacts only (i.e. the remaining impacts following implementation of mitigation) for the construction and operation phases of the proposed project. As per DMRB HD 45/09 guidance, where there are two alternatives provided in **Table 5.3**, a single significance rating will be chosen based on professional judgement. Criteria to inform assessment of the impacts on groundwater are provided in **Chapter 4**.

Table 5.2 Evaluating the Sensitivity (value/importance) of Water Environment Attributes

Importance	Criteria	Typical Examples
Very High	Attribute has a high quality and rarity on regional or national scale	Surface Water: EC Designated Salmonid/Cyprinid fishery WFD Class 'High' Site protected/designated under EC or UK habitat legislation (SAC, SPA, SSSI, WPZ, Ramsar site, salmonid water)/species protected by EC legislation
		Flood Risk: Floodplain or defence protecting more than 100 residential properties from flooding
High	Attribute has a high quality and rarity on local scale	Surface Water: WFD Class 'Good' Major Cyprinid Fishery Species protected under EC or UK habitat legislation
		Flood Risk: Floodplain or defence protecting between 1 and 100 residential properties or commercial/industrial premises from flooding
Medium	Attribute has a medium quality and rarity on local scale	Surface Water: WFD Class 'Moderate'
		Flood Risk: Floodplain or defence protecting 10 or fewer commercial/industrial properties from flooding
Low	Attribute has a low quality and rarity on local scale	Surface Water: WFD Class 'Poor' or 'Bad'
		Flood Risk: Floodplain with limited constraints and a low probability of flooding of residential and commercial/industrial properties

Table 5.3 Estimating the Magnitude of Impact on Water Environment Attributes

Magnitude	Criteria	Typical Examples
Major Adverse	Results in loss of attribute and/or quality and integrity of the attribute	Surface Water: Calculated risk of pollution from a spillage >2% annually Loss or extensive change to a fishery Loss or extensive change to a designated Nature Conservation Site
		Flood Risk: Increase in peak flood level (0.5% annual probability) >100mm
Moderate Adverse	Results in effect on integrity of attribute, or loss of part of attribute	Surface Water: Calculated risk of pollution from spillages >1% annually and <2% annually Partial loss in productivity of a fishery
		Flood Risk: Increase in peak flood level (0.5% annual probability) >50mm
Minor Adverse	Results in some measurable change in attributes quality or vulnerability	Surface Water: Calculated risk of pollution from spillages >0.5% annually and <1% annually
		Flood Risk: Increase in peak flood level (0.5% annual probability) >10mm
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the integrity of the water environment	Surface Water: Risk of pollution from spillages <0.5%
		Flood Risk: Negligible change in peak flood level (1% annual probability) <+/- 10mm
Minor Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring	Surface Water: Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is <1% annually)
		Flood Risk: Reduction in peak flood level (0.5% annual probability) >10mm
Moderate Beneficial	Results in moderate improvement of attribute quality	Surface Water: Calculated reduction in existing spillage by 50% or more (when existing spillage risk >1% annually)
		Flood Risk: Reduction in peak flood level (0.5% annual probability) >50mm
Major Beneficial	Results in major improvement of attribute quality	Surface Water: Removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring to a watercourse
		Flood Risk: Reduction in peak flood level (0.5% annual probability) >100mm

Table 5.4 Estimating the Significance of Residual Effects

Magnitude / Sensitivity	Negligible	Minor	Moderate	Major
Very High	Neutral	Moderate/Large	Large/Very Large	Very Large
High	Neutral	Slight/Moderate	Moderate/Large	Large/Very Large
Medium	Neutral	Slight	Moderate	Large
Low	Neutral	Neutral	Slight	Slight/Moderate

6 Landscape, Townscape and Visual Impact

6.1 Introduction

A detailed landscape, townscape and visual impact assessment (LVIA), including a cumulative assessment, will be carried out to identify and assess any significant landscape, townscape or visual effects anticipated to be associated with the proposed development and to inform further refinement of the proposed layout and design. As the industry norm, the acronym 'LVIA' will be used in this report and in the subsequent assessment to refer to the assessment of effects including those on townscape character. The landscape, townscape and visual assessments will be undertaken by chartered Landscape Architects at Sweco (a practice registered by the Landscape Institute) with relevant assessment experience.

The following will form the main focus of the LVIA:

- the general effect of the proposed development on local landscape and townscape character and the ability of the landscape/townscape to accommodate the change;
- visual effects on key receptors such as people in settled areas, at recognised viewpoints, tourist and visitor attractions and using key transport routes; and
- the potential cumulative effects with other consented and proposed developments in the area which are of a similar scale and type to the proposed development.

An LVIA consists of two separate but interlinked main components: a landscape assessment; and a visual assessment. Given the nature of the site and study area, in this instance the landscape assessment includes a townscape assessment. When presenting the methodology, this chapter refers to 'landscape assessment' and this can generally be taken to also refer to 'townscape assessment'. Where applicable specific detail on the approach to townscape assessment will be set out.

The landscape assessment considers the effects on the landscape as an environmental resource. The visual assessment considers the change to people's views (identified as residents, visitors to the area, people working in the area etc.). Landscape and visual effects will be considered for both the construction and operational phases of the proposed development.

The LVIA is underway and will be informed by a combination of desk and site-based assessment techniques. At this stage the initial findings of the LVIA are being used to inform the design of the proposed development. The LVIA chapter of the ES will present the findings of the iterative assessment process including identification of any mitigation that has been incorporated into the design.

The LVIA will build on landscape and visual assessment work already carried out in relation to the proposed development. A number of route options were considered at a previous stage and a preliminary landscape and visual assessment of each of the options has informed a wider decision on the most suitable routes.

6.2 Project Description

The design of the proposed development is being iteratively developed by the applicant in response to the ongoing EIA process. The final LVIA will clearly set out the maximum parameters of the development such as the maximum height of proposed buildings and structures. In the meantime the likely key parameters which form the basis of the preliminary landscape and visual assessment have been drawn from the project description in Section 2.5.

6.3 Consultation

No specific consultation has been carried out to date in relation to the LVIA. However, the following key stages of consultation will be undertaken:

- A review of consultation responses in relation to this scoping report;
- Discussion on the assessment methodology, including the interpretation of the 'worst case' assessment scenario from a landscape and visual perspective. This stage will require the completion of a 'design-fix' for the proposed development; and
- Agreement on the location of representative viewpoints with Renfrewshire Council.

A summary of consultation to date of relevance to the LVIA is presented in **Table 6.1**.

Table 6.1 Summary of Consultation

Consultee	Response/Action	Data Provided	Action Taken
A&DS	Has no comment to make at this stage of the development	No	No action required
Forestry Commission Scotland	FCS encouraged the promotion of the Policy on Control of Woodland Removal. Any of the following: Ancient Woodland Inventory, Native and Semi-Native Woodlands, or Tree Preservation Orders (amongst others), if impacted by the development, should require a direct engagement with the relevant authority.	No	No action required at this stage however further consultation will take place once areas of woodland loss are known
GCV Green Network Partnership	Noted that the City Deal projects present significant opportunities to deliver important elements of the Green Network in Renfrew. Green Network elements need to be properly designed and any environmental improvements should follow the Integrated Green Infrastructure approach.	No	Noted. No action required at this stage
Living Streets	Living Streets recommends using the Scottish Government's Place Standard at areas of significant potential change to help establish community perception	No	Noted. No action required at this stage

6.4 Study Area

Following the preliminary landscape and visual desk and site based assessments, the extent of the study area has been defined as a 1km radius around the site boundary. It is considered that the nature and form of the proposed development and the surrounding urban context are such that no significant landscape or visual effects would be experienced outside of this study area. In particular, the screening effect of surrounding buildings is considered to limit the potential visual influence of the largest element of the proposed development, the River Clyde bridge crossing.

The 1km LVIA study area provides a boundary to the assessment, identification of receptors and the selection of representative viewpoints and is shown on **Figure 6.1**. However, the preliminary assessment has identified that potentially significant effects, particularly on people's views, would be located within a more immediate radius to the site and the focus of the assessment, including the majority of viewpoint locations, will be within approximately 0.5km of the site boundary.

6.5 Desk Based Research

The preliminary LVIA work has made reference to the following information sources:

- survey data related to the site, e.g. topographical and tree surveys;
- drawings relating to the development proposals and their construction;
- Ordnance Survey mapping and aerial photography;
- development plans and guidance containing information relating to landscape designations and landscape related policies at the local, regional and national level; and
- the published SNH landscape character assessment for the study area.

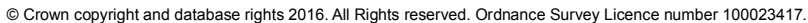
Relevant details of information from these sources are provided in **Section 6.7**.

6.6 Field Surveys

Preliminary field surveys have been undertaken from public roads, public rights of way and publically accessible areas, including areas of public open space. The site and study area has been visited in relation to landscape and visual studies in: April; May; and July 2016.

Site work has involved:

- a corroboration of the findings of the desktop review;
- gathering of information on landscape elements, character, views and localised screening;
- confirming a list of preliminary viewpoints and taking reference photographs;
- preliminary identification of landscape and visual effects; and
- consideration of opportunities for landscape and visual mitigation.



6.7 Baseline Description

6.7.1 Site Description

The site is located on the north-western edge of the town of Renfrew, beside the River Clyde.

The following is a description of the site from its northern to southern extent:

- the northern extent of the site is located just to the north of the River Clyde and is within an urban area named Yoker. This part of the site comprises an existing road called Dock Street which connects to Dumbarton Road/Glasgow Road, a large dual carriageway. The road sits adjacent to small industrial units and residential properties, which include two high rise towers (15 storey), although it is understood that proposals are in place to replace these towers with low rise residential development;
- the site passes through a riverside industrial area and then crosses the River Clyde which is approximately 120m in width at this point;
- on the southern bank of the river, the site passes through an area of industrial units and scrap metal yards known as Meadowside Industrial Estate;
- the site passes through an area of mixed woodland and connects to Argyll Avenue beside Renfrew Golf Course, which is directly adjacent to the site at this point; and
- The southern extent of the site is located at a roundabout on Inchinnan Road and Argyll Avenue.

6.7.2 Landscape and Townscape Character

The site and 1km study area is located within the study area of the 'Glasgow and the Clyde Valley Landscape Character Assessment', completed for Scottish Natural Heritage (SNH) by Land Use Consultants in 1999 (Report No. 116). The site is almost entirely located in areas identified as 'Urban', however it briefly passes through an area identified as a 'Green Corridors' character type and is directly adjacent to an area which is identified as a 'Alluvial Plain character type'.

The areas identified as 'Urban' are not attributed a landscape character description. Therefore the LVIA will set out the descriptions for the character areas that are available, i.e. Alluvial Plain; and Green Corridors, and a townscape character assessment will be carried out for the Urban areas.

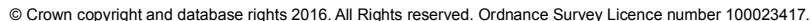
Refer to **Figure 6.1** for the landscape character areas and **Figure 6.2** for the townscape areas which were identified during LVIA work undertaken to date. The potential effects on landscape and townscape areas will be identified within the LVIA chapter.

6.7.3 Landscape Designations

There are no national landscape designations (e.g. National Scenic Areas) on the site or within the study area. There are also no local landscape designations (e.g. Areas of Great Landscape Value) on the site or within the study area. Please refer to **Figure 6.3** for designations relevant to the LVIA.

There are protected areas which are of relevance to the LVIA, including:

- Greenbelt, the nearest part of which is located within the north-western extent of the site. This is primarily a planning designation, however it is relevant to the consideration of openness and visual effects within the site and study area; and



- Notes**

Key

 - Indicative Boundary of Proposed Development
 - Study Area
 - Townscape Character Area

0 125 250 500 750 Metres

Reference Drawings

REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D
-	-	-	-	-	-

Sweco
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SWECO

Client RENFREWSHIRE COUNCIL

Drawing Status BIM AUTHORISATION **Suitability** S6

Project Title CLYDE WATERFRONT AND RENFREW RIVERSIDE

Drawing Title Figure 6.2: Townscape Character Areas

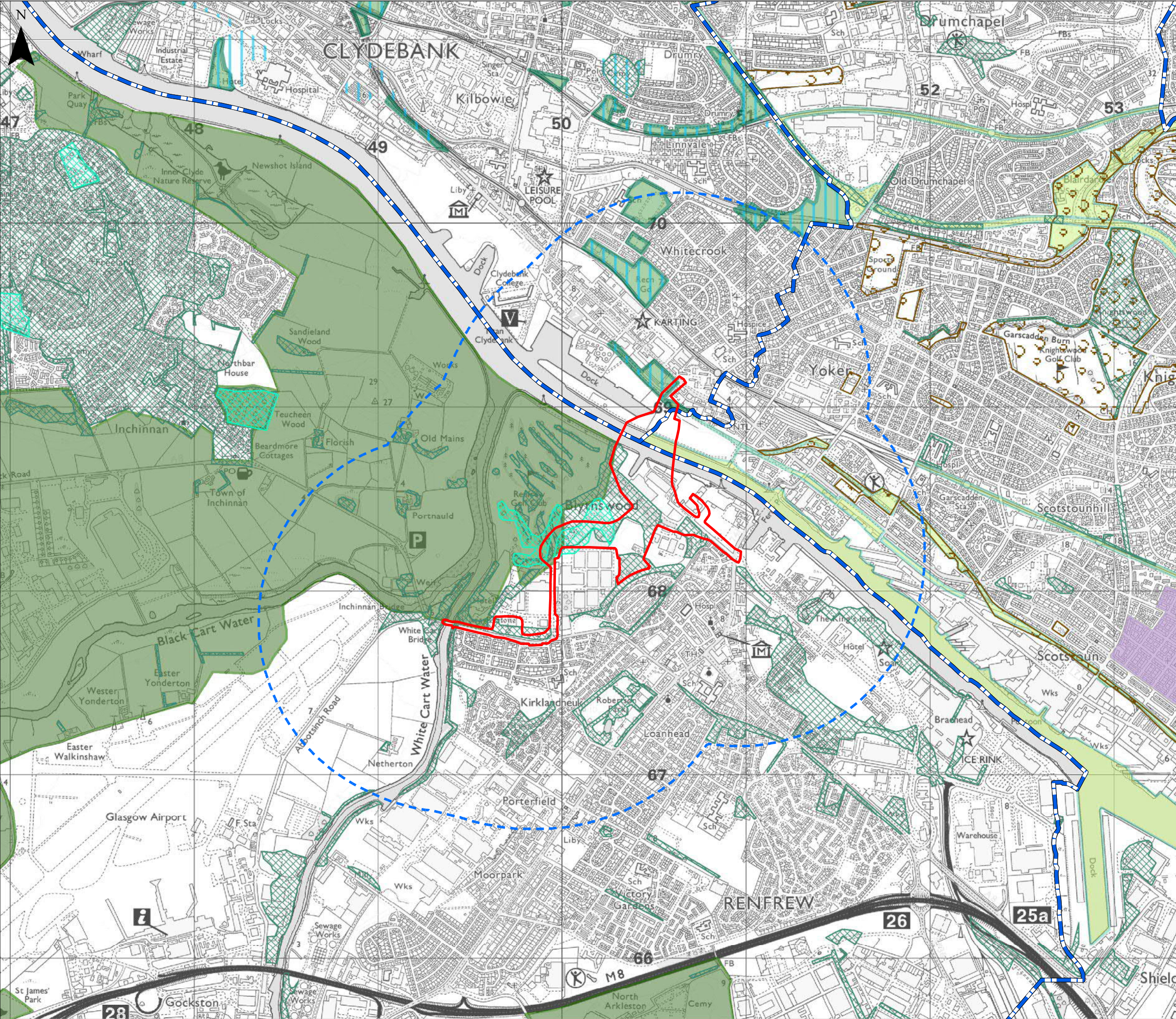
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Original Size A3	Date 24/08//2016	Date 24/08/2016	Date 07/09/2016	Date 07/09/2016

Drawing Number 117086 - SWECO - EAC - 00 - SP - EN - 00003

Project Originator Volume Location Type Role Number

Project Ref. No. 117086 (R09)

Revision 0A



Notes

Key

- Indicative Boundary of Proposed Development
- Study Area
- Council Boundary
- Ancient Woodland Inventory (AWI)
- Semi-Natural Ancient Woodland (SNAWI)
- Conservation Areas

Renfrewshire Council

- Greenbelt

Glasgow City Council

- Long Established Woodland
- Green Corridor

West Dunbartonshire Council Local Plan

- Open Space
- Greenbelt

West Dunbartonshire Council Local Development Plan

- Open Space

0 125 250 500 750 Metres

Reference Drawings

REV	DATE	AMENDMENT DETAILS	ORIG	CHKD	APPD
1	24/08/2016	Initial Design	JM	FC	RM
2	24/08/2016	Design Development	JM	FC	RM
3	24/08/2016	Final Design	JM	FC	RM

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Client
RENFREWSHIRE COUNCIL

Drawing Status
BIM AUTHORISATION

Suitability
S6

Project Title
CLYDE WATERFRONT AND RENFREW RIVERSIDE

Drawing Title
Figure 6.3: Landscape Designations

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A3	24/08/2016	24/08/2016	07/09/2016	07/09/2016

Drawing Number	Project	Originator	Volume	Location	Type	Role	Number
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- Ancient Woodland, which is relevant to the consideration of value attributed to landscape features within the site and the potential for loss of such features due to the proposed development. The site passes through areas of ancient woodland in the Blythswood and Renfrew Golf Club area.

6.7.4 Visual Envelope and Potential Visual Receptors

The site is located on the north-western extent of the town of Renfrew. The built nature of the study area limits visibility of the existing site due to the screening effect of residential and industrial buildings located here. A full visual analysis will be carried out of the site and proposed development, however at this stage the following can be stated with regards to the potential visual receptors which will be considered in the LVIA:

6.7.4.1 Residential Receptors

The site is largely located within industrial areas and largely set away from residential properties. However, there are some notable residential receptors including:

- properties in the southern part of Yoker, specifically a set of high rise buildings adjacent to Dumbarton Road/Glasgow Road. Further analysis of residential areas to the north of the River Clyde will be carried out to establish visual effects of the proposed development. This will likely include areas directly beside the River Clyde such as Ellerslie;
- recently completed, under construction and planned (i.e. developments with planning consent in place) residential properties either side of the River Clyde, between Rothesay Dock and Elleslie Crescent, close to the Renfrew Ferry and along either side of King's Inch Road between Renfrew and Braehead; and
- properties in Kirklandneuk at the southern extent of the proposed site beside Inchinnan Road.

Residential receptors are likely to be identified as being of high susceptibility to change within the LVIA.

6.7.4.2 Recreation

Recreation areas identified as potential visual receptors of the proposed development are likely to comprise the following:

- NCN Route 7: a tree lined cyclepath located directly to the north of the Rothesay Dock;
- Renfrew Golf Club: an 18 hole golf course with mature tree planting on the boundary and throughout the course;
- Blythswood Woodland, area of mature established woodland located to the east of Renfrew Golf Club and which includes public access routes;
- a footpath and cycleway located to the west of Renfrew golf course;
- a footpath and cycleway located to the north of Renfrew golf course; and
- a footpath and cycleway located to the east of Renfrew golf course.

Recreational receptors are likely to be identified as being of medium or high susceptibility to change within the LVIA.

6.7.4.3 Receptors at Employment Sites

Receptors at employment sites are likely to comprise the following:

- Rothesay Dock (and adjacent land): an operating dock comprising a fuel depot and a boatyard and associated businesses. Located on the north bank of the River Clyde between Yoker and Clydebank;
- Meadowside Industrial Estate: a number of local businesses including Christie & Sons (Metal Merchants), Renfrew Car Breakers and a vehicle storage facility. Located to the immediate south of the River Clyde, to the north of Blythswood and west of Ferry Road;
- Caledonian Pavers: paving merchant and storage site;
- Ferry Inn: a public house in Clyde Street at the corner of Ferry Road;
- Kings Inch Hotel: four storey Travelodge hotel on Kings Inch Road;
- Diageo Blythswood / Blythswood Retail Park, Diageo Blythswood: a bonded warehouse used for bottling spirits. Located to the south-east of Renfrew Golf Course. The Retail Park is located to the south of the Golf Course, set back from Inchinnan Road; and
- Normandy Hotel, located on the eastern bank of the White Cart Water south of Renfrew Golf Course.

Receptors at employment sites are likely to be identified as being of low susceptibility to change within the LVIA.

6.7.5 Representative Viewpoints

A list of viewpoints will be agreed with the local planning authority, however the following are a preliminary list of viewpoints which have been identified:

Table 6.2 Preliminary Viewpoints

No.	Name	OS Location	Location and position in relation to site	Reason for selection
1	Glasgow Road	NS 50644 69154	Adjacent to the northern boundary of the site	Representative of residential receptors and road users
2	Footpath beside River Clyde	NS 50290 68797	0.2 km W of the site	Representative of recreational users
3	Meadowside Street	NS 50940 68199	Adjacent to the eastern boundary of the site	Representative of residential receptors
4	Argyll Avenue	NS 49957 68167	Located at southern extent of the site	Representative of pedestrians and road users
5	Inchinnan Road	NS 49941 67755	Located at southern extent of the site	Representative of residential receptors
6	Elleslie Cres	NS 51133 68564	Located at the existing Yoker Ferry location.	Representative of residential, leisure and ferry users.

Viewpoint locations are illustrated on **Figure 6.4**. Please note that these are very much preliminary locations and will be refined following further consultation and during future site visits.

6.8 Potential Effects

The LVIA will consider the effects of the proposed development during the construction and operation phases. The operation phase is taken as being the point at which all construction is complete and the scheme appears as it was designed in the final proposals. It is not proposed to split the operational phase assessment into separate Year 1 and Year 15 assessments. This approach is generally taken in areas in which extensive mitigation planting is proposed and the Year 15 assessment would take into account the mitigating effect of mature/semi-mature vegetation. However as the study area is urban and potential for significant landscape or visual effects relatively limited, it is expected that the necessity for extensive mitigation planting will be limited and there is no requirement for a Year 15 assessment.

6.8.1 Landscape

Anticipated operational phase landscape effects relate to:

- change to the landscape and townscape character of the site. A particular focus will be on the introduction of the new bridge crossing on the River Clyde;
- change to adjacent landscape character areas,. The full landscape and townscape character assessments will consider the impact of the introduction of a new road scheme, including a bridge crossing, into a predominantly urban area and how well the scheme assimilates into that existing context; and
- the loss of some landscape features within the site, including trees adjacent to Renfrew Golf Club at Blythswood.

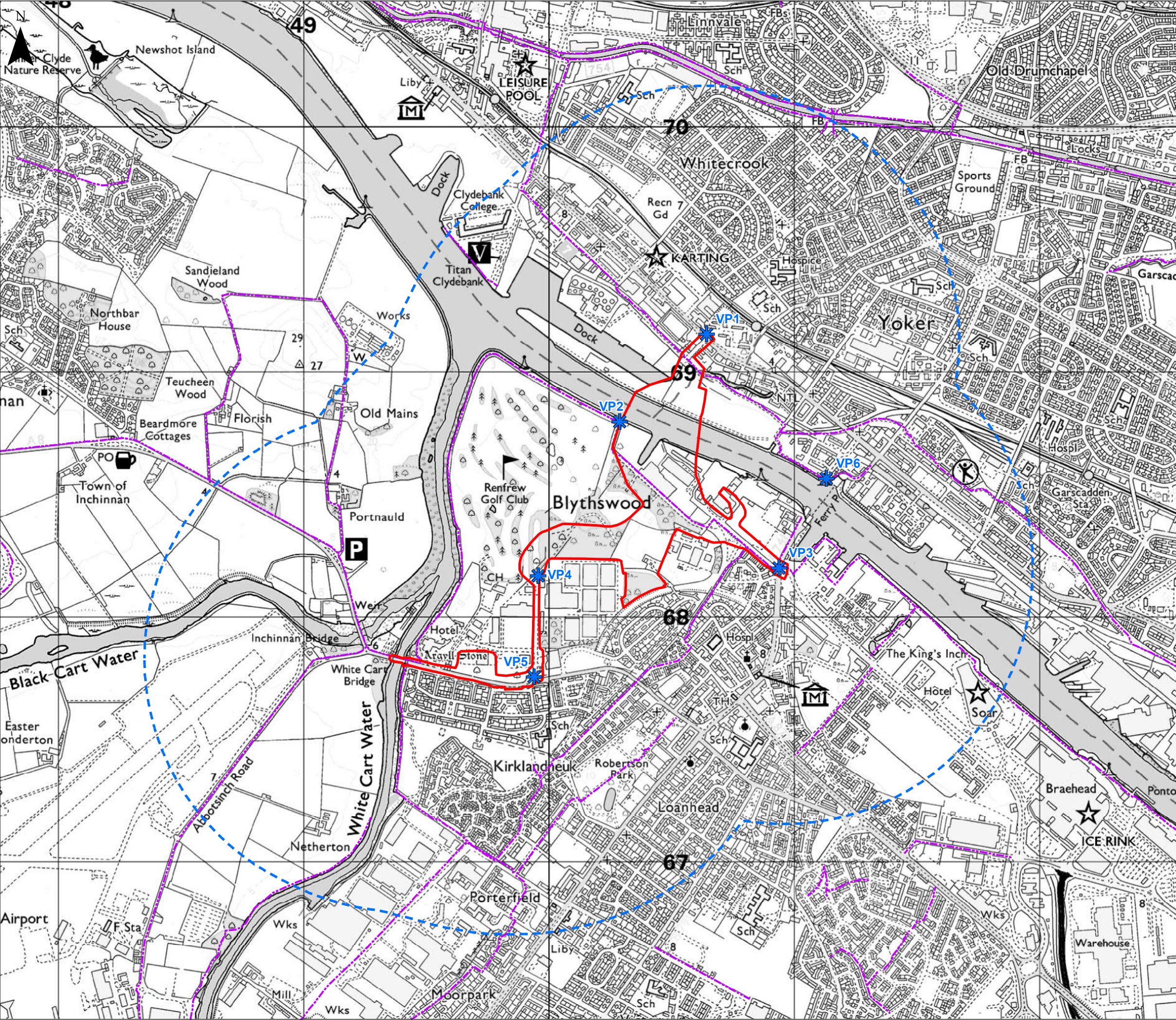
In addition to the operational phase landscape effects, the proposed development is anticipated to give rise to landscape effects during construction. Effects on the site and study area during the construction phase will be temporary. The construction phase landscape assessment will therefore focus on the changes to the local landscape/townscape which would be unique to construction, e.g. the introduction of site compounds and heavy machinery.

6.8.2 Visual

Anticipated operational phase visual effects relate to change in the visual amenity of receptors such as those as listed in **Section 6.7.4**. The assessment of change in visual amenity will focus on the following aspects of the development:

- the introduction of the new bridge crossing over the River Clyde;
- the introduction of a new road link off Argyle Avenue and the potential loss of existing screening features (i.e. vegetation) in this location; and
- changes to existing roads within the scheme corridor.

In addition to the operational phase visual effects, the proposed development is anticipated to give rise to visual effects during the construction phase. Effects on the site and study area during construction will be temporary but may last up to approximately two years. The construction phase visual assessment will focus on the changes to visual amenity which would



Notes

Key

- Provisional Scoping Viewpoints
- Indicative Boundary of Proposed Development
- Study Area
- CWRR Core Paths

0 125 250 500 750 Metres

Reference Drawings

REV	DATE	AMENDMENT DETAILS	ORIG	CHKD	APPD
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

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Client
RENFREWSHIRE COUNCIL

Drawing Status
BIM AUTHORISATION

Project Title
CLYDE WATERFRONT AND RENFREW RIVERSIDE

Drawing Title
Figure 6.4: Visual Context

Scale	Designed	Drawn	Checked	Approved
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A3	24/08/2016	24/08/2016	07/09/2016	07/09/2016
Drawing Number	Project	Originator	Volume	Location
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SWECO

Client
RENFREWSHIRE COUNCIL

Drawing Status
BIM AUTHORISATION

Project Title
CLYDE WATERFRONT AND RENFREW RIVERSIDE

Drawing Title
Figure 6.4: Visual Context

Scale	Designed	Drawn	Checked	Approved
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Original Size	Date	Date	Date	Date
A3	24/08/2016	24/08/2016	07/09/2016	07/09/2016
Drawing Number	Project	Originator	Volume	Location
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117086 (R09)

Revision 0A

be unique to the construction phase, e.g. the introduction of site compounds, heavy machinery and construction lighting into people's views.

6.9 Proposed Methodology

For further information, please refer to **Appendix 6.1**, where the detailed proposed methodology which will form the basis of the LVIA is provided.

7 Ecology and Nature Conservation

7.1 Introduction

This section sets out the proposed approach to the assessment of potential ecological effects of the proposed development, which has been undertaken in accordance with the Guidelines for Baseline Ecological Assessment²⁴ and the Guidelines for Ecological Impact Assessment in the UK²⁵.

Specifically, this section seeks to:

- describe key consultation undertaken with statutory and non-statutory organisations regarding the predicted ecological effects of the proposals;
- describe initial baseline conditions relevant to the proposed project and wider study area;
- present an initial assessment of the ecological effects associated with construction and operation of the proposed project;
- describe outline mitigation proposed to ameliorate predicted ecological effects;
- outline the proposed approach to the Ecological Impact Assessment (EclA) (as part of the wider EIA).
- present the proposed survey methods that will be used to generate ecological and baseline information for the EclA; and
- present a justification for predicted significant effects to be scoped out of the EclA.

7.2 Consultation

A range of organisations have been consulted to date. The results of the consultation process, are summarised below (Table 7.1).

Table 7.1 Consultation Responses

Consultee	Response/Action	Data Provided	Action Taken
Clyde Amphibian and Reptile Group	Advised the group does not hold up-to-date records and that contact should be made with Glasgow Museums Biological Records Centre for relevant amphibian and reptile data.	No	No action required
Clyde Bat Group	No response received as of 09/03/16.	No	No action required
Glasgow Museums Biological Records Centre	Advised the organisation holds records and that a search could be undertaken subject to an additional fee.	Yes	Additional costs were approved; data is described below and will be presented in the ES
Marine Scotland	Marine Scotland confirmed use of the River Clyde and Black and White Cart Waters by diadromous fish including:	n/a	Following meeting MS confirmed fish surveys in Clyde would not be

²⁴ IEMA (1995) Guidelines for Baseline Ecological Assessment. Institute of Environmental Management & Assessment

²⁵ CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland

Consultee	Response/Action	Data Provided	Action Taken
	Atlantic salmon, sea trout, river lamprey and European eel. As part of their response, use of the rivers as spawning staging areas was noted. In addition, Marine Scotland noted a requirement for screening of Likely Significant Effects (LSE) associated with the River Endrick Special Area of Conservation (SAC)		needed and that the proposed approach to HRA Screening (for River Endrick SAC) was acceptable. An HRA Screening appraisal will be undertaken and reported to MS and SNH
Renfrew Biological Records	Advised the organisation holds records but could not access them due to on-going IT issues. The group stated that Glasgow Museums Biological Records centre hold all of their data and to contact this organisation.	No	See above under 'Glasgow Museums Biological Records Centre'
River Clyde Foundation	Advised the group does not hold up-to-date records and that contact should be made with Glasgow Museums Biological Records Centre regarding relevant amphibian and reptile data.	No	See above under 'Glasgow Museums Biological Records Centre'
RSPB	Advised the charity holds records and that a search could be undertaken subject to an additional fee.	Yes	Additional costs were approved; data is described below and will be presented in the ES
Scottish Badgers	The group confirmed the existence of one sett recorded within 1 km of the search area and recommended a survey is carried out.	n/a	Surveys for badger will be undertaken to inform an assessment of the construction and operational effects as part of the EIA
Scottish Natural Heritage	SNH initially provided a response confirming a potential requirement to take into account impacts to designated sites, protected species and birds. Subsequent consultation has confirmed a Habitats Regulations Appraisal is not required in respect to the Black Cart Water Special Protection Area (SPA) or Inner Clyde SPA but that protected Species and development licences may be required at a later stage in the project. Consultations on protected species survey methods have also been held with SNH.	n/a	Further consultation during the EIA process will be undertaken
Scottish Ornithologist Club	Initial information request is still being processed within the organisation.	Pending	No action required
Scottish Wildlife Trust	The group confirmed they only hold/issue data relevant to their nature reserves and as there are no reserves within the search area.	n/a	No action required

Consultation undertaken for the project to date has provided clear advice and direction, in addition to sufficient background information for the purpose of the assessment of ecological effects. Therefore, no additional consultation is proposed as part of the EIA process other than for agreement of HRA screening for the River Endrick SAC.

7.2.1 Glasgow Museums Biological Records Centre

Consultation with Glasgow Museums Biological Records Centre provided biological records for a 5km search area extending from the centre of the project Study Area.

Records of common toad (*Bufo bufo*), common frog (*Rana temporaria*) and palmate newt (*Lissotriton helveticus*) were common throughout the search area, in addition to eight records of great crested newt (*Triturus cristatus*), which were specifically noted by Glasgow Museums Biological Records Centre as being questionable in terms of the reliability and veracity of the source information. Regardless, the nearest great crested newt record (centred in Barshaw Park) is located approximately 3.5km from the proposed project.

Historical records of marine mammals were recorded within the vicinity of the study area, these comprised: common seal (*Phoca vitulina*), grey seal (*Halichoerus grypus*) and common porpoise (*Phocoena phocoena*). However, it should be noted that the records were noted to be in excess of 20 years old.

In addition, records of seven terrestrial mammal species were provided for the search area, as outlined in **Table 7.2** below.

Table 7.2 Records of Terrestrial Mammals

Species	No of Records	Date	Location
Badger (<i>Meles meles</i>)	7	2003-2010	Confidential
Brown long-eared bat (<i>Plecotus auritus</i>)	4	1904 - 1989	-
Common pipistrelle (<i>Pipistrellus pipistrellus</i>)	13	1986 - 2010	-
Daubenton's bat (<i>Myotis daubentonii</i>)	1	1992	Glasgow airport
Otter (<i>Lutra lutra</i>)	10	1935 - 2015	-
Soprano pipistrelle (<i>Pipistrellus pygmaeus</i>)	1	2008	-
Water vole (<i>Arvicola amphibius</i>)	27	1977 - 2009	-

Records of 3,936 bird species were provided for the search area, which included 33 bird species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

7.2.2 RSPB

Consultation with the RSPB provided 2,762 biological records for a 5km search area extending from the proposed project. Of the records provided, 17 were provided in respect to bird species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), in addition to records of the following mammal species:

- brown hare (*Lepus europaeus*);
- soprano pipistrelle; and
- European hedgehog (*Erinaceus europaeus*).

7.3 Baseline

7.3.1 Site Description

The proposed development lies within an area comprising a mosaic of mixed residential housing and industrial businesses, interspersed by amenity areas, parkland, areas of semi-natural habitat, running water (the River Clyde, the Black Cart Water and the White Cart Water) and hard-standing.

7.3.2 Desk Study

A search of publically available data²⁶ has been undertaken to inform earlier stages of the project. This has been used to inform the scope of the ecological assessment. The search established a number of European and nationally important sites designated for ecological considerations within proximity of the proposals, which are described below.

7.3.2.1 Nature Conservation Sites

There are no statutory designated sites within the red line boundary. However, within 2km (north west) there are designated conservation sites at the Inner Clyde (Special Protection Area (SPA), Ramsar Site and Site of Special Scientific Interest (SSSI)), and the Black Cart Water SPA and SSSI whose primary designations are for wintering birds. The wider area also includes River Endrick Special Area of Conservation (SAC), which will be subject to an HRA Screening and the information will be used to inform the EIA (as discussed in **Table 7.1** Marine Scotland consultation). Two further areas of ancient woodland (at Teucheen Wood and Jordanhill Wood) and a large area of SINC are located in the south west on agricultural land adjacent to the Black Cart Water SPA/SSSI. The Inner Clyde SPA/SSSI is also co-incident with an RSPB Nature Reserve and Important Bird Area (IBA) and the Black Cart Water is also designated as an IBA (see **Figure 7.1**; **Table 7.3**).

Table 7.3 Statutory Designated Sites

Site Name	Designation	Grid Reference	Size	Distance from Site
Inner Clyde	SPA, SSSI	NS 482 702	1825.29 ha	1.40 km (west)
Inner Clyde	Ramsar site	NS 482 702	1824.29 ha	1.31 km (west)
Black Cart Water	SPA/SSSI	NS 468 670	56 ha	0.78 km (west)
River Endrick	SAC	NS 506 873	236 ha	<10 km (north)

The Inner Clyde SPA and Black Cart SPA have statutory protection under the European Union (EU) Directive on the Conservation of Wild Birds (79/409/EEC). SSSIs have statutory protection under the Wildlife and Countryside Act 1981 (as amended), while Ramsar Sites receive protection under the Convention on Wetlands of International Importance.

The Inner Clyde SSSI/SPA is designated under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive (redshank (*Tringa tetanus*), 1,918 individuals representing at least 1.3% of the wintering Eastern Atlantic - wintering population (winter peak mean)).

²⁶ Including SNH (2016) Information Database at <http://www.snh.gov.uk/publications-data-and-research/snhi-information-service>

The Black Cart SSSI/SPA is designated under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive (whooper Swan (*Cygnus Cygnus*), 220 individuals representing at least 4.0% of the wintering population in Great Britain (early 90s winter peak mean)).

7.3.2.2 Non-statutory Sites

7.3.2.2.1 Ancient Woodlands and Sites of Importance for Nature Conservation (SINC)

Two areas of ancient woodland at Blythswood between the golf course and Renfrew were identified within the proposed project, with one additional area of ancient woodland recorded within 2km of the proposed project (at Teucheen Wood) (see **Figure 7.2**; **Table 7.4**).

Table 7.4 Ancient Woodland Sites

Site ID/Name	OS Grid Reference	Category	Distance from Site	Size
Blythswood	NS 498 682	2b	n/a	4.36 ha
Unnamed	NS 501 683	2b	n/a	4.64 ha
Teucheen Wood	NS 482 690	2b	1.48 km (west)	5.09 ha

In addition to the above areas of long-established woodland, two SINC were identified within the proposed project. The first SINC, which is located to the immediate east of Renfrew Golf Club comprises a 13ha plot of woodland corresponding with the extent of Blythswood (an area of semi-natural woodland located to the south of the River Clyde).

A second SINC was recorded along the western boundary of the proposals and is primarily associated with the White Cart Water – a riverine system that flows through the town of Paisley and drains into the River Clyde to the immediate west of Renfrew Golf Club. The SINC designation includes most of the lower reaches of the White Cart Water, in addition to a number of wooded habitats adjacent to the river.

7.3.2.2.2 Important Bird Areas (IBA)

Two IBAs were identified within 2km of the proposed project:

- adjacent to the River Clyde to the north-west of the proposed project and contiguous with the boundary of the Inner Clyde SPA/SSSI; and
- an IBA comprising a section of the Black Cart Water and adjacent land, to the south-west of the project. The boundary of this site is contiguous with the boundary of the Black Cart Water SPA/SSSI.

7.3.2.2.3 Protected Species Records

Records for protected and notable species were identified by interrogating online data sources for the 10km Ordnance Survey (OS) Grid (NS46, NS47, NS56, NS57).

Sixty-four protected and/or notable bird species were identified. The study identified four species which are afforded protection under Annex 1 of the Birds Directive (barnacle goose (*Branta leucopsis*), kingfisher (*Alcedo atthis*), merlin (*Falco columbarius*) and white-tailed eagle (*Haliaeetus albicilla*)) and seven species offered protection under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) (barn owl (*Tyto alba*), common crossbill (*Loxia curvirostra*), fieldfare (*Turdus pilaris*), kingfisher, merlin, redwing and white-tailed eagle). Similarly, and with

respect to bird species of conservation concern/priority, the desk study identified the following:

- twenty-three bird species listed as an action species within the historical UK BAP²⁷;
- twenty-six species listed as Red List Species of Conservation Concern²⁸; and
- one species (lesser whitethroat) listed as an action species within the LBAP.

Ten protected/notable mammal species were recorded by the desk study. The first species (badger) is afforded specific legal protection under the Protection of Badger Act 1992 (as amended) and Wildlife and Countryside Act 1981 (as amended), while all species of bat, otter and pine marten (*Martes martes*) are fully protected under the Conservation (Natural Habitat &c) Regulations 1994 (as amended). Although red squirrel (*Sciurus vulgaris*) and water vole are not afforded protection at a European level, unlike bats and otters, they are afforded protection under the Wildlife and Countryside Act 1981 (as amended), in addition to brown hare, hedgehog and pine marten.

Similarly, and with respect to mammal species of conservation concern/priority, the desk study identified the following:

- seven species (hedgehog, brown hare, otter, water vole, pine martin, red squirrel and soprano pipistrelle) listed as an action species within the historical UK BAP; and
- five species (brown hare, common pipistrelle, otter, soprano pipistrelle and water vole) listed as an action species within the LBAP.

One single protected amphibian species (great crested newt) was recorded by the desk study, which receives strict protection under the Conservation (Natural Habitat &c) Regulations 1994 (as amended) and Wildlife and Countryside Act 1981 (as amended). This species is additionally subject to a UK BAP.

7.3.2.3 Invasive Non-Native Species

Records of the following invasive/non-native species were identified by the desk study:

- Japanese knotweed (*Fallopia japonica*);
- giant hogweed (*Heracleum mantegazzianum*); and
- Himalayan balsam (*Impatiens glandulifera*).

²⁷ The UK Government (1992) The UK Biodiversity Action Plan (<http://jncc.defra.gov.uk>)

²⁸ Eaton M A, Aebischer N J, Brown A F, Hearn R, Lock L, Musgrove A J, Noble D G, Stroud D and Gregory D (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. British Birds 108, pp 708-746

7.4 Potential Effects

The key ecology and nature conservation impacts with respect to the proposed project are likely to include the following:

7.4.1 Construction

- direct mortality of fauna during construction;
- habitat loss (temporary and permanent) through land-take;
- fragmentation of existing habitats;
- disturbance and displacement during construction;
- pollution to water courses from runoff during development phases;
- point source and diffuse pollution;
- increased sediment loading;
- decreased habitat complexity; and
- changes to discharge regime.

7.4.2 Operation

- direct mortality of fauna during operation;
- behavioural changes of fauna during operation;
- fragmentation of existing habitats;
- disturbance and displacement during operation;
- pollution to water courses from road drainage;
- point source and diffuse pollution;
- increased sediment loading;
- decreased habitat complexity; and
- changes to discharge regime.

7.5 Proposed Scope of Assessment

In accordance with the CIEEM EcIA good practice guidance²⁹, the Ecology and Nature Conservation Chapter of the ES will present the results of consultation and a detailed desk-study, in addition to a description of the habitats and fauna baseline for the proposed project and wider ecological study area (the zone of influence). The findings of the survey work will be analysed and presented (where appropriate) in a technical report providing baseline conditions and summarised as part of the chapter.

Activities during the construction and operational phases and their predicted impact significance on important ecological features, such as protected species, will be identified and

²⁹ CIEEM. (2016). Guidelines for Ecological Impact Assessment in the UK and Ireland. Accessed: July 2016. Available at: <http://www.cieem.net/ecia-guidelines-terrestrial> - Accessed: July 2016.

characterised at the geographical scale at which they are significant taking into account the following parameters:

- positive or negative;
- magnitude;
- extent;
- duration;
- reversibility; and
- timing and frequency.

Following the determination and assessment of predicted significant ecological effects, professional judgement will be used, coupled with an understanding of important ecological features and legal requirements, to determine the requirements for appropriate mitigation. Mitigation will be proposed (where practicable) at the relevant geographical scale of significance to avoid, reduce or offset identified potential effects.

Residual effects will be assessed using the same methodology for the assessment of predicted ecological effects but taking into consideration committed mitigation. In addition and where applicable, an assessment of predicted cumulative ecological effects will be undertaken as discussed in **Chapter 13**.

7.5.1 Study Area

Field surveys will be undertaken within all suitable areas of the proposed project and a wider study area (outside the proposed project), which varies in width relevant to the important ecological feature.

Further information regarding the width of the pertinent study area is presented below:

- extended Phase 1 Habitat (the proposed project and adjacent area up to 100m from the outmost edge of development);
- badger survey (the proposed project and adjacent area up to 100m from the outmost edge of development);
- otter survey (the proposed project and 250m up and downstream of freshwater habitats);
- water vole survey (the proposed project and 100-200m up and downstream of freshwater habitats); and
- bat surveys (the proposed project and adjacent area, between 20-100m from the outmost edge of development);

It should be noted that, where applicable, the relevant study area will be extended to provide a greater level of ecological understanding regarding the ecological effects on an important ecological feature. Further details of survey methodology is contained within **Appendix 7.1**.

7.5.2 Matters to be Scoped Out of the Ecological Assessment

7.5.2.1 Baseline Surveys

It is considered that there is sufficient evidence to show that there are unlikely to be significant effects on Great Crested Newts, breeding birds and fresh water fish species or habitats, and therefore no further surveys are proposed for these as part of the assessment of ecological effects. This approach has been agreed in consultation with SNH and Marine Scotland. Based on our current understanding of the site and informed by Phase 1 habitat survey work it is also considered that NVC surveys are not required and have therefore been scoped out of the EIA.

7.5.2.2 Habitat Regulations Appraisal (HRA)

Consultation with SNH in April 2016 (Dave Laing – Operations Officer, Pers. Com., 19 April 2016) confirmed an absence of Likely Significant Effects (LSE) between the proposed project and the Black Cart Water SPA and Inner Clyde SPA. Consequently, a Habitats Regulations Appraisal (HRA) will not be required in support of the proposed project for these sites.

An HRA Screening appraisal will be undertaken to assess the potential for LSE of the proposals on the River Endrick SAC following consultation with Marine Scotland (see **Section 7.2**).

8 Archaeology and Cultural Heritage

8.1 Introduction

This section sets out the approach to assessing impacts of the proposals on the historic environment, including designated heritage assets (Scheduled Monuments, Listed Buildings, World Heritage Sites, Conservation Areas, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields) and other undesignated features of cultural significance. Specifically, this section aims to address the topic as follows:

- summarise consultation carried out to date during the options assessment, and identify further consultation which will take place as part of the EIA;
- provide a high-level summary of baseline conditions relating to the historic environment;
- identify potential effects based on the high-level baseline study previously undertaken;
- set out the scope of the desk-based assessment which will be undertaken to provide detailed cultural heritage baseline data and identify all potential effects;
- describe proposed mitigation measures; and
- describe the methodology which will be applied in assessing any residual effects.

8.2 Consultation

Historic Environment Scotland (HES) and West of Scotland Archaeology Service (WoSAS) were consulted for initial comments on the proposals (see **Table 8.1**).

Table 8.1 Consultation to Date

Consultee	Response/Action	Data Provided	Action Taken
Historic Environment Scotland	Letters dated 29 January and 15 April 2016 noted presence of a number of Category A Listed Buildings and a Scheduled Monument within the study area. Site meeting, 26 May 2016: confirmed the importance of the Category A listed bridges over the White Cart Water and Black Cart Water and the potential for sensitive archaeology between the A8 Greenock Road and the Scheduled Monument at All Hallows Church, Inchinnan.	No	No action required
West of Scotland Archaeology Service	Meeting in April 2016: identified a number of areas of archaeological interest within the study area, where early investigation may be worthwhile; and suggested a number of historic locations/themes that could be enhanced by providing information to visitors, with the involvement of Renfrewshire Local History Forum. Letter dated 24 May 2016: identified a number of heritage assets in the vicinity of the route options where potential impacts may require mitigation through archaeological investigation and recording. Site meeting, 26 May 2016: confirmed the importance of the Category A listed bridges over the White Cart Water and Black Cart Water and the potential for sensitive	No	No action required

Consultee	Response/Action	Data Provided	Action Taken
	archaeology between the A8 Greenock Road and the Scheduled Monument at All Hallows Church, Inchinnan.		

The following will be consulted during the preparation of the Environmental Statement:

- Historic Environment Scotland (HES), regarding Scheduled Monuments and Category A Listed Buildings;
- West of Scotland Archaeology Service (WoSAS), regarding archaeological remains, whether designated or not;
- Renfrewshire Council Buildings Conservation, regarding Listed Buildings and Conservation Areas; and
- Renfrewshire Local History Forum, regarding any aspect of cultural heritage, and particularly where there may be opportunities to enhance community involvement.

Consultees will be invited to comment on potential impacts identified through a desk-based assessment, and on mitigation proposals.

8.3 Baseline Description

8.3.1 Baseline Data Sources

A high-level baseline study has been carried out for the options assessment, the results of which are included in this section. This study aimed to support the identification of any potentially significant effects on cultural heritage assets under the three sub-topics identified in DMRB guidance (archaeological remains, historic buildings and historic landscapes), based on a review of the following data sources:

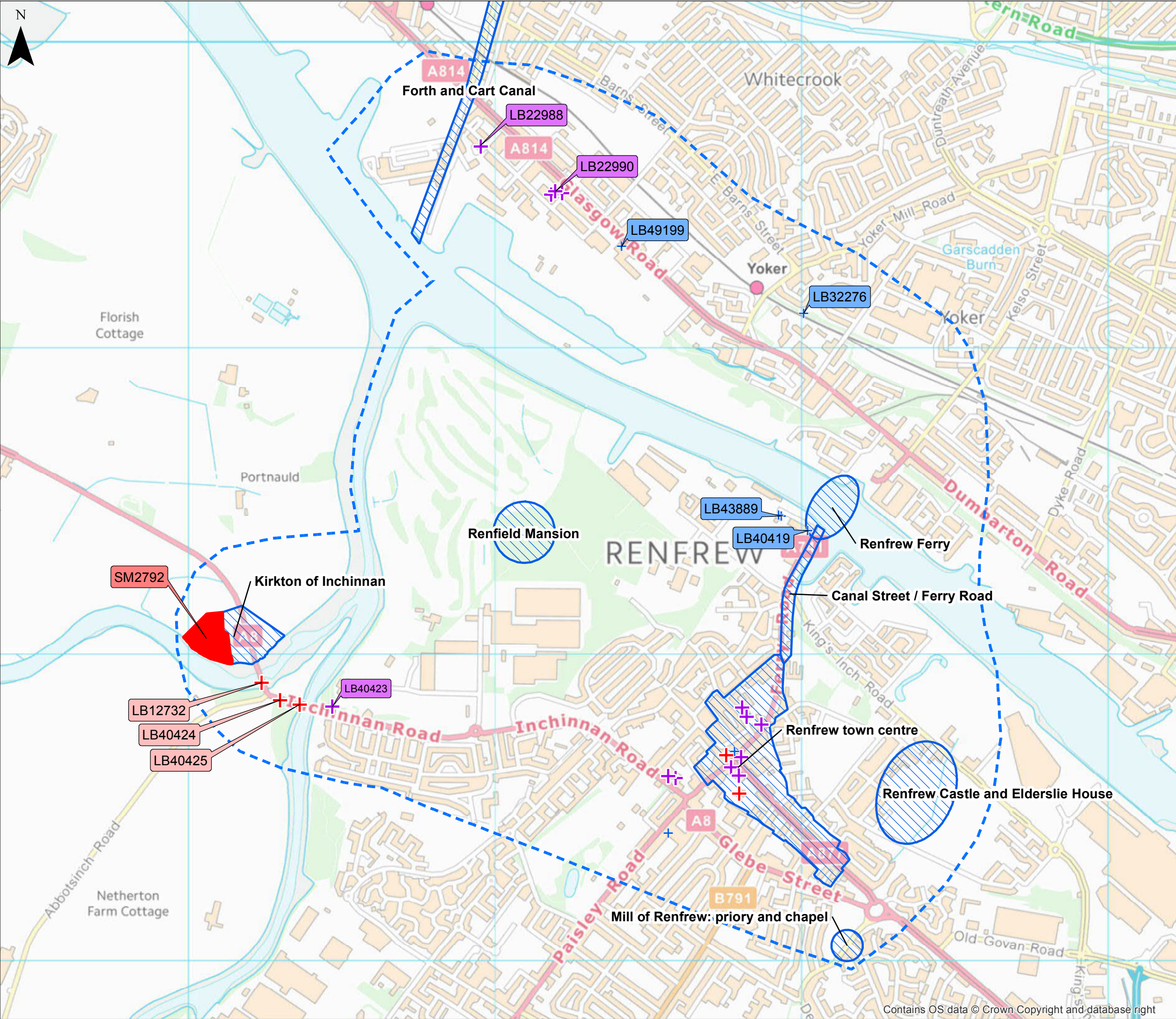
- heritage designations (Scheduled Monuments, Listed Buildings, Conservation Areas, Inventory Gardens and Designed Landscapes and Inventory Historic Battlefields);
- archaeological records in the West of Scotland Archaeology Service Historic Environment Record (WoSAS HER); and
- archaeological records in the National Monuments Record of Scotland (NMRS).

Figures 8.1 and **8.2** show the heritage designations and archaeologically sensitive areas identified within the study area defined for the options assessment. The archaeologically sensitive areas are defined through professional judgment as areas where there is potential for significant impacts on archaeological remains.

8.3.2 Archaeological Remains

8.3.2.1 Designated Heritage Assets

There is one Scheduled Monument in the far west of the study area: Inchinnan, site of All Hallows Church (SM2792). This is the location of an early Christian monastic site and of at least three successive churches built between the medieval period and the late 19th century. The late 19th century All Hallows Church was demolished in 1965 to accommodate the expansion of Glasgow airport. Only parts of the church's foundations are visible above ground level, and its cultural significance relates mainly to the archaeological research potential of site, including remains of the medieval church, monastic structures and burials.



Notes

Key

- Core study area
- Category A listed building (LBXX) (Historic Environment Scotland data 2016)
- Category B listed building (LBXX) (Historic Environment Scotland data 2016)
- Category C listed building (LBXX) (Historic Environment Scotland data 2016)
- Scheduled monument (SMXX) (Historic Environment Scotland data 2016)
- Archaeological sensitivity

0 100 200 400 600 Metres

REV	DATE	AMENDMENT DETAILS	ORIG	CHKD	APPD
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

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SWECO

Client
RENFREWSHIRE COUNCIL

Drawing Status
BIM AUTHORISATION

Suitability
S6

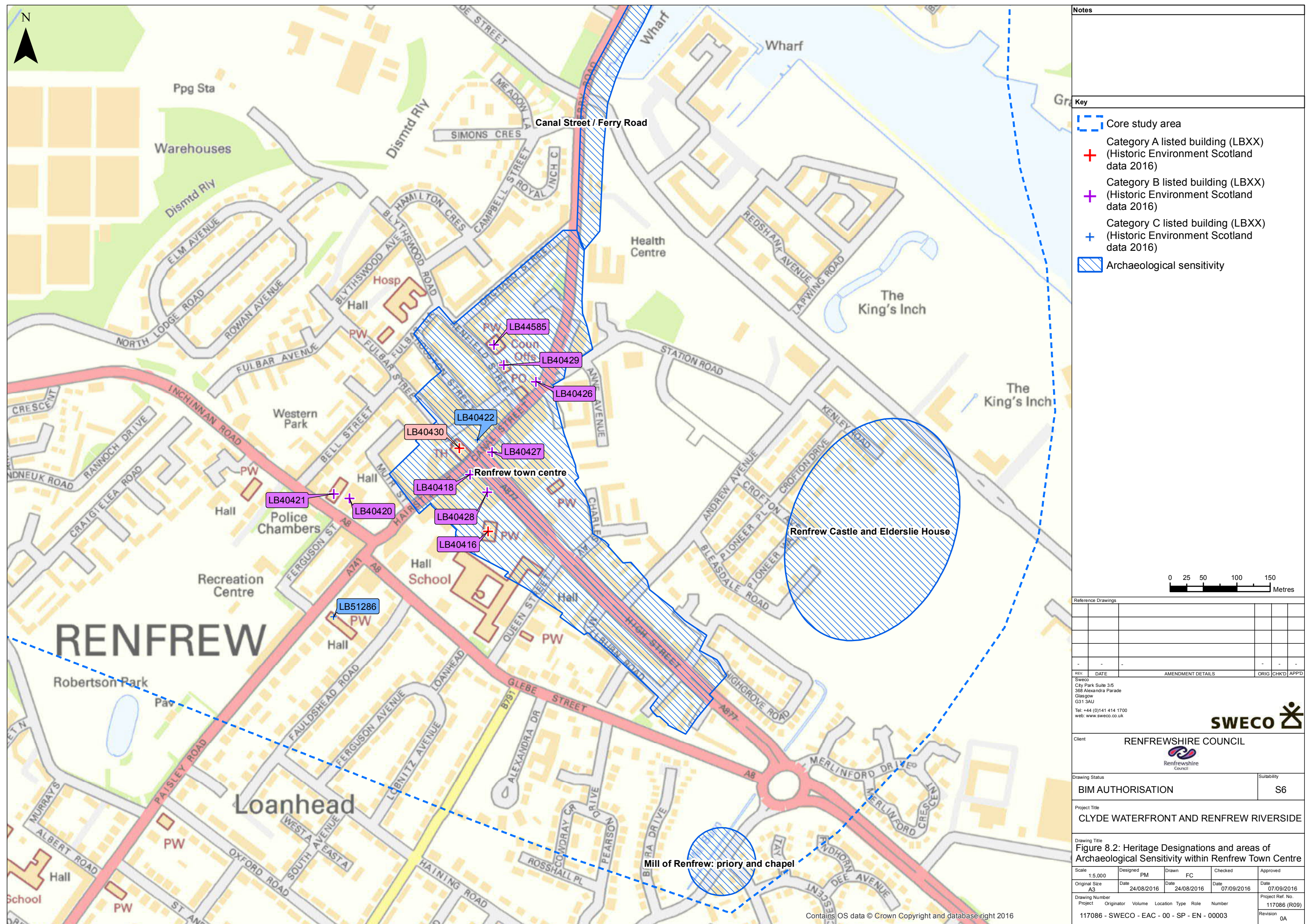
Project Title
CLYDE WATERFRONT AND RENFREW RIVERSIDE

Drawing Title
Figure 8.1: Heritage Designations and areas of Archaeological Sensitivity

Scale	Designed	Drawn	Checked	Approved
1:12,000	PM	FC	RM	HC
Original Size	Date	Date	Date	Date
A3	24/08/2016	24/08/2016	07/09/2016	07/09/2016

Drawing Number	Project	Originator	Volume	Location	Type	Role	Number
117086 - SWECO - EAC - 00 - SP - EN - 00003							

Revision
117086 (R09)
0A



8.3.2.2 Undesignated Heritage Assets

Renfrew town centre (WoSASPIN 8685): The area shown on **Figure 8.2** is defined in the WoSAS HER (PIN8685), corresponding to the extent of the town as shown on the First Edition Ordnance Survey map (surveyed 1857). The earliest historical reference to Renfrew is from 1136 when the church and its revenues were bestowed on Glasgow Cathedral by King David I. The early burgh was probably planned around the axis of the High Street; Canal Street and Hairst Street, following an important route between Paisley and the ferry across the Clyde, are also likely to have early origins. Important features relating to the early burgh include the Tolbooth, built in 1670, which was located on the site currently occupied by the Town Hall, and the market cross nearby which was removed in 1755. Renfrew Old Parish Church (built 1861-2) occupies the site of the medieval parish church. A castle, built in the 13th century, occupied a location in what is now Castlehill Gardens, north-east of Renfield Street (WoSASPIN 8670); geophysical survey and trial trenching have been carried out here, but this showed that the site had been severely disturbed. The course of the river Clyde originally passed closer to the town and it had an important harbour, the location of which is uncertain, possibly near the junction of Ferry Road and Station Road.

Mill of Renfrew: Priory and Chapel (WoSASPIN 8666): A Cluniac Priory existed at Renfrew in the 12th century, which was probably the antecedent to the priory at Paisley, but its location is uncertain. Renfrew Mill, which was located beside Mill Burn and is shown as a ruin on the First Edition Ordnance Survey map, has been suggested as a possible location.

The King's Inch: Renfrew Castle (WoSASPIN 61731) and Elderslie House (WoSASPIN 8694): The King's Inch, formerly an island in the Clyde, separated from Renfrew by the Pudzeoch Burn, was the site of a castle which was built in the 12th century and replaced several times before being replaced by a mansion, Elderslie House, a short distance to the north, in 1777. A number of archaeological evaluations, excavations and watching briefs have been carried out in advance of redevelopment in this area, primarily aiming to locate the castle, the exact location of which remains unproven.

Kirkton of Inchinnan (WoSASPIN 62749): A small settlement is shown beside All Hallows' Church on Roy's Military Survey (1747-52). The area indicated on the constraints map corresponds to the record for this site in the WoSAS HER. There is potential for medieval or post-medieval settlement remains within this area, associated with the Scheduled monastery and church.

Renfield mansion (WoSAS PIN 8702): A country house in approximately this location was demolished in 1810 and replaced by Blythswood House, approximately 400m to the north-west; the sites of both houses are within the golf course that now covers much of the former Blythswood estate. Foundations and other remains of the country house may survive within this area.

Canal Street / Ferry Road: Ferry Road follows the former course of a canal which was dug in 1786 to provide access to Renfrew's harbour, after the Clyde changed its course, cutting off the channel which formerly separated Renfrew from the King's Inch. Remains of structures relating to the canal may survive in this area.

Forth and Cart Canal (WoSASPIN 40484): The Forth and Cart Canal was opened in 1840 to connect the Forth and Clyde Canal to Paisley via the White Cart Water. It was abandoned in 1893 and is now filled in. Several bridges and locks are recorded along its length, but it is unclear if any remains of these, or of the canal itself, survive.

Renfrew Ferry (WoSASPIN 41834): A ferry across the Clyde between Ferry Road and Yoker Ferry Road has existed since the late 18th century, when the Renfrew Ferry moved from its previous location further upstream, between the King's Inch and Blawarthill (Simpson, A T and Stevenson, S 1981 'Historic Renfrew: the archaeological implications of development', page 5). While there do not appear to be any particularly notable historic structures associated with the ferry, the continuing existence of a ferry crossing in this location is a feature which contributes to the historic character of this section of the Clyde.

8.3.3 Historic Buildings

There are three Category A Listed bridges on Inchinnan Road (A8) where it crosses the White Cart Water and the Black Cart Water. Inchinnan Bridge (LB12732) and White Cart Bridge (LB40424) are stone bridges with multiple arches, both of which were built in 1812 in a similar style. The Rolling Lift Bridge over the White Cart Water (LB40425), built in 1924, is the only lifting bridge of this type in Scotland and therefore represents an important element of industrial/engineering heritage. The setting of all three bridges is experienced principally in terms of short-range views along and across the rivers and the approaches along the road.

Close to the White Cart Water on the north side of Inchinnan Road, the 'Argyll Stone' and 'St Conval's Chariot' (LB40423) are respectively the base of a medieval cross, and a granite boulder (on which St Conval was said to have floated across the Irish Sea). They are enclosed by ornate cast iron railings, within wooded gardens in the grounds of the Normandy Hotel. The setting of this Listed Building is limited to these gardens.

There are a number of Listed Buildings in Renfrew town centre, all of late 19th or early 20th century date. The Cross, Renfrew Town Hall (LB40430) is a Category A Listed mid-Victorian town hall with an ornate French Gothic tower that dominates the north-west end of the High Street. Renfrew Old Parish Church (LB40416) is a Gothic Revival style church with a stone spire, built in 1861-2; the church itself is Category B Listed, although it contains two monuments which are Category A Listed (LB40417). Both the church and the town hall are prominent 'landmark' buildings which are widely visible in the Renfrew area. The key view of the town hall is along the High Street, but views towards it along Hairst Street and Canal Street are also highly relevant to its setting. Views from High Street, Hairst Street and Canal Street, which were the principal streets of the medieval and later town, are also probably key to the setting of the church. The dominance of these two tall structures in wider views across Renfrew as a whole is probably also relevant to their settings.

Other Listed Buildings in the town centre have more localised settings, in as much as they are only visible from the surrounding streets. These include several Victorian buildings at the north-east end of the High Street, opposite the town hall (LB40418, LB40428 and LB40427). Victory Baths (LB40420), a swimming pool opened in 1921, and County Police Chambers (LB40421), built in 1910, both face south-west onto Inchinnan Road. The Brown Institute (LB40426) is located on Canal Street, and Renfrew North Parish Church (LB44585) and the former Renfrew Parish Council Chambers (LB40429) both face south-west onto Renfield Street. Renfrew Trinity

Church (LB51286, Category C Listed) is not widely visible beyond the immediate vicinity on Paisley Road.

The Ferry Inn (LB40419) is a Category C Listed public house on the corner of Ferry Road and Clyde Street: the setting of this building relates principally to the river crossing at this point. Two Category C Listed houses on Clyde Street (LB43889) appear to have been demolished, judging by recent Google Earth images.

There are several Listed Buildings north of the river in Clydebank. Clydebank Riverside Station (LB22988) is a 19th century station building, now converted for housing following the disuse of the branch line which it served; the location for this building is given incorrectly in HES and WoSAS records as NGR 249967,669593, while the correct location (as shown in Figure 1), approximately 300m to the north, is 249956,669658 as quoted in the NMRS. There are two churches on the south side of Glasgow Road, the Church of our Holy Redeemer (LB22990) and the Hamilton Memorial Church (LB49199). A Valve House for sewerage pumping (LB32276) is located on an embankment beside the railway. The settings of all these buildings are localised, and very little of their original settings survives in an area which was heavily bombed during the Second World War and has been extensively redeveloped.

Just outside the study area to the north-west is the Titan Cantilever Crane at John Brown's Shipyard (LB22993) which is a Category A Listed Building and is a prominent landmark on the banks of a Clyde that is an iconic reminder of the area's shipbuilding industry.

8.3.4 Historic Landscapes

HLAMap identifies two areas of historic landscape within the study area. One of these corresponds to the medieval town of Renfrew, and covers the same extent as the area of archaeological sensitivity described above and shown on **Figure 8.2**. The second area is the former designed landscape around Blythswood House: this is now a golf course and retains little if any of its historic character.

8.4 Potential Effects

8.4.1 Construction

Typical construction impacts which could occur as a result of the proposed development include:

- removal of archaeological deposits, due to topsoil removal and excavation associated with site activities including road construction, site investigation, site clearance, landscaping, installation of structures and services;
- damage to fabric of historic buildings due to demolition works, vibration from piling or other construction works; and
- change to historic landscape integrity from removal of trees and landscape features.

None of the archaeologically sensitive areas or historic buildings identified in the high-level baseline study will be affected by construction impacts.

Currently unknown archaeological remains may be affected by construction impacts. All such impacts will be mitigated through archaeological investigation and recording, resulting in a negligible or at most minor negative residual impact.

8.4.2 Operation

Typical operational impacts which could occur as a result of the proposed development include:

- impacts on the settings of archaeological sites and monuments, historic buildings or areas of historic landscape, resulting from visual or noise intrusion associated with roads/paths, fences, structures, lighting, landscaping or other elements;
- traffic movement leading to vibration and compaction, causing damage to archaeological deposits and historic buildings; and
- changes to access, eg severance, leading to neglect, dereliction or other change in land-use with secondary effects on archaeological sites and monuments, historic buildings or historic landscapes.

The availability of a road bridge across the Clyde at Renfrew may lead to the closure of the Renfrew ferry service. The ferry crossing is considered a heritage asset of local importance, and its disuse would result in an effect of minor significance.

No other potential operational impacts have been identified in the high-level scoping study.

8.5 Proposed Scope of Assessment

8.5.1 Desk-based Assessment

A desk-based assessment will be carried out to inform assessment of the proposed development and any cumulative effects identified with the emerging masterplan. The inner study area will include all areas where construction activities could have a physical impact on archaeological remains or historic buildings. The outer study area will extend up to 1km from the proposals, to allow for the identification of any potential impacts on the settings of heritage assets.

All readily available and relevant documentary sources for the inner study area will be examined, following the Chartered Institute for Archaeologists' (CIfA) Standard and Guidance for archaeological desk-based assessment. This will include:

- spatial data and descriptions of designated assets from Historic Environment Scotland;
- the National Record of the Historic Environment (NRHE), including the Canmore database and associated photographs, prints/drawings and manuscripts held by HES;
- Historic Landscape Assessment data, viewed through the HLAMap website;
- the West of Scotland Archaeology Service Historic Environment Record (WoSAS HER);
- the National Collection of Aerial Photography (NCAP);
- lidar data supplied by the Scottish Government;
- geological data available online from the British Geological Survey;
- historic maps held by National Library of Scotland;
- historic maps and plans held by the National Records of Scotland; and
- other readily available published sources and unpublished archaeological reports.

A walkover survey will be carried out to assess the condition of heritage assets identified from the desk-based study, identify any previously unrecorded assets, and gather information about current site conditions (e.g. land use and topography) relevant to the assessment.

The results of the desk-based assessment will be presented in a report which will serve as a basis for consultation and will be included as an appendix to the ES.

8.5.2 Impacts to be Assessed

The cultural heritage chapter of the ES will include a summary of the results of the desk-based assessment, and will identify all potential impacts from the proposals. Any impact which may result in an effect of minor or greater significance on a heritage asset will be assessed in full; impacts which will clearly lead to no effect, or a negligible effect on heritage assets will be scoped out. The advice of consultees will be sought on which impacts should be assessed in full, or scoped out, based on the results of the desk-based assessment.

8.5.3 Mitigation

Mitigation may comprise the following measures, where appropriate:

- Design to avoid or minimise the extent of physical disturbance to archaeological sites and monuments, historic buildings and historic landscape, allowing preservation in situ.
- Design modifications to avoid or reduce impacts on setting, through reducing or screening visual intrusion or enhancing the surroundings in which a historic site or monument, historic building or landscape is experienced.
- Measures to offset adverse effects and deliver added value to the project by enhancing understanding and appreciation of the historic environment, for instance through archaeological investigation, recording, analysis, interpretation and publication; or improving access and presentation of heritage assets to the public.

8.5.4 Impact Assessment Methodology

Residual effects on heritage assets will be assessed in line with relevant legislation, policy and guidance relating to cultural heritage, including:

- The Ancient Monuments and Archaeological Areas Act 1979;
- The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997;
- Scottish Planning Policy (paragraphs 135-151);
- Historic Environment Scotland Policy Statement 2016;
- Planning Advice Note 2/2011: Planning and Archaeology;
- Design Manual for Roads and Bridges: Volume 11, Section 3 Part 2 (HA 208/07 Cultural Heritage, August 2007);
- Guidance published by Historic Environment Scotland in the series 'Managing Change in the Historic Environment', including 'Setting' and 'Engineering Structures';
- The 'Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment' (2014) and the 'Standard and guidance for historic environment desk-based assessment' (2014), both published by the Chartered Institute for Archaeologists (CIfA); and

- WoSAS Procedural Guidance for Archaeology and Development (West of Scotland Archaeology Service 2009).

Impact assessment will follow a step-by-step approach as set out below. The standard assessment criteria that will be applied are provided below.

1. Characterisation of the heritage asset in terms of its type, date, extent, principal features and condition.
2. An objective description of the asset's setting (if a potential setting impact is identified), including topography, land use, key views and other attributes, e.g. paths of approach, sound, sense of place etc.
3. Assessment of the asset's cultural significance, with reference to Historic Environment Scotland Policy Statement Annexes 1-6. HES guidance 'Managing Change in the Historic Environment: Setting (Assessment Stage 2)' is referred to in determining how, and to what extent setting contributes to the asset's significance.
4. Objective description of the impact of the development on the heritage asset. Where appropriate, effects on setting will be informed by visualisations to show the extent of visibility. Historic Environment Scotland and WoSAS will be consulted to ensure the visualisations provided meet their requirements. Site visits will be undertaken where necessary to confirm the findings of the assessment.
5. Assessment of the magnitude of effect(s), with reference to 'MCHE: Setting' (Assessment Stage 3) where a potential setting impact is identified. Magnitude is defined as the extent to which the heritage asset's cultural significance (as defined in Step 3) is adversely or beneficially affected by the changes identified in Step 4.
6. Assessment of the significance of effect in EIA terms: this is broadly based on a matrix combining the magnitude of the effect with the importance of the asset, but also involves professional judgement, particularly where the matrix gives two possible results for a particular combination of magnitude and importance.

9 Traffic and Transport

9.1 Introduction

This section presents an overview of baseline traffic and transport conditions in the area of the proposed development including for road traffic and for non-motorised users (NMUs). The traffic modelling work which is being undertaken for the project is explained and initial findings of traffic appraisal work are presented to set out a context for the anticipated effects of the proposed development on future traffic flows and for NMU users.

9.2 Consultation

Consultation has been undertaken with a number of key traffic and transport stakeholders. As part of the development of the traffic model, technical meetings were held with Transport Scotland, Renfrewshire Council, Glasgow City Council and West Dunbartonshire. Details of the traffic modelling work are not presented in this Scoping Report but can be found in the project's transport modelling reports³⁰.

It was recognised at an early stage of the CWRR project that the input of NMU groups would help to achieve an important project objective of providing better quality, integrated walking and cycling routes to key employment, healthcare, and leisure locations. A number of relevant NMU organisations were consulted and an NMU workshop was held with key representatives in April 2016. The key feedback from a number of these groups is presented in Chapter 3: Land Use and Communities (see **Table 3.1**).

The NMU workshop allowed attendees to consider the emerging design proposals and gave them the opportunity to highlight issues and provide their views on design for pedestrians and cyclists. Feedback from the workshop is being used to input to the emerging design of cycleways and pedestrian facilities.

9.3 Baseline Description

This section describes the baseline traffic and transport environment within the proposed development area and the existing transport infrastructure.

9.3.1 NMU

The existing provision for NMUs varies considerably throughout the CWRR study area. These largely consist of a network of core paths, cycle routes and footways, including various forms of pedestrian and/or cycle crossings within the local road network. The provision of existing NMU user facilities in and around Renfrew and Yoker are shown on **Figure 3.1**.

To the north of the River Clyde, in and around Clydebank and Yoker, the cycle network is largely confined to on-road facilities which provide NMU routes throughout the district. Within the Renfrew area, cycle networks are generally located out with the urban areas with partial penetration into the town centre and residential areas using dedicated cycle facilities. In general, the on-road cycle facilities identified within the study area do not include provision of

³⁰ SIAS (June 2016) Renfrewshire City Deal, Part B Option Testing Report

dedicated cycle lanes and segregation from motorised traffic or advance stop lines at junctions, both major and minor.

The multi-modal accessibility tool, TRACC has been used to estimate journey times between various destinations north and south of the Clyde for the current NMU and road network.

Figures 9.1 and 9.2 show the existing journey times for Clydebank, Yoker and Renfrew.

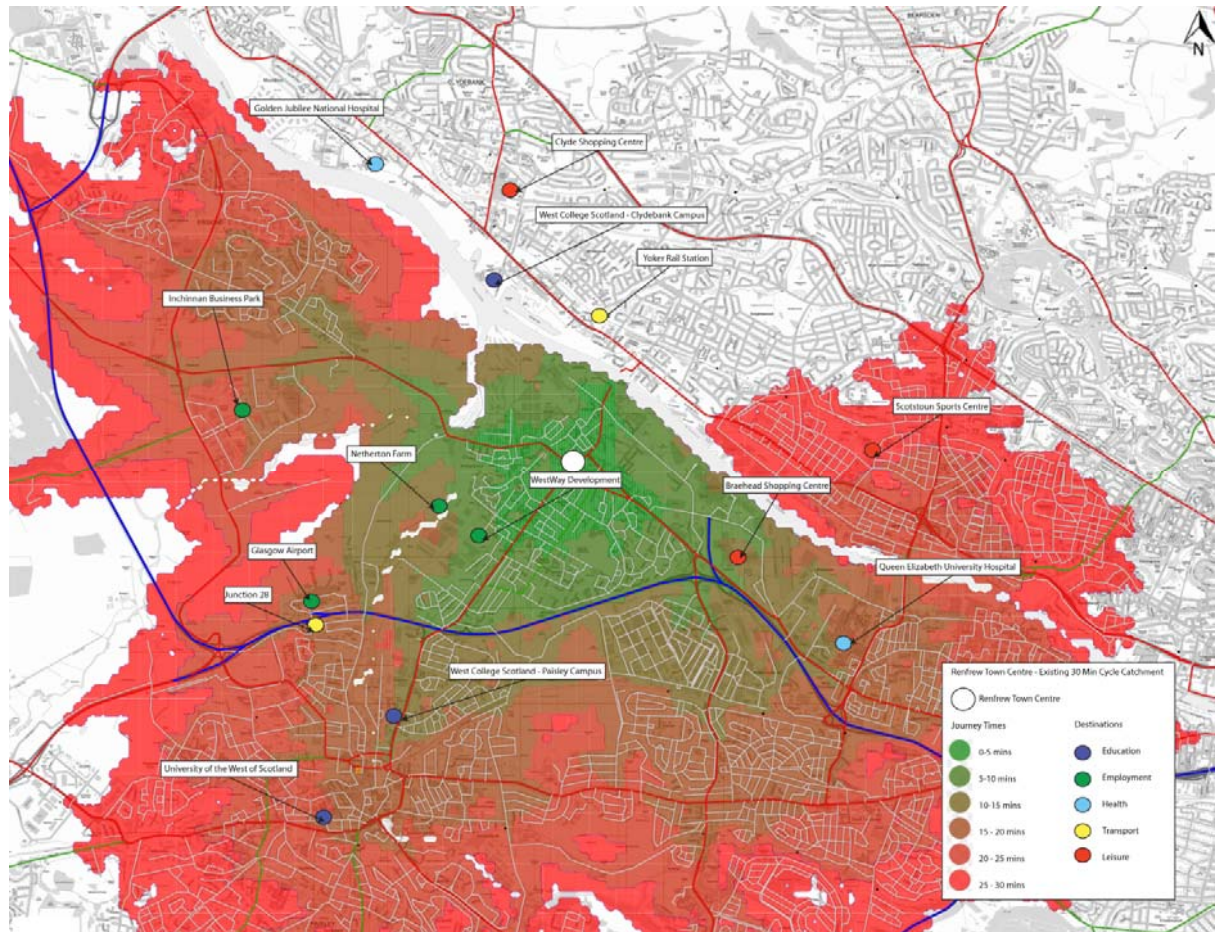


Figure 9.1 Existing Journey Times - Renfrew

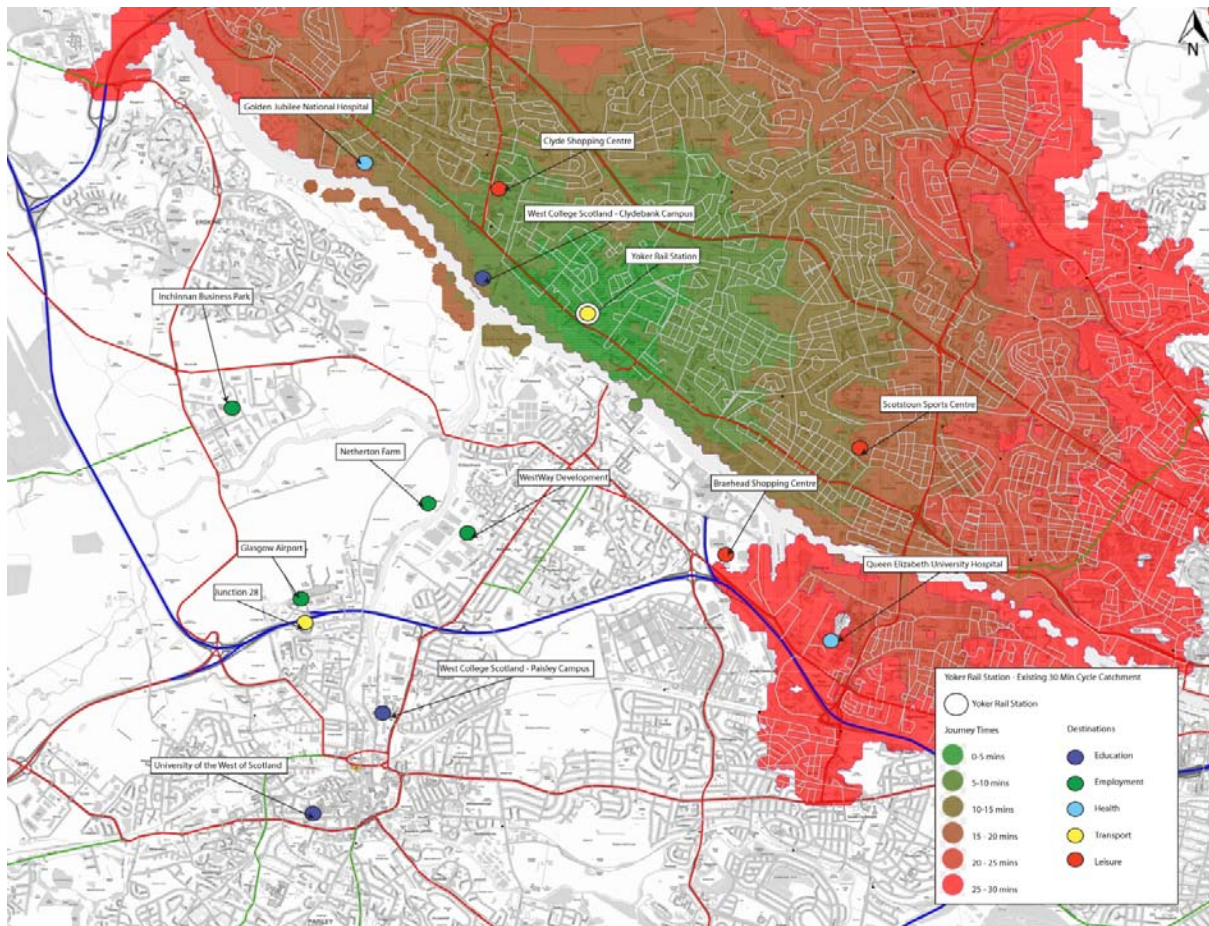


Figure 9.2 Existing Journey Times - Yoker

9.3.2 Road Traffic

In order to establish the existing traffic conditions in the CWRR area, a variety of surveys have been commissioned and were undertaken in August 2015.

Initial analysis of link flows has indicated that, when compared to the theoretical capacities set out in the NESA Manual (DMRB Volume 15, Section 1, Part 5):

- Abbotsinch Road, Inchinnan Road, Paisley Road, Renfrew Road, the Erskine Bridge and Dumbarton Road are currently operating within capacity; and
- The M8 between Junctions 27 and 28 and the Clyde Tunnel are operating close to capacity.

Traffic flow levels in the CWRR area vary throughout the hours of the day. An operational model created in S-Paramics was developed covering the areas of Renfrew, Paisley and Yoker. The study area can be seen in **Figure 9.3**.

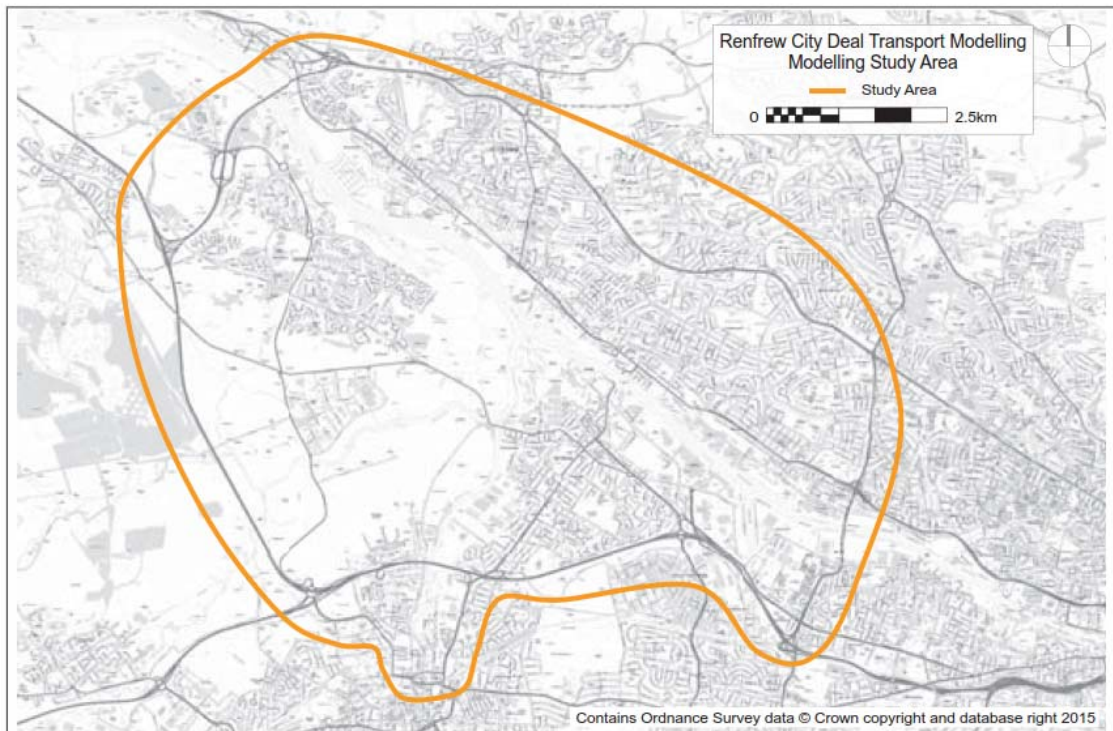


Figure 9.3 Traffic Model Study Area

The traffic model has been used to generate traffic flow information for a 'base year' (2015) and for future traffic levels predicted (in 2037) to take account of the anticipated growth in traffic. This future year scenario is based on anticipated development between now and 2037 in line with the Local Development Plans (LDPs) of the three local authorities.

The traffic flows for the base (2015) and the Local Development Plan (2037) scenarios for CWRR can be seen in **Figure 9.4** and **Table 9.1** displaying the respective locations of each of the test points.



Figure 9.4 CWRR Traffic Model Study Area

Table 9.1 Two way 3 hour traffic flows on key links (Base 2015 and LDP 2037)

	Road	Direction	AM 0700 – 1000		PM 1600 - 1900	
			Base 2015	LDP 2037	Base 2015	LDP 2037
1	Crossing C	NB	-	-	-	-
	Crossing C	SB	-	-	-	-
2	Renfrew Northern Development Rd	NB	-	611	-	619
	Renfrew Northern Development Rd	SB	-	312	-	1068
3	Inchinnan Rd W	EB	1998	2434	1911	2603
	Inchinnan Rd W	WB	1119	1165	2530	2371
4	Inchinnan Rd E	EB	1977	1812	1945	2039
	Inchinnan Rd E	WB	1102	828	2479	1381
5	Hairst St	NB	445	398	653	809
	Hairst St	SB	394	342	718	446
6	Kings Inch Rd	EB	709	1198	876	1432
	Kings Inch Rd	WB	340	495	799	1461

	Road	Direction	AM 0700 – 1000		PM 1600 - 1900	
			Base 2015	LDP 2037	Base 2015	LDP 2037
7	Dumbarton Rd	EB	1506	1959	2101	2709
	Dumbarton Rd	WB	1599	1937	1724	2016
8	Dumbarton Rd W	EB	1313	1811	1798	2118
	Dumbarton Rd W	WB	1674	1799	1521	1906
9	Dumbarton Rd E	EB	1355	1709	1872	2158
	Dumbarton Rd E	WB	1590	1677	1677	1856

The main traffic findings in terms of predicted changes in future traffic flows (without the CWRR project in place) between the Base model and the LDP scenario are:

- a reduction in traffic flow on Inchinnan Road East between Argyll Avenue and Renfrew Cross as a result of the introduction of the Renfrew Northern Development Road (RNDR)³¹;
- the Renfrew Northern Development Road accounts for a significant increase in traffic flows during peak periods on Kings Inch Road;
- a reduction in southbound traffic flows on Hairst Street during the PM peak. This is largely due to the re-assignment to the Renfrew Northern Development Road; and
- a significant increase in peak period traffic flows on Dumbarton Road. No new infrastructure improvements are proposed in this area with the increase in flows being a function of general traffic growth.

9.4 Potential Effects

9.4.1 Construction

During the construction process it is expected that traffic on the local road network will increase as a result of the presence of construction vehicles, in addition to the associated growth forecasts which accompany future traffic flows. All construction traffic will be expected to follow pre-designated routes upon entering and exiting the site during specified operating hours. This will ensure that any disruption to local residents, businesses, and the local highway network in general is kept to a minimum.

Facilities including wheel-washing points located at site accesses, temporary pedestrian routes and temporary hoardings are, among other things, to be in place to help minimise the adverse effects of the construction process and to maximise safety. Services including road sweeping will also be implemented.

³¹ Whilst the RNDR is a key part of the CWRR project proposals, it has also been assumed to be in place for the LDP 2037 scenario because it is a committed scheme in relevant Renfrewshire Council plans including the LDP

9.4.2 Operation - NMU

The design of the proposed two lane carriageway cross-sections for all new CWRR road infrastructure have incorporated an off carriageway provision for NMUs in the form of a 3m shared footway/cycleway adjacent to either side of the carriageway where possible. This has been illustrated in **Figure 3.1**.

The design of the proposals aims to provide a more direct walking and cycling route than presently in place, to enhance facilities for NMUs and to provide connections with existing NMU links wherever possible. The core path REN/2 currently follows the route of the River Cart from Inchinnan Road north, and the River Clyde; from the confluence with the River Cart to the Renfrew Ferry; a distance of approximately 3km. This is currently the only signed traffic free route from the west of the study area to the proposed new bridge crossing point. The new alignment would reduce the distance to travel from the Bascule Bridge to the Ferry Terminal by approximately 1.4km and will provide a continuous NMU link from Ferry Road to the new Clyde crossing by means of Meadowside Street then along the new approach roads to the crossing.

Isochronal journey time maps produced using the multi-modal accessibility tool (see **Figures 9.5** and **9.6**), TRACC display the predicted journey times between various locations north and south of the Clyde for Yoker and Renfrew, respectively, with the new roads and river crossing in place.

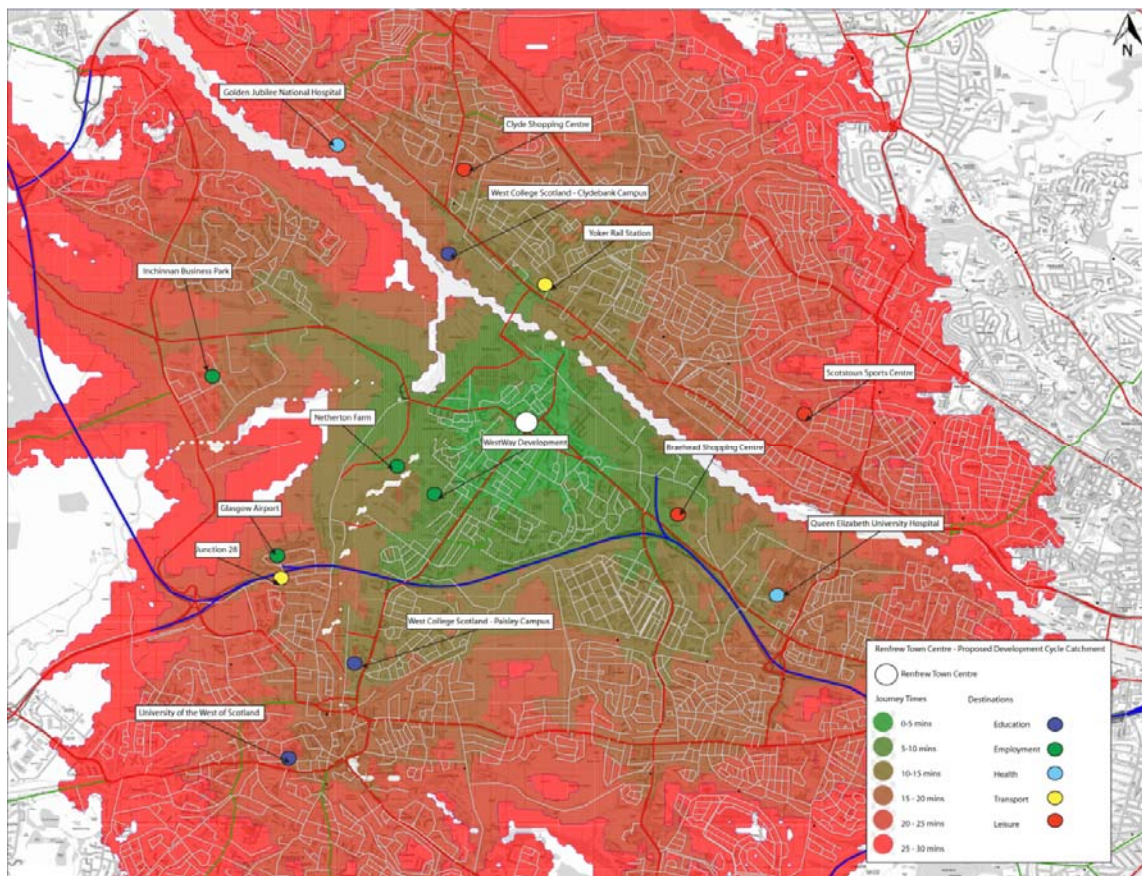


Figure 9.5 Predicted Journey Times – Renfrew

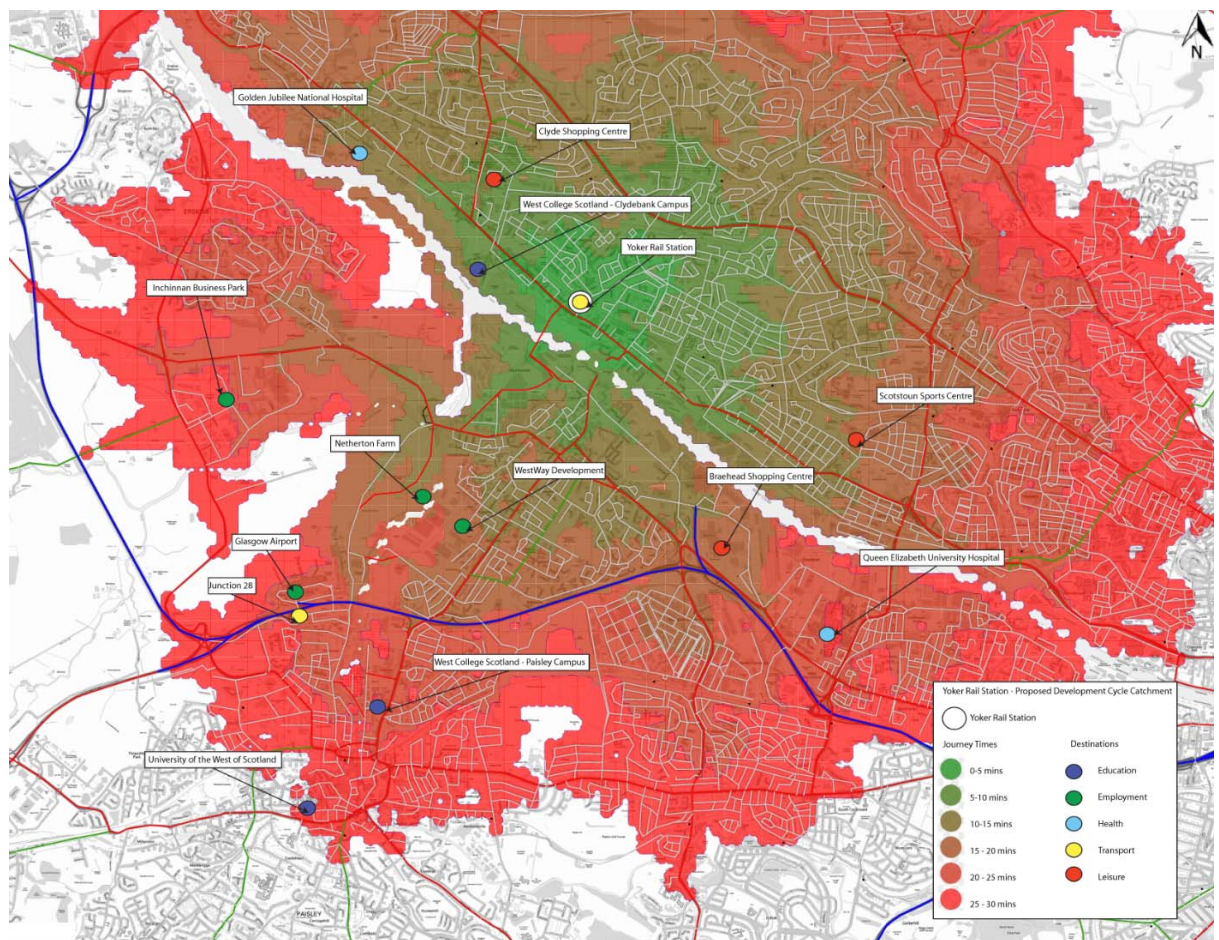


Figure 9.6 Predicted Journey Times – Yoker

9.4.3 Operation - Road Traffic

Predicted traffic flows for the Local Development Plan (2037) scenario (ie without the CWRR project) and the Corridor C³² (2037) alignment (with the CWRR project) from a number of key links have been compared. A summary the results is displayed in **Table 9.2**.

Table 9.2 Two Way 3 hour Traffic Flows on Key Links

Road	Direction	AM 0700 – 1000		PM 1600 - 1900	
		LDP 2037	Option C 2037	LDP 2037	Option C 2037
1	Clyde Crossing NB	-	1200	-	1180
	Clyde Crossing SB	-	1189	-	1541
2	Northern Distributor Rd NB	611	1198	619	1223

³² Corridor C refers to the preferred option for the Clyde Crossing which has been taken forward from the options stage to development as the specimen design for CWRR. The traffic model for the project incorporates the new river crossing and approach roads north and south together with the RNDR

Road	Direction	AM 0700 – 1000		PM 1600 - 1900	
		LDP 2037	Option C 2037	LDP 2037	Option C 2037
Northern Distributor Rd	SB	312	742	1068	1514
3 Inchinnan Rd W Inchinnan Rd W	EB	2434	2542	2603	2451
	WB	1165	1558	2371	3066
4 Inchinnan Rd E Inchinnan Rd E	EB	1812	1349	2039	1319
	WB	828	798	1381	1600
5 Hairst St Hairst St	NB	398	442	809	395
	SB	342	503	446	512
6 Kings Inch Rd Kings Inch Rd	EB	1198	1678	1432	2166
	WB	495	1052	1461	2223
7 Dumbarton Rd Dumbarton Rd	EB	1959	2072	2709	2756
	WB	1937	1897	2016	2107
8 Dumbarton Rd W Dumbarton Rd W	EB	1811	2268	2118	2598
	WB	1799	2172	1906	2198
9 Dumbarton Rd E Dumbarton Rd E	EB	1709	1627	2158	1949
	WB	1677	1474	1856	1820

A summary of the main traffic findings between the 2037 LDP scenario and the proposed development alignment scenario are:

- an increase in traffic volumes in parts of the CWRR area associated with the increased traffic attracted to the new crossing;
- there are predicted increases in traffic flows on the RNDR, Kings Inch Road and Dumbarton Road due to the new Clyde crossing, apart from on Glasgow Road at Dock Street where there is a slight reduction; and
- a slight increase in traffic flows on Inchinnan Road West and a decrease in flows on Inchinnan Road east of the junction of the proposed RNDR at Argyll Avenue.

Figure 9.7 and 9.8 show that the introduction of the new crossing would reduce accumulated queuing during both the AM and PM peaks when compared to the LDP scenario.

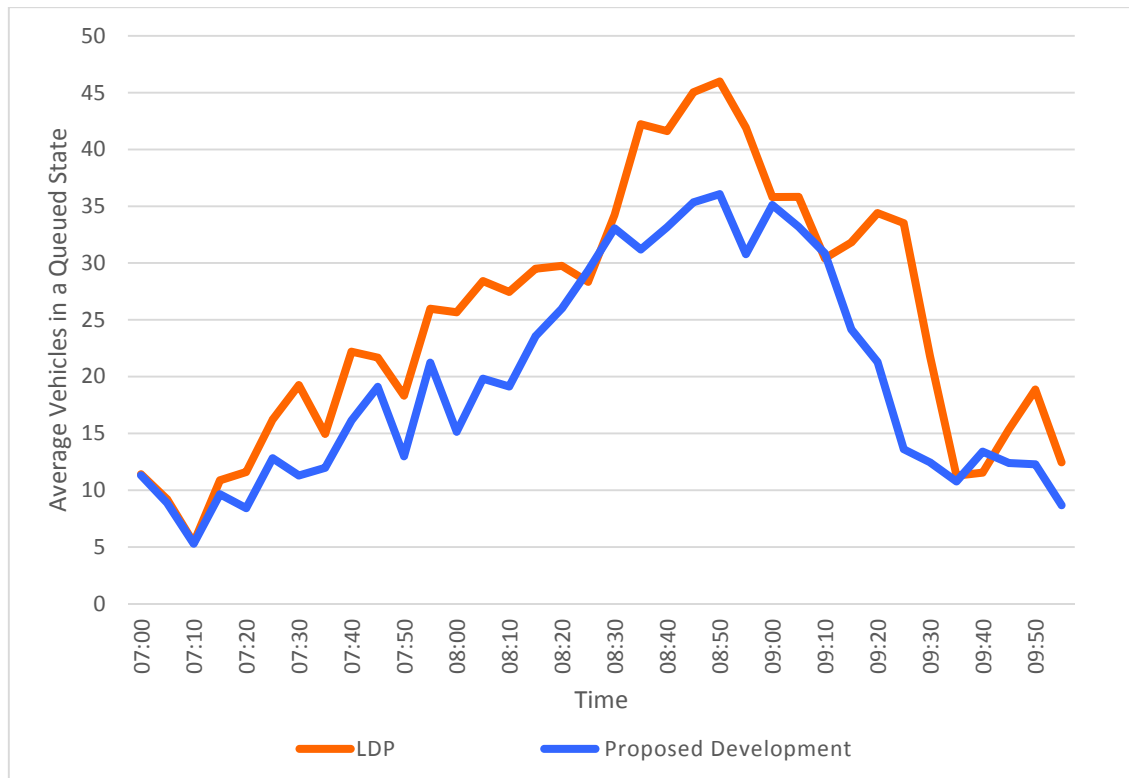


Figure 9.7 AM Peak Accumulative Queuing (LDP to Proposed Development)

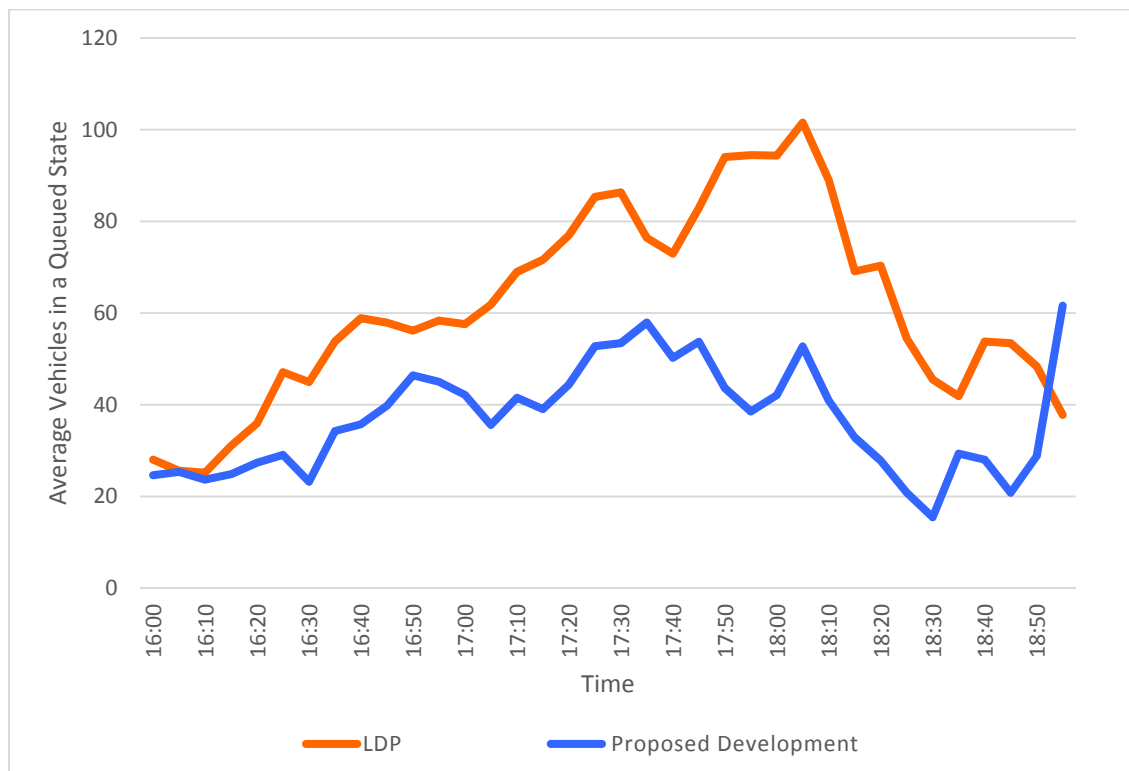


Figure 9.8 PM Peak Accumulative Queuing (LDP to Proposed Development)

In summary, the 2037 scenario with the CWRR infrastructure in place is shown to experience the lower levels of accumulative queuing during the AM and PM peak periods than the LDP (without project) scenario.

In addition to the reduced accumulative queuing, introduction of the Clyde crossing is predicted to result in significant savings in Cross-Clyde journey times for both north-south, and south-north journeys.

9.5 Proposed Scope of Assessment

For Traffic and Transport, three main criteria will be used to inform the transport assessment process. These are:

- Traffic Flows
- Journey times and speeds to key destinations
- Accessibility (TRACC)

The detailed information and analysis prepared for the traffic and transport economic assessments will be summarised and used to present an overview of the predicted effects of the proposed development's construction and operation in a traffic chapter for the ES. Traffic modelling will also be undertaken for the CWRR project in combination with the infrastructure measures proposed for the adjacent GAIA City Deal project. The outputs from this modelling will be presented in the cumulative effects assessment volume of the ES (see Section 13.4) and will be used to inform noise and air quality modelling of these changes.

10 Noise and Vibration

10.1 Introduction

This section describes the scope and approach of the noise and vibration impact assessment. Drawing on the results of work that has already been undertaken for the options assessment stages of the proposed development, initial consideration is given to potentially significant effects that could arise during construction and operational phases.

The noise and vibration impact assessment methodology will be based on guidance contained in the *Design Manual for Roads and Bridges, Volume 11: Environmental Assessment, Section 3: Environmental Assessment Techniques*, in particular *Part 7: HD 213/11- Revision 1 Noise and Vibration* (HD 213/11).

Assessment of construction phase impacts would be focussed in the region of the proposed new routes and any improvements to the existing network. Operational phase impacts could also arise in these areas, but also across the wider area due to associated traffic redistribution.

The potential for impacts over a wider area during the operational phase is recognised in the determination of the Study Area as defined within HD 213/11. The Study Area is derived based on distance buffers around the proposed new routes but also those routes which are being 'bypassed or improved'. In the case of this development, the alternative routes across the River Clyde are the Erskine Bridge, which is 5.5km to the north-west and the Clyde Tunnel, which is 4.5km to the south-east. Those routes which might therefore be considered to be 'bypassed' would include not only these existing River Clyde crossings, but also the direct routes between these crossings and the proposed new routes. This will clearly result in a large Study Area.

The work undertaken to date has recognised that road traffic noise impacts could arise across such a large Study Area, but has focussed on a comparison of the impacts which could arise across a common area local to the proposed new route options that were assessed. This is because it is the new routes that have the potential to generate the greatest adverse effects and so were identified as a key differentiator between the options being compared.

The noise and vibration assessment work that has been undertaken to date has included initial consultation with West Dunbartonshire Council, Renfrewshire Council, and Glasgow City Council, a review of baseline conditions local to the proposed development, including the identification of nearby noise and vibration sensitive receptors and a review of the prevailing local noise environment.

Pertinent information from this work is presented below, but the need to quantify the impact of the proposed development across the wider DMRB compliant Study Area is recognised and accounted for in the proposed assessment methodology.

10.2 Consultation

Initial consultation has been undertaken with the Environmental Health Departments of each of the three Local Authorities in the vicinity of the proposals. The responses received are detailed in **Table 10.1**.

Table 10.1 Consultation responses, noise and vibration

Consultee	Response/Action	Data Provided	Action Taken
West Dunbartonshire Council Environmental Health Department	Advised that the residents of Clydebank East have been mounting a campaign, mainly through the Clydebank East Community Council and local MSP, regarding aircraft noise affecting residents of Linnvale and Whitecrook in Clydebank, and seeking to obtain funding for sound insulation works to their homes to reduce the effects of aircraft noise.	No	Suggests high levels of aircraft noise in the identified areas of Linnvale and Whitecrook. If these areas fall within the assessment study area, then careful consideration required in accurate determination of baseline conditions, with reference to aircraft noise contours.
Renfrewshire Council Environmental Health Department	Awaiting response	-	-
Glasgow City Council	Awaiting response	-	-

Additional consultation will be undertaken with all the Local Authorities as the detailed noise and vibration assessment progresses. In particular, this consultation will seek input from the Local Authorities on:

- available information on known local sources of noise and vibration across the area;
- any specific noise or vibration related local planning policies;
- national noise and vibration policies that are considered particularly relevant to the local area;
- any known local receptors, other than dwellings, that could be particularly sensitive to noise and vibration (e.g. medical facilities, research centres etc.);
- sources of historic noise or vibration complaint; and
- if any Candidate Noise Management Areas (CNMAs) and Candidate Quiet Areas (CQAs) are within the jurisdiction of each Local Authority and any information on work undertaken to progress these from 'candidate' status to 'confirmed'.

10.3 Baseline Description

10.3.1 Prevailing Noise and Vibration Environment

The introduction of a new noise source to a low noise area usually has greater potential to generate significant impacts than if it were introduced to a high noise area. There is however a judgement to be made in that it may be desirable not to significantly increase noise levels in areas where high noise levels already exist, for example within any NMAs or CNMAs as defined within agglomeration Noise Management Plans³³.

In response to the *European Parliament and Council Directive for Assessment and Management of Environmental Noise 2002/49/EC*, more commonly referred to as the *Environmental Noise Directive* (END), the Scottish Government has undertaken an environmental noise mapping exercise. Separate noise maps have been prepared for the L_{den} noise index (a weighted average of the daytime, evening and night-time noise levels) and the L_{night} noise index (night-time only noise levels). For each index, noise maps have been prepared for the following:

- road traffic noise only;
- rail traffic noise only;
- industrial noise only;
- aircraft noise only; and
- consolidated noise (all sources combined).

This exercise is repeated every five years and the latest 'second round' noise maps were completed in 2012. **Figure 10.1** presents the second round L_{den} (day, evening and night) noise map for the consolidated sources, whilst **Figure 10.2** presents the second round L_{night} (night only) noise map (also consolidated sources). Also presented on these figures is an outline of the proposed development routes that are to be assessed and a nominal 300m buffer around the development elements. Whilst the Study Area for the noise and vibration assessment will be greater than this, (see Section 10.4.4.1), it is considered that the greatest potential for adverse noise and vibration effects will be in the vicinity of the proposed new road traffic routes upon which these 300m buffers have been determined.

With regards to baseline vibration, the key operational phase vibration impact that could arise from the proposed development is road traffic induced airborne vibration, e.g. that associated with low frequency noise causing movement in building elements (window rattle etc.). In accordance with HD 213/11, the potential for this is directly related to noise levels. Therefore consideration of the environmental noise maps, in conjunction with the location of receptors, inherently accounts for consideration of those existing receptors which are either more, or less, susceptible to existing levels of airborne vibration.

³³ Glasgow Agglomeration Noise Action Plan, The Scottish Government, July 2014 ISBN 978-1-78412-702-2 (Web only - <http://www.scottishnoisemapping.org/downloads/NAPS/round-2/Glasgow%20Noise%20Action%20Plan.pdf>)

From consideration of **Figures 10.1** and **10.2** it can be seen that the main sources of environmental noise in the vicinity of the proposed development are transport related, including road traffic noise, air traffic noise and to a lesser extent rail traffic noise. Small localised pockets of industrial noise are also present during the daytime.

The key sources of road traffic noise are the A814 Glasgow Road / Dumbarton Road north of the River Clyde, and Kings Inch Road and the A8 Inchinnan Road (leading to Abbotsinch Road and Greenock Road) south of the River Clyde. Recognition is also noted of the traffic noise on Meadowside Street associated with industrial uses in that area.

The main source of rail traffic noise is the Dalmuir to Glasgow / Dalmuir to Larkhall / Helensburgh Central to Edinburgh railway line which runs in a broadly NW to SE direction, but is north of the A814 Glasgow Road / Dumbarton Road. There are no rail traffic noise sources south of the River Clyde.

It can also be seen that the Glasgow Airport noise contours are prevalent across the local area to the north-west of the proposed development.

Considering the wider area, beyond the vicinity of the proposed development, the Scottish Government noise maps depict a noise environment typical of what is expected of an urban / suburban area, comprising a combination of road, rail, aircraft and industrial / commercial noise sources.

10.3.2 Noise and Vibration Sensitive Receptors

HD 213/11, details that examples of sensitive receptors include 'dwellings, hospitals, schools, community facilities, designated areas (e.g. National Park, SAC, SPA, SSSI, SAM), and public rights of way. Consideration will be given to sensitive receptors that exist and those that are proposed / approved.

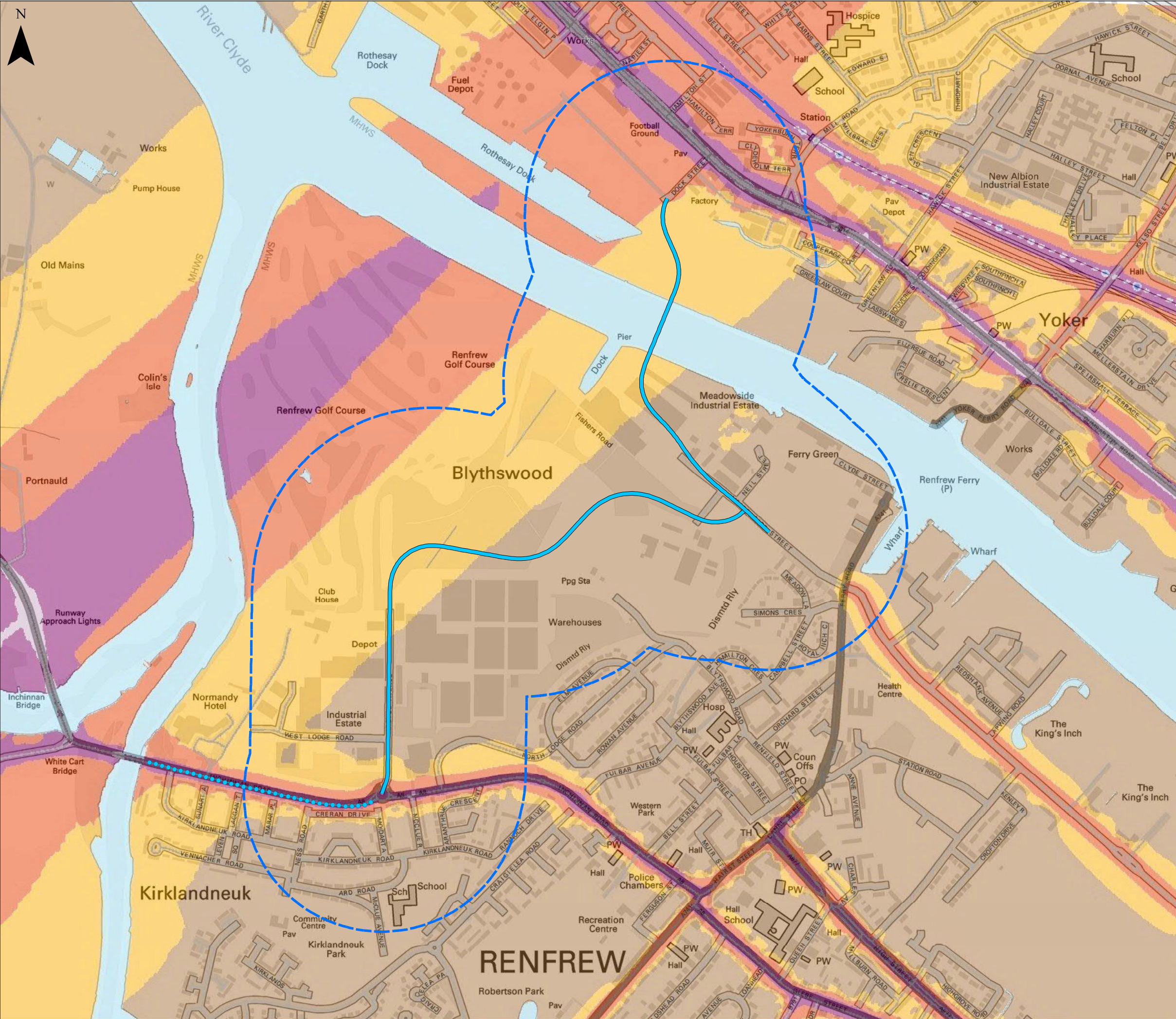
10.3.2.1 Existing Receptors

Address based noise and vibration sensitive receptors in the vicinity of the proposals have been identified by means of:

- a desk review of the Ordnance Survey (OS) AddressBase Premium database;
- a review of OS mapping and freely available aerial and street scene photography; and
- observations made during a site walk-over.

The OS AddressBase Premium database includes address point classification codes such as 'residential', 'other', 'land' and 'commercial' and also includes over 560 subcategories, e.g. 'medical', 'dentists', and 'general practitioners' etc.

These address data have been filtered to include only those entries for sub-categories considered both noise-sensitive and falling within the overarching descriptors of 'residential / temporary residential' or 'community facilities (both 'sensitive' and 'less sensitive'), educational, medical and outdoor recreation and parks', and a separate sub category for entries falling within the OS classification code of 'unclassified'. Other addresses / data entries have been filtered out, e.g. non-sensitive commercial addresses and garages etc.



Notes

Key

Indicative Line of New / Upgraded Road

Indicative Line of New Cycle Link

Indicative Line of New / Upgraded Road 300m Buffer

x < 55 dB(A)

55 => x <= 60 dB(A)

60 => x <= 65 dB(A)

65 => x <= 70 dB(A)

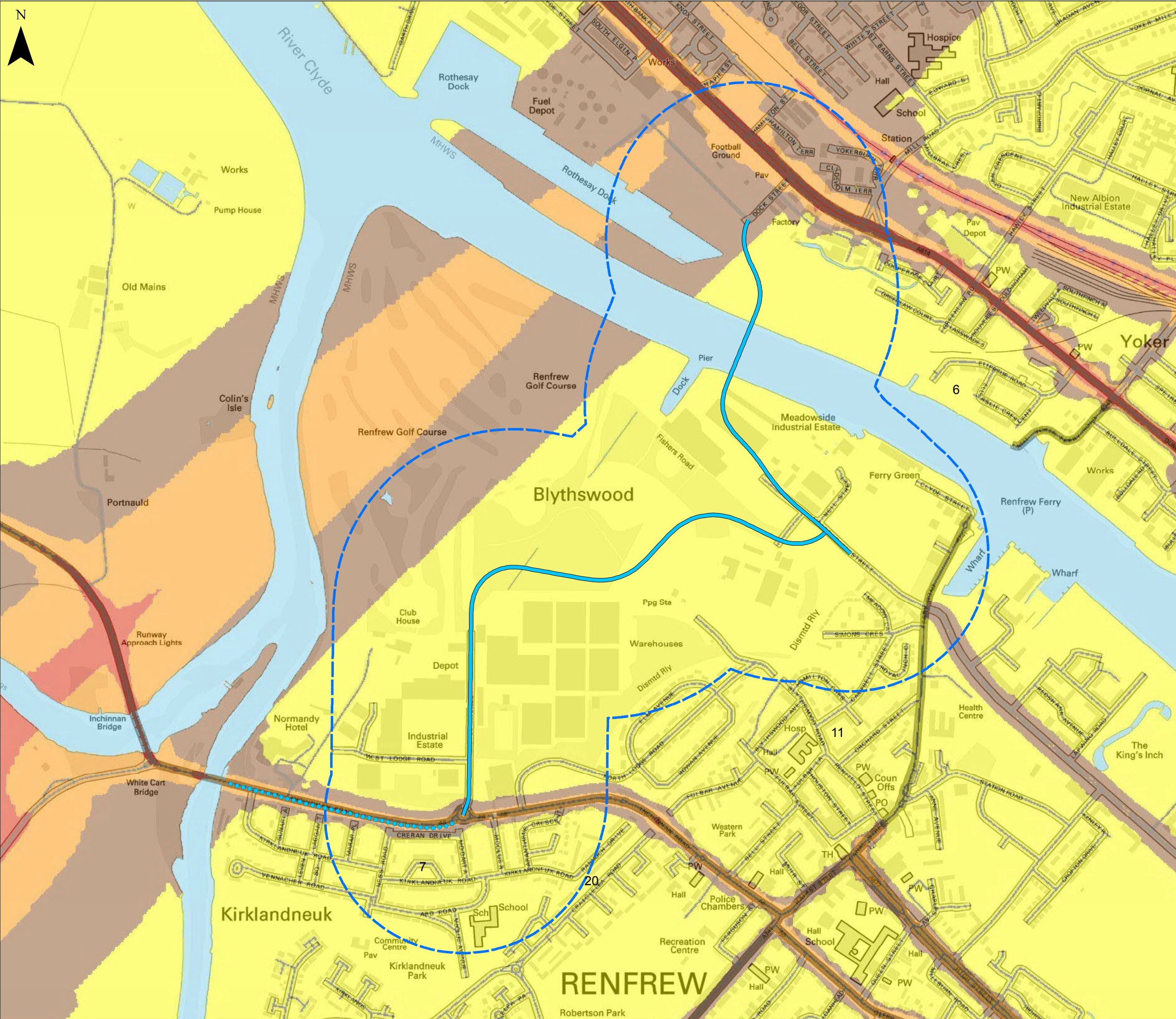
70 => x <= 75 dB(A)

75 => x <= 80 dB(A)

x >= 80 dB(A)

0100200400Meters

Reference Drawings				
REV	DATE	AMENDMENT DETAILS	ORIG	CHKD
Sweco City Park Suite 3/5 368 Alexandra Parade Glasgow G3 1 3AU Tel: +44 (0)141 414 1700 web: www.sweco.co.uk				
Client RENFREWSHIRE COUNCIL				
Drawing Status BIM AUTHORISATION			Suitability S6	
Project Title CLYDE WATERFRONT AND RENFREW RIVERSIDE				
Drawing Title Figure 10.1: Scottish Government Noise Mapping (L _{den}), Proposed Development Alignment and 300m buffer				
Scale	1:8,000	Designed	BR	Drawn
Original Size	A3	Date	07/08/2016	Date
Drawing Number	117086 - SWECO - EAC - 00 - SP - EN - 00003	Checked	JP	Approved
Project	Originator	Volume	Location	Type
117086	SWECO	EAC	00	SP
EN	00003			
Revision	0A			



Notes

Key

- Indicative Line of New Cycle Link
- Indicative Line of New / Upgraded Road
- Indicative Line of New / Upgraded Road 300m Buffer
- $x < 50 \text{ dB(A)}$
- $50 \text{ to } 55 \text{ dB(A)}$
- $55 \Rightarrow x \leq 60 \text{ dB(A)}$
- $60 \Rightarrow x \leq 65 \text{ dB(A)}$
- $65 \Rightarrow x \leq 70 \text{ dB(A)}$
- $70 \Rightarrow x \leq 75 \text{ dB(A)}$
- $75 \Rightarrow x \leq 80 \text{ dB(A)}$
- $x \geq 80 \text{ dB(A)}$

0 100 200 400 Meters

REV	DATE	AMENDMENT DETAILS	ORIG	CHKD	APPD
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

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SWECO

Client
RENFREWSHIRE COUNCIL

Drawing Status	Suitability
BIM AUTHORISATION	S6

Project Title
CLYDE WATERFRONT AND RENFREW RIVERSIDE

Drawing Title
Figure 10.2: Scottish Government Noise Mapping (L_{night}), Proposed Development Alignment and 300m Buffers

Scale	Designed	Drawn	Checked	Approved
1:8,000	BR	BR	JP	HC

Original Size	Date	Date	Date	Date
A3	07/09/2016	07/09/2016	07/09/2016	07/09/2016

Drawing Number	Project	Originator	Volume	Location	Type	Role	Number
117086 - SWECO - EAC - 00 - SP - EN - 00003							

Project Ref. No.	Revision
117086 (R09)	0A

The address data which are within a nominal 300m distance buffer of the proposed development route centrelines have been geographically mapped onto OS StreetView mapping along with the proposed development routes and the 300m buffers.

The results of the OS mapping and aerial photography review have been used to identify potential key areas of anomalies within the address data. These areas have then been subject to a site walk-over and visual inspection. The results of this review and site walk-over have been used to complete manual updates to the address data.

Figure 10.3 and **10.4** present the resulting residential and non-residential address based receptors that have been identified within 300m of the proposed development route centrelines.

Digital mapping has been reviewed to identify local Core Paths and designated areas. These are presented in **Figure 10.5** along with the proposed scheme elements and associated 300m buffers.

The latest Glasgow Agglomeration Noise Action Plan³⁴ has also been reviewed to identify local CNMAs and CQAs in the vicinity of the proposed development. These are also detailed on **Figure 10.5**.

The wider area, beyond the vicinity of the proposals, comprises general suburban and urban areas including the conurbations of Erskine, Southbar, Inchinnan, Renfrew and Clydebank. All of these areas include noise sensitive development such as residential dwellings.

As part of the noise and vibration assessment work to be undertaken, the identification of noise and vibration sensitive receptors, as described above, will be extended to cover the final determined Study Area.

10.3.2.2 Proposed / Approved Receptors

As well as considering existing receptors HD 213/11 states that 'Where planning permission for a residential development or any other sensitive receptor has been granted but for which construction has not started, the potential impacts on these locations should be estimated and reported separately'. Consideration will also therefore be given to those proposed developments which: a) include a residential element, and b) benefit from a planning consent. Such consented developments as identified within 300m of the proposed development route centrelines are depicted in **Figure 10.6**.

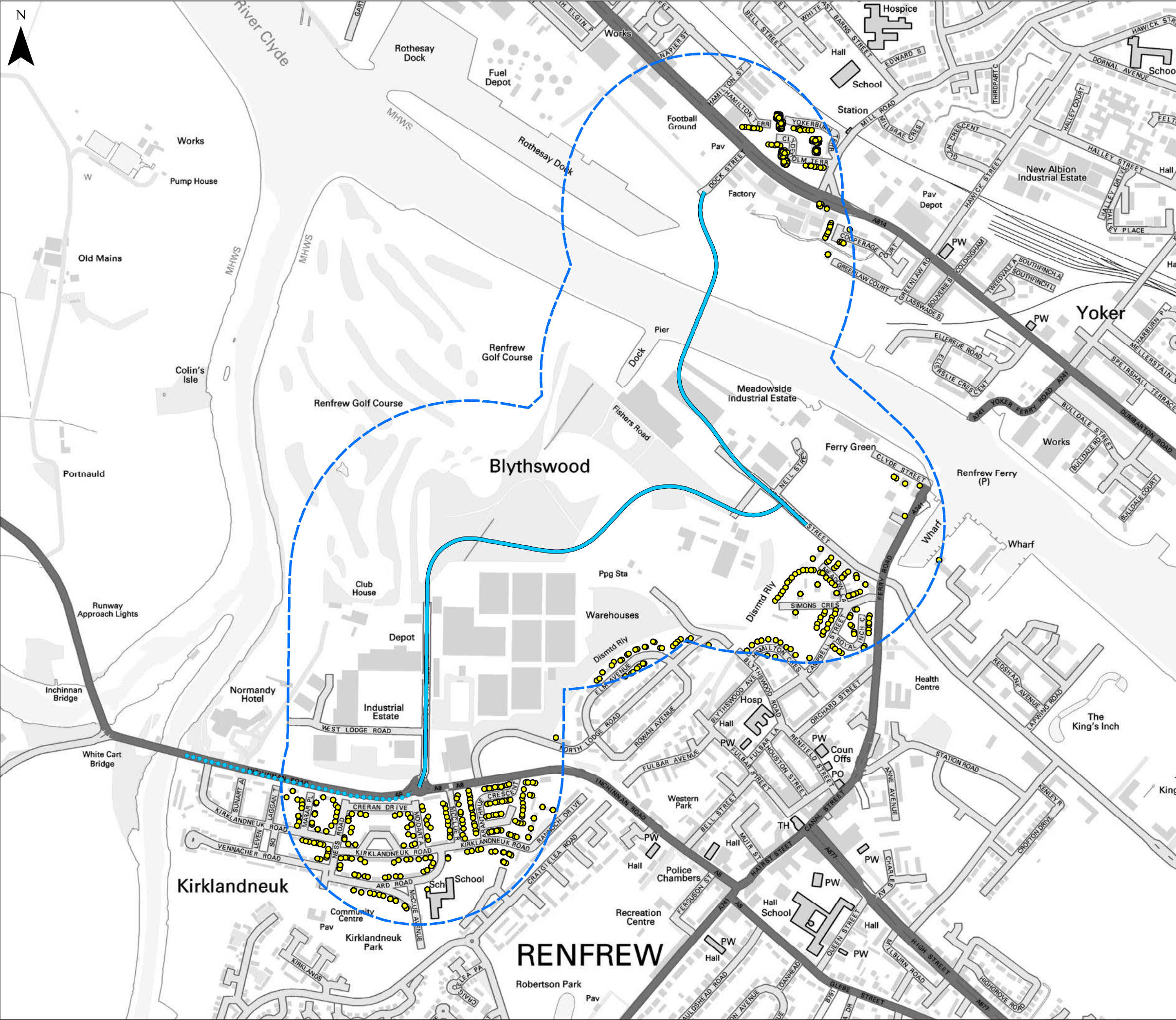
As part of the noise and vibration assessment work to be undertaken, account will be given to consented developments, with residential elements, across the final determined Study Area.

10.4 Potential Effects

10.4.1 Construction

The following construction phase impacts are considered to have the potential to give rise to significant effects and have been 'scoped-in' to the proposed assessment:

³⁴ Glasgow Agglomeration Noise Action Plan, The Scottish Government, July 2014 ISBN 978-1-78412-702-2 (Web only - <http://www.scottishnoisemapping.org/downloads/NAPS/round-2/Glasgow%20Noise%20Action%20Plan.pdf>)



Notes

Key

Indicative Line of New Cycle Link

Indicative Line of New / Upgraded Road

Indicative Line of New / Upgraded Road 300m Buffer

Residential Receptors

0100200400

Meters

Reference Drawings

REV

DATE

AMENDMENT DETAILS

ORIG

CHKD

APPD

-	-	-	-	-	-
-	-	-	-	-	-

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Client

RENFREWSHIRE COUNCIL

Drawing Status

Suitability

BIM AUTHORISATION

S6

Project Title

CLYDE WATERFRONT AND RENFREW RIVERSIDE

Drawing Title

Figure 10.3: Proposed Development Alignment, 300m Buffers and Residential Receptors

Scale

1:8,000

Designed

BR

Drawn

BR

Checked

JP

Approved

HC

Original Size

A3

Date

07/09/2016

Date

07/09/2016

Date

07/09/2016

Date

07/09/2016

Drawing Number

Project

Originator

Volume

Location

Type

Role

Number

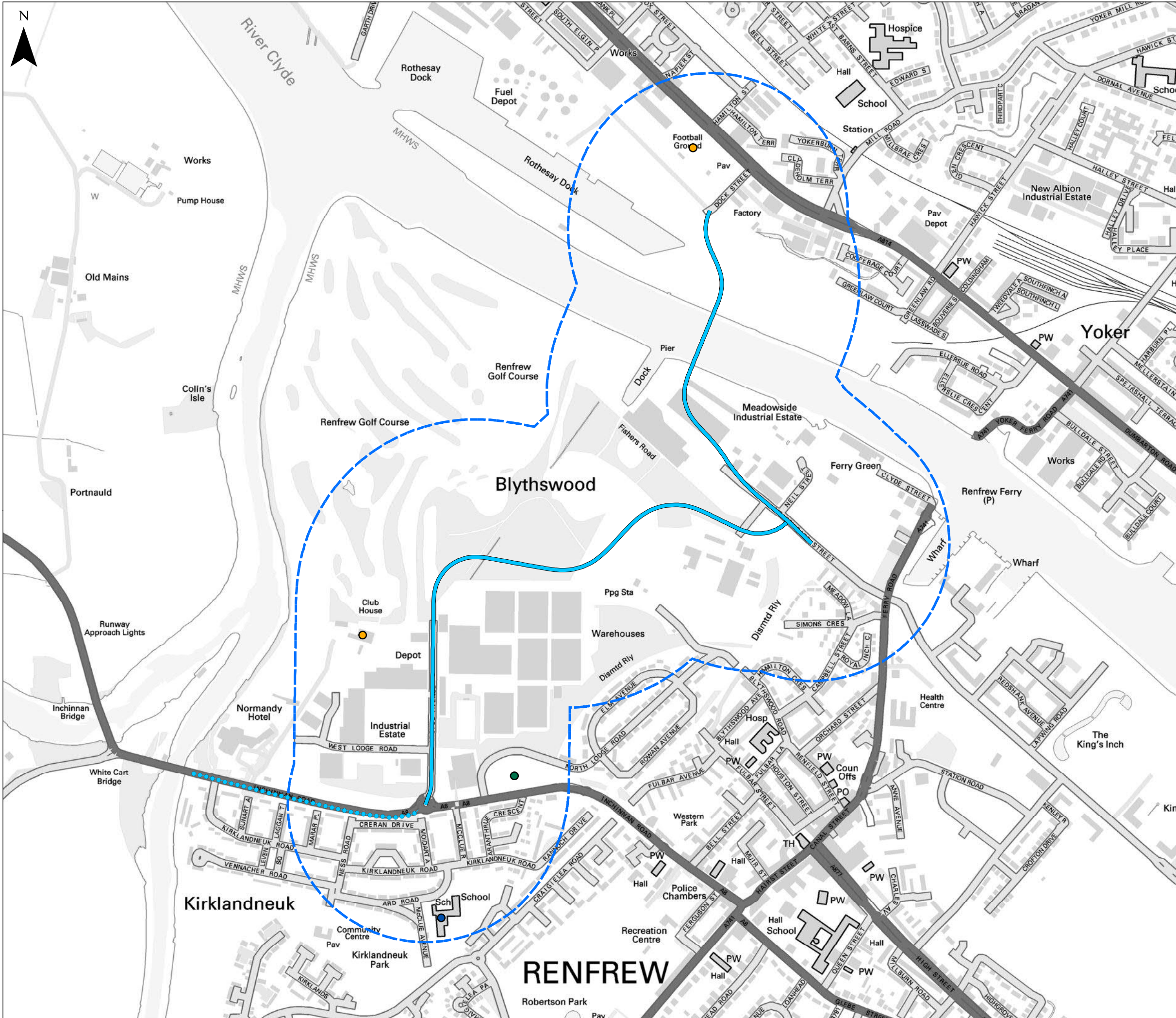
117086 - SWECO - EAC - 00 - SP - EN - 00003

Project Ref. No.

117086 (R09)

Revision

0A



Notes

Key

- Indicative Line of New Cycle Link
- Indicative Line of New / Upgraded Road
- Indicative Line of New / Upgraded Road 300m Buffer
- Outdoor Recreation Parks
- Community Facilities - Less Sensitive
- Educational Receptors

0 100 200 400 Meters

REV	DATE	AMENDMENT DETAILS	ORIG	CHKD	APPD
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

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Client
RENFREWSHIRE COUNCIL

Drawing Status	Suitability
BIM AUTHORISATION	S6

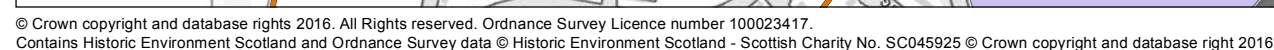
Project Title
CLYDE WATERFRONT AND RENFREW RIVERSIDE

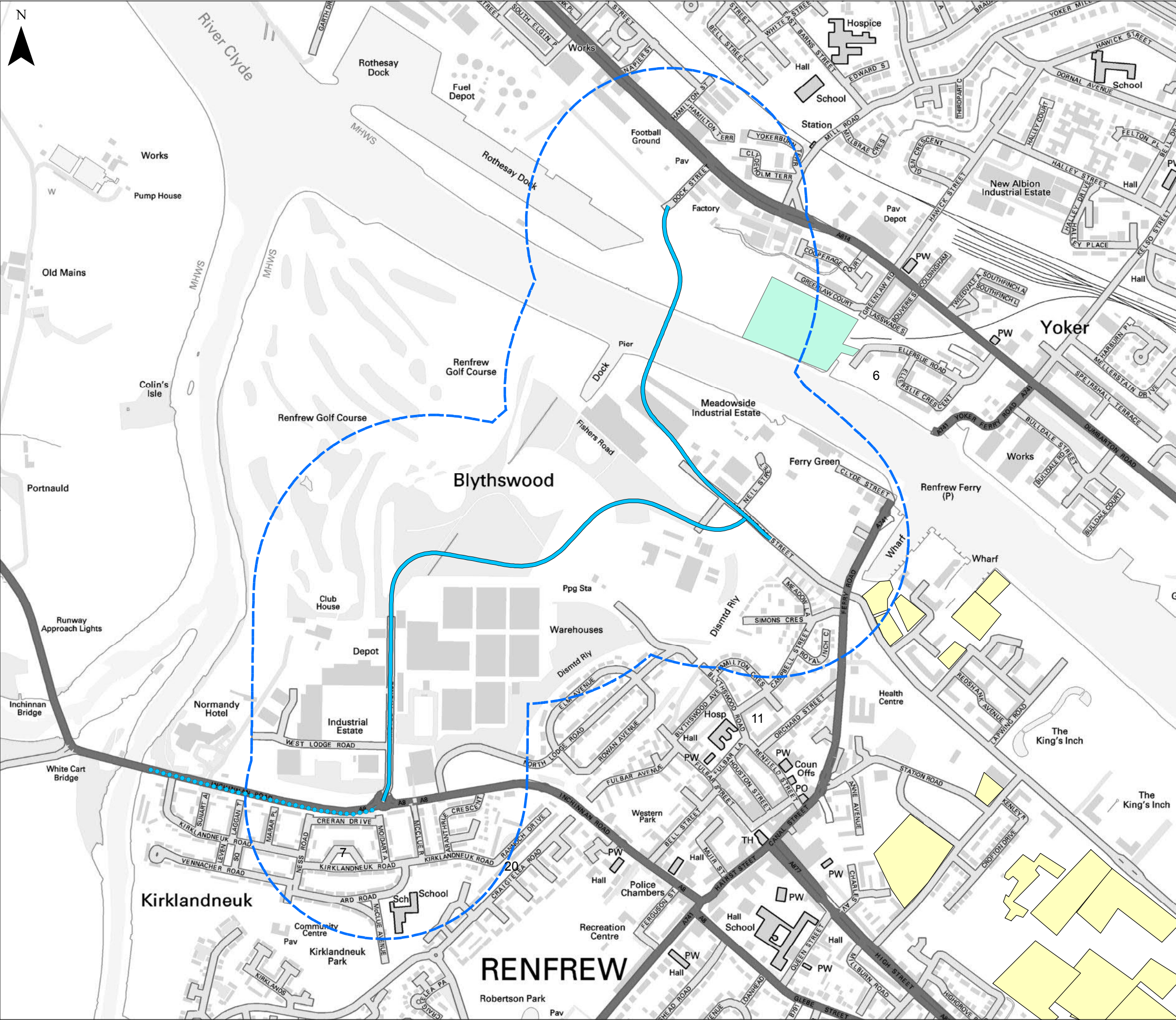
Drawing Title
Figure 10.4: Proposed Development Alignment, 300m Buffers and Non-Residential Receptors

Scale	Designed	Drawn	Checked	Approved
1:8,000	BR	BR	JP	HC

Original Size	Date	Date	Date	Date
A3	07/09/2016	07/09/2016	07/09/2016	07/09/2016

Drawing Number	Project	Originator	Volume	Location	Type	Role	Number	Project Ref. No.	Revision
117086 - SWECO - EAC - 00 - SP - EN - 00003								117086 (R09)	0A





Notes

Key

Indicative Line of New Cycle Link

Indicative Line of New / Upgraded Road

Indicative Line of New / Upgraded Road 300m Buffer

Glasgow City Consented Residential Planning Applications

Renfrewshire Consented Residential Planning Applications

0100200400Meters

Reference Drawings					
REV	DATE	AMENDMENT DETAILS	ORIG	CHKD	APPD
Sweco City Park Suite 3/5 368 Alexandra Parade Glasgow G3 1 3AU Tel: +44 (0)141 414 1700 web: www.sweco.co.uk					
Client RENFREWSHIRE COUNCIL 					
Drawing Status BIM AUTHORISATION			Suitability S6		
Project Title CLYDE WATERFRONT AND RENFREW RIVERSIDE					
Drawing Title Figure 10.6: Proposed Development Alignment, 300m Buffers, Approved Developments with Residential Element					
Scale	1:8,000	Designed	BR	Drawn	BR
Original Size	A3	Date	07/09/2016	Date	07/09/2016
Drawing Number	117086 - SWECO - EAC - 00 - SP - EN - 00003	Checked	JP	Approved	HC
Project	Originator	Volume	Location	Type	Role
117086	SWECO	EAC	00	SP	EN
Project Ref. No. 117086 (R09)					Revision 0A

- construction noise on existing and consented noise-sensitive receptors;
- construction traffic noise on existing and consented noise-sensitive receptors; and
- construction vibration on existing and consented vibration sensitive receptors.

The above impacts would be short term, only having the potential to arise during the construction period. As the proposed development routes are primarily 'off-line', it is anticipated that traffic diversions during the construction phase will be minimal and an assessment of associated temporary noise level changes has therefore been scoped-out of the assessment methodology.

10.4.2 Operation

The following operational phase impacts are considered to have the potential to give rise to significant effects and have therefore been 'scoped-in' to the noise and vibration assessment:

- road traffic noise level changes (from both new routes and traffic redistribution) on existing and consented noise sensitive receptors; and
- road traffic induced airborne vibration (from both new routes and traffic redistribution) on existing and consented vibration sensitive receptors.

The above impacts would be long term / permanent.

With regards to groundborne vibration, HD 213/11, states that an assessment of this "*will only apply in rare cases where, for example, traffic is expected to pass very close to buildings*". In the case of this development, new road traffic routes are not proposed in very close proximity to residential dwellings. The only road sections proposed in very close proximity to dwellings are where the scheme ties-in to existing route sections. At this stage it is proposed that an assessment of groundborne vibration is scoped-out of the assessment, however this will be kept under review as the detailed design progresses.

10.5 Proposed Scope of Assessment

HD 213-11 details a staged approach to the noise and vibration assessment, with the stages named 'Scoping', 'Simple' and 'Detailed'. The methodology for the Scoping stage assessment requires that the Study Area is defined and noise level changes of 1dB $L_{A10,18hr}$ or greater in the short term, or 3dB $L_{A10,18hr}$ or greater in the long term arising as a result of the scheme are determined. However, both of these points are dependent upon the scheme traffic data which are currently being finalised. It is therefore proposed that the Study Area and noise level changes associated with the proposed development are considered at the outset of the detailed assessment work to be undertaken for the EIA.

It is also stated within HD 213/11 that where it is evident there are dwellings within 1km of the scheme / bypassed routes that would be subject to noise level changes of 1dB $L_{A10,18hr}$ or greater in the short term, or 3dB $L_{A10,18hr}$ or greater in the long term, then the Simple stage assessment can be bypassed, with progress directly to the Detailed stage assessment.

It can be seen from **Figure 10.3** that there are several existing dwellings in the vicinity of the proposed development and it is anticipated that at least some of these will be subject to noise level changes greater than these stated criteria.

The proposed assessment methodology has therefore been based upon that prescribed within HD 213/11 for the 'Detailed stage' assessment. It is however proposed that an initial review of the scheme traffic data will be undertaken for the full DMRB compliant Study Area. This review will be undertaken in the form of a 'sift exercise', to identify those routes which would and would not be subject to the stated 1dB and 3dB noise level change criteria. This initial sift exercise would then be used to reduce the Study Area for the Detailed Stage assessment such that areas that are not anticipated to be subject to significant impacts are scoped-out of the assessment (See Section 10.5.4.1).

10.5.1 Construction Noise

10.5.1.1 Study Area

Whilst HD 213/11 adopts the same Study Area for construction phase impacts as identified for operational phase impacts, the nature of the proposed development is that applying this approach would mean the inclusion of extensive areas in which construction operations are not proposed and therefore for which significant effects are not anticipated.

In accordance with DMRB Volume 11 Section 3 Part 3: Disruption due to construction it is proposed that a reduced Study Area is adopted for construction noise. The Study Area for construction noise will be defined based on a 100m set back distance from proposed key construction working operations / working areas.

10.5.1.2 Assessment Methodology

Available information on the construction of the proposed development will be reviewed including the construction programme, proposed working method statements, phasing diagram, compound locations and working areas etc. This review will be undertaken to identify those operations which could give rise to significant impacts and will include consideration to potential night-time working and the likely duration of impact.

Based on the results of this review, the construction noise Study Area(s) will be determined as described above and the numbers of receptors will be identified. Any receptors likely to be particularly sensitive to construction noise impacts will be highlighted.

Noise level predictions will be undertaken in accordance with the methodology detailed within BS5228-1 for a sample of key working operations / working phases and local noise sensitive receptors within the Study Area(s).

Appropriate construction noise assessment criteria will be derived based on the guidance contained within BS5228-1+A1:2014, the prevailing local noise environment and the outcomes of consultation with the Local Authority Environmental Health Officers.

The results of the noise level predictions will be assessed by comparison with the adopted assessment criteria and the number of properties likely to be subject to different degrees of effect will be determined. Noise level predictions will take account of any proposed noise mitigation measures, such as environmental barriers etc.

10.5.2 Construction Traffic Noise

10.5.2.1 Study Area

Given the generally urban / suburban nature of the local area, it is anticipated that construction compounds will be located adjacent to the existing road network and therefore that new haul routes will not be required either to access the compounds or to provide access between the compounds and the construction working areas.

The construction traffic noise Study Areas will therefore be defined based on a 50m buffer around any existing local road traffic routes linking the construction compounds to the wider network. The wider network (at which the defined study areas finish), will constitute those existing routes as judged to already be subject to moderate to high existing traffic flows, and therefore for which significant noise level changes would not be anticipated.

10.5.2.2 Assessment Methodology

The proposed construction traffic access routes will be reviewed, as well as the proposed construction compound locations. For each compound, a qualitative assessment of the existing local road network will be undertaken to determine those local routes that are anticipated to be subject to reasonable or high traffic flows currently. The remaining routes (subject to low flows) linking each compound with the wider network will be identified and the construction traffic noise Study Area(s) will be calculated as described above.

For each identified link with the Study Area(s), the Basic Noise Level (BNL) will be determined in accordance with the *Calculation of Road Traffic Noise* memorandum 1988 (CRTN). Calculations will be undertaken for both 'baseline' and 'with construction' scenarios and the associated noise level change will be determined. For each link, the number of receptors within the Study Area will be determined and allied with the calculated noise level changes.

10.5.3 Construction Vibration

10.5.3.1 Study Area

The Study Areas will be defined based on set-back distances from the proposed key construction working areas. The set-back distances adopted will depend on the working operations to be undertaken, as considered further below.

10.5.3.2 Assessment Methodology

BS5228:2009+A1: 2014: *Code of practice for noise and vibration control on construction sites*. *Vibration* details ground-borne vibration prediction methods for a range of common construction working operations such as percussive piling, dynamic compaction, vibratory piling and vibratory compaction etc. Also presented within this Standard are historic measurement results for these operations and assessment criteria corresponding to different degrees of human response to groundborne vibration.

Available information on the construction of the proposed development will be reviewed including the construction programme, proposed working method statements, phasing diagram, compound locations and working areas etc. From this review, the potential vibration generative working operations which are anticipated to be required in the delivery of the development will be identified.

For these working operations, and drawing on the published prediction methods and historic data, typical set-back distances at which different degrees of adverse comment might be expected will be determined. The construction vibration Study Area will then be defined based on these set-back distances and the location at which such working operations are anticipated to be required. The number of receptors within the Study Area(s) will be determined and split into categories corresponding to different degrees of effect.

10.5.4 Operational Traffic Noise

10.5.4.1 Study Area

Initially the Study Area for the Operational Traffic Noise assessment will be defined in full accordance with HD 213/11.

- The start and end points of the physical works associated with the road project will be identified.
- Existing routes that are being bypassed or improved, and any proposed new routes between the start and end points will be identified.
- A boundary one kilometre from the carriageway edge of the routes identified in bullet point 2 above will be determined.
- A boundary 600m from the carriageway edge around each of the routes identified in bullet point 2 above and also 600m from any other affected routes within the boundary defined in bullet point 3 above will be determined. The total area within these 600m boundaries is termed the 'calculation area'. An affected route is where there is the possibility of a change of 1dB $L_{A10,18h}$ or more in the short-term or 3dB $L_{A10,18h}$ or more in the long-term (i.e. conditions (ii), (iii), (iv) or (v) given in paragraph A1.8 of HD 213/11).
- Any affected routes beyond the boundary defined in bullet point 3 above will be determined.
- A boundary 50m from the carriageway edge of the routes identified in bullet point 5 above will be determined.

A sift exercise will then be undertaken drawing upon the scheme traffic data to identify those routes which will and will not be subject to significant noise level changes within the above defined Study Area. This sift exercise will be as follows:

- Basic Noise Level (BNL) calculations will be undertaken for all routes within the Study Area, for the following scenarios:
 - (a) Year of Opening 'Without scheme';
 - (b) Year of Opening 'With Scheme'; and
 - (c) Design Year (Year of Opening +15) 'With Scheme'.
- The short term noise level changes will be determined based on 'scenario b' minus 'scenario a' and the longer term noise level changes will be determined based on 'scenario c' minus 'scenario a'. Those routes which are predicted to be subject to a short term noise level change of less than 1dB and a long term noise level change of less than 3dB will be identified.

The routes identified from the above sift will be used to reduce the Study Area such that these are effectively scoped-out of the assessment. The approach to reducing the Study Area will be that a 600m buffer will be drawn around all proposed new routes and all routes which remain following the completion of the above sift exercise. The 50m boundaries around carriageway edges of affected routes beyond the original 1km boundary will be retained in the determination of the revised Study Area.

This approach is such that the resulting appraisal will be focussed only on those routes for which there is the potential for significant effects to arise. The updated Study Area is referenced here after as the ‘final determined Study Area’.

Whilst the approach above is an adoption of the DMRB guidance, it is anticipated that this will give rise to an assessment focused only on those routes for which there is the potential for significant effects to arise.

10.5.4.2 Assessment Methodology

For the final determined Study Area (post sift exercise), an assessment of operational road traffic noise impacts will be undertaken following the Detailed stage assessment methodology as defined within HD 213/11. This will include the elements described below.

10.5.4.3 Baseline Noise Survey

A review of the Scottish Government noise mapping and address based receptor data (see Sections 10.2.1 and 10.2.2.1 above) will be undertaken and the need for a baseline noise survey will be determined.

It is anticipated that a baseline noise survey is likely to be required to:

- establish the prevailing baseline noise conditions for receptors in areas which are well removed from significant sources of road traffic noise;
- establish the prevailing baseline noise conditions for receptors which are subject to significant sources of noise that are not road traffic, e.g. aircraft noise / industrial / commercial noise; and
- assist in the determination of appropriate noise level limits / assessment criteria for construction noise.

Subject to access and appropriate site security, it is anticipated that the survey would comprise a series of 24-hour continuous weekday measurements at a sample of locations within the final determined Study Area. Where the site is not sufficiently secure to allow unattended monitoring, a sampled measurement approach may be followed. This would include, for example, a series of fully attended 15 minute measurements at each position during daytime, evening and night-time periods.

10.5.4.4 Noise Modelling

Using proprietary PC based noise modelling software, detailed ‘Do Minimum’ and ‘Do Something’ noise models will be prepared for both the Year of Opening and a Future (+15) assessment year. The noise models will be used to undertake receptor based road traffic noise level predictions in accordance with the methodology detailed within CRTN, and Annex 4 of HD 213/11, for all receptors within the 600m buffers used in the determination of the final

determined Study Area. Predictions will include noise from all roads within the 600m buffers. For sensitive receptors towards the edge of the 600m buffers, consideration will be given to the contribution from roads outside the 600m area, by application of professional judgement.

The noise models will be used to undertake noise level predictions of the $L_{A10,18hr}$ noise index. For building receptors (e.g. dwellings), these predictions will include façade corrections. Predictions will be undertaken for first floor height (i.e. 4m), unless the building is identified as single storey, in which case a 1.5m height will be used. For open space receptors such as parks, free-field noise levels will be predicted at ground floor height (1.5m).

10.5.4.5 Assessment of permanent traffic noise impacts

For all adopted receptors, the following comparison of the receptor noise levels will be made:

- Do-Minimum baseline year versus Do-Minimum future assessment year (long term);
- Do-Minimum baseline year versus Do-Something baseline year (short term); and
- Do-Minimum baseline year versus Do-Something future assessment year (long term).

Where it is identified that night-time impacts require consideration, only comparisons for the long term will be considered (in compliance with HD 213/11). The comparisons will be reported by completing Tables A1.1 and A1.2 of HD 213/11.

For each of the routes identified in bullet point 5 of Section 10.5.4.1 above, calculated BNLs will be reported and counts of sensitive receptors within 50m of the centrelines of these routes will be made. These counts will be reported by completing Tables A1.1 and A1.2 of HD 213/11.

Where a building is predicted to experience different changes in noise level on different façades, the least beneficial change in noise level will be accounted for in the assessment results. When all façades show a decrease in noise level, then the smallest decrease will be reported. When all façades show an increase in noise level then the largest increase will be reported. Where this approach leads to the reporting of two or more façades (i.e. where the same least beneficial change in noise level is shown on two or more façades) then the change on the façades with the highest noise level in the Do-Minimum scenario will be reported. The same approach will be adopted for non-residential receptors. Where this approach is such that beneficial effects from the scheme could potentially be overlooked, these will be reported separately.

Consideration will be given to whether any significant impacts are anticipated to arise outside the final determined Study Area, e.g. in any areas out to the original 1km buffer area applied for the sift study. Where appropriate, a qualitative assessment of any identified significant impacts will be made.

Short term and long term noise level difference maps will be prepared indicating the level of change at each receptor position. These maps will use 1dB or 3dB noise level change bands as appropriate. A list of receptor noise level changes will also be prepared.

For the night-time period, the following sift exercise will be undertaken:

- Night-time noise maps will be prepared for the full Study Area for the following scenarios:
 - Year of Opening ‘Without scheme’
 - Year of Opening ‘With Scheme’
 - Design Year (Year of Opening +15) ‘With Scheme’
- These maps will be prepared by application of the guidance detailed within the TRL report *Converting the UK Traffic noise index $L_{A10,18h}$ to EU noise indices for noise mapping*, and will present free-field night-time noise levels.
- Receptor locations will be overlaid onto the noise maps and the noise maps will be used to depict those areas which would be subject to noise levels of 55dB $L_{night,outside}$ or higher.
- Those receptors which are subject to noise levels lower than the 55dB contour for all scenarios, will be scoped-out of the assessment.
- Those remaining receptors which would be subject to a noise level change of less than 3dB will also be scoped-out of the assessment.

Table A1.2 of HD 213/11 will then be completed for the remaining receptors not scoped-out of the assessment. The following will be highlighted:

- where the introduction of the project results in a sensitive receptor being exposed to night-time noise levels in excess of 55dB $L_{night,outside}$ where it is currently below this level; and
- where a receptor is exposed to pre-existing $L_{night,outside}$ in excess of 55dB and this is predicted to increase

The above assessment will be undertaken for existing receptors, but consideration will also be given to receptors which benefit from a valid planning consent. For consented receptors, a separate appraisal of potential impact will be undertaken and reported.

10.5.4.6 Assessment of permanent traffic nuisance impacts

An assessment of traffic noise nuisance will be undertaken in accordance with the guidance detailed within HD 213/11 for the ‘Detailed stage’ assessment. This will include:

- Calculation of the change in noise nuisance for all dwellings at which full CRTN noise level calculations have been undertaken. The change in noise nuisance will be determined in accordance with Annex 6 of HD 213/11.
- The results will be tabulated to detail the change in the number of people bothered in 10% change bands up to 40%, with a further band for >40%.
- Separate assessments will be undertaken for Do-Minimum baseline year versus Do-Minimum in the future assessment year and for Do-Minimum in the baseline year versus Do-Something in the future assessment year.
- The results of the assessments will be presented by completing Table A1.3 of HD 213/11.
- Calculations will be based on the highest nuisance levels determined during the first 15 years after opening.

- Nuisance calculations will be undertaken on the façade with the least beneficial change in noise (i.e. the one used in the completed noise assessment as detailed above).

10.5.4.7 Assessment of permanent traffic induced airborne vibration impacts

A review of the noise nuisance assessment results will be undertaken and it will be considered whether an assessment of airborne vibration nuisance is warranted. Where this is deemed to be appropriate, this will be completed in accordance with the guidance in HD 213/11 for the 'Detailed stage' assessment. This will include:

- Calculation of the change in vibration nuisance for all dwellings within 40m of routes for which full CRTN noise level calculations have been undertaken.
- The results will be tabulated to detail the change in the number of people bothered in 10% change bands up to 40%, with a further band for >40%.
- Separate assessments will be undertaken for Do-Minimum baseline year versus Do-Minimum in the future assessment year and for Do-Minimum in the baseline year versus Do-Something in the future assessment year.
- The results of the assessment will be presented in Table A1.4 of HD 213/11.

11 Air Quality

11.1 Introduction

This section describes the proposed approach to the assessment of potential effects to local air quality associated with the proposed development.

The method of assessment of air quality effects has been developed with reference to relevant non-statutory guidance, including:

- Design Manual for Roads and Bridges, Volume 11: Environmental Assessment, Section 3: Environmental Assessment Techniques, Part 1: HA 207/07 Air Quality;
- Local Air Quality Management (LAQM) Technical Guidance TG(16);
- Institute of Air Quality Management guidance on *Land-Use Planning & Development Control: Planning for Air Quality*; and
- Institute of Air Quality Management guidance on *Assessment of dust from demolition and construction*.

The proposals have the potential to affect local air quality during both the construction and operational (post-construction) phases of the project. During construction, potential effects will occur in proximity to the locations of construction activity, whilst post-construction effects to air quality will occur over a wider area due to the effects of changes in road traffic flows on the local road network.

The following sections described the proposed approach to assessing the effects on local air quality of both the construction and operational phases of the project.

For the operational phase of the project the assessment considers air pollutants harmful to human health, as identified within the National Air Quality Strategy. The principal source of atmospheric emissions during the operational phase of the project will be from engine combustion (from road traffic) therefore the pollutants considered within the assessment of the operational phase of the project are therefore the products of combustion, namely nitrogen dioxide (NO₂), fine particulates (PM₁₀) and carbon monoxide (CO).

For the construction phase the assessment also considers the combustion generated emissions from road traffic and construction equipment but also considers the potentially effects to receptor amenity through the deposition of dust.

11.2 Consultation

Consultation has been undertaken with the relevant air quality officers within the Environmental Health departments of each of the three local authority areas potentially affected by the project, namely Glasgow City Council, Renfrewshire Council and West Dunbartonshire Council.

Initial consultation was undertaken during early project work to identify potential constraints in the options generation and assessment phases of the project design. This consultation included obtaining existing baseline air quality data and discussion on the proposals to undertake additional baseline monitoring.

Further consultation was undertaken in the form of a meeting with Environmental Health officers from each of the three local authorities in August 2016. A presentation was provided of the proposed project design, preliminary findings of the initial assessment work and an outline of the proposed scope of work for the Environmental Impact Assessment (EIA).

11.3 Baseline

Baseline air quality conditions within the study area were determined with reference to ambient monitoring undertaken by the various Councils, published LAQM reports and Scottish Government collated data on ambient air quality conditions.

The estimated annual average background pollutant concentrations across the study area are below the relevant annual average air quality objectives, indicating air quality is good. The estimates are, however, an average concentration across the grid square and therefore do not reflect concentrations at hotspot locations.

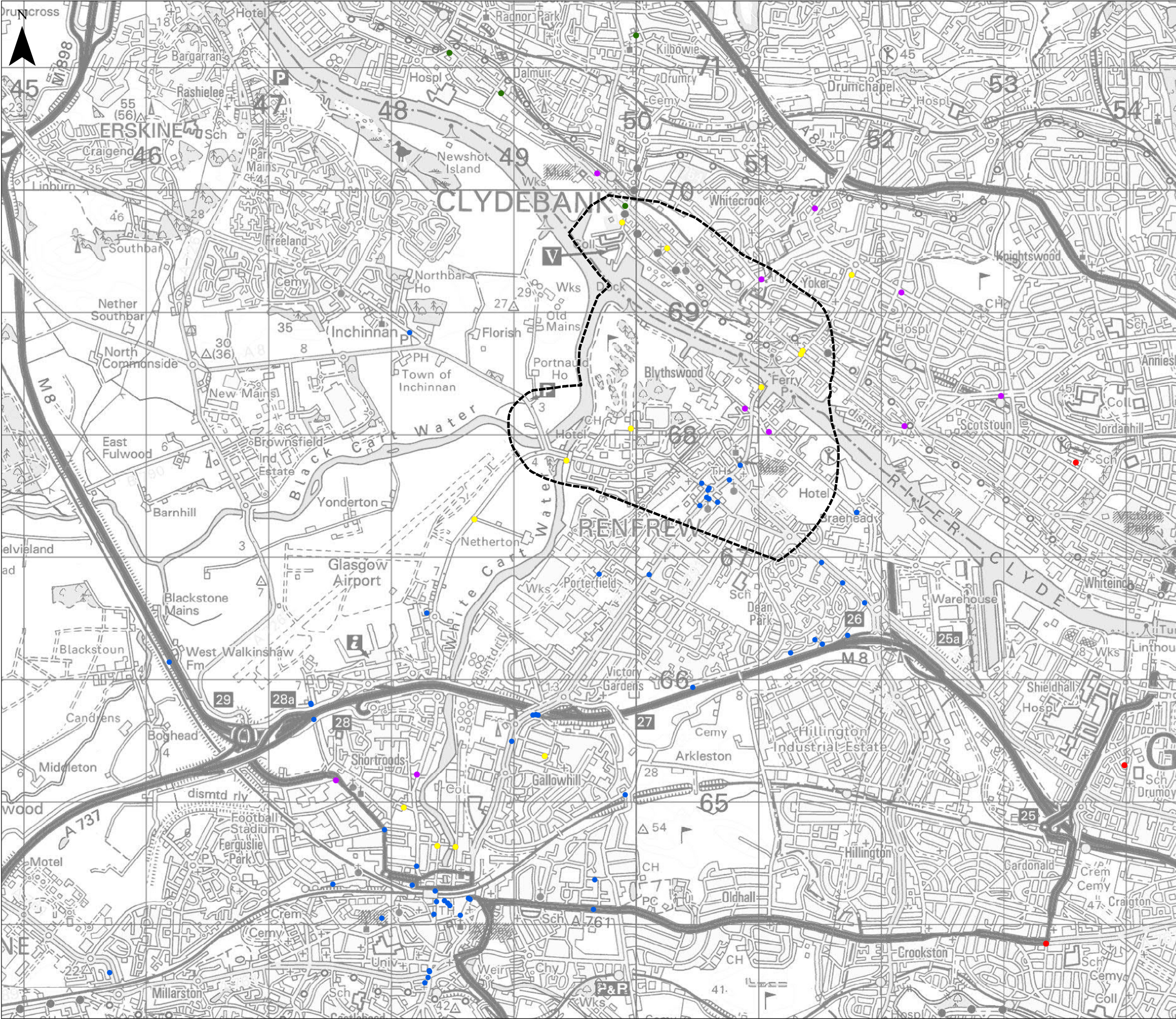
The principal air pollutant emissions sources within the study area are road traffic and emissions associated with Glasgow Airport operations. Monitoring of ambient air quality levels at locations most likely to be affected by these emission sources (hotspot locations) is undertaken by each of the Councils. Ambient air quality monitoring locations across the study area, and locations outside the study area which may provide representative air quality monitoring data for areas potentially affected by the project are presented in **Figure 11.1**.

Renfrewshire Council undertake extensive monitoring of air quality across the CWRR project study area concentrated around the town centre areas of Paisley and Renfrew including relevant monitoring locations within the Wider Study Area. Similarly, West Dunbartonshire Council undertakes monitoring within the core study area and buffer north of the river. No existing monitoring has been undertaken by Glasgow City Council within the core study area or buffer area.

In most cases monitoring has been of ambient NO₂ concentrations, using passive diffusion tubes (PDTs). Monitoring of NO₂ provides a good indicator of ambient air quality levels attributable to traffic emissions. Additional monitoring using automatic analysers for both NO₂ and PM₁₀ has been undertaken at locations close to the M8 in Renfrew and historically at the perimeter of Glasgow International Airport.

Existing monitoring has indicated that air quality across the study area and buffer is generally good, however potential for exceedance of National Air Quality Strategy (NAQS) objectives for NO₂ and PM₁₀ have been identified with Renfrew town centre. Renfrewshire Council is currently developing proposals for the declaration of an Air Quality Management Area (AQMA) in this area. Renfrewshire Council also has an existing AQMA in Paisley Centre, however the AQMA is outside the study area for the CWRR project. A further area of elevated concentrations has been identified by the Council in Renfrew, at Cockels Loan, overlooking the M8, however no AQMA is currently proposed at this location.

No exceedences of NAQS objectives have been identified within West Dunbartonshire, although historic monitoring at Kilbowie Road has indicated elevated concentrations and the Council continue to monitor in this location.



Notes

Key

CWRR Core Study Area

Monitoring Sites per Local Authority

Renfrewshire Council Monitoring Sites

Glasgow Council Monitoring Sites

Dunbartonshire Council Monitoring Sites

Additional Monitoring Sites

Diffusion Tubes Round 1 & 2

Diffusion Tubes from Round 3 Onwards
(including locations from round 1 and 2)

00.250.50.751

km

Reference Drawings				
REV	DATE	AMENDMENT DETAILS	ORIG	CHKD
1	01/09/2016	Initial Issue	JB	JB
2	01/09/2016	Design Development	JB	JB
3	01/09/2016	Final Design	JB	JB
4	01/09/2016	Construction	JB	JB
5	01/09/2016	Handover	JB	JB
6	01/09/2016	Completion	JB	JB
7	01/09/2016	Final Review	JB	JB
8	01/09/2016	Final Approval	JB	JB
9	01/09/2016	Final Sign-off	JB	JB
10	01/09/2016	Final Delivery	JB	JB

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Client

RENFREWSHIRE COUNCIL

Drawing Status

Suitability

BIM AUTHORISATION

S6

Project Title

CLYDE WATERFRONT AND RENFREW RIVERSIDE PROJECT

Drawing Title

Figure 11.1: Air Quality Monitoring Site Locations

Scale	1:30,000	Designed	JB	Drawn	JB	Checked	SMcG	Approved	HC	
Original Size	A3	Date	01/09/2016	Date	01/09/2016	Date	01/09/2016	Date	07/09/2016	
Drawing Number	117086	Project	Originator	Volume	Location	Type	Role	Number	117086 (R09)	
117086 - SWECO - EAC - 00 - SP - EN - 00003									Revision	0A

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As no monitoring is undertaken by Glasgow City Council within the study area no existing area of poor air quality were known, however following a site visit and consultation with Glasgow City Council an area of potential sensitivity for air quality was identified within a street canyon section of Dumbarton Road, at the junction with Renfrew Ferry Road.

As a number of gaps in the monitoring network were identified which would allow appraisal of baseline conditions in respect of the CWRR project, a number of additional monitoring locations have been commissioned to measure ambient air quality (NO₂ as a marker pollutant). The locations of monitoring are indicated on **Figure 11.1**. Only two months of monitoring data are available at the time of writing for most of these locations, however measured air quality levels (NO₂ concentrations) are generally low and significantly below NAQS objective levels. The exception is the monitoring location at the Dumbarton Road/Renfrew Ferry Road junction, where concentrations are elevated but marginally below the NAQS annual mean objective level for NO₂. The monitoring has confirmed the sensitivity of this area to change in air quality.

11.4 Potential Effects

An initial assessment of the potential effects to local air quality associated with the operational phase of the project was undertaken during the options generation and assessment phase of the project.

The initial assessment considered the potential for change to ambient air quality concentrations as a result of potential changes to road traffic flows. The potential changes to road traffic flows across the roads within the study area were determined with reference to preliminary traffic model outputs of predicted traffic flows for differing options for the project design.

The potential significance of changes to local air quality within the study area was determined based on an evaluation of the potential change in road traffic flows (and therefore the potential change in emissions from road traffic), the presence and number of sensitive receptors located in proximity to proposed project development locations or roads affected by the project and the prevailing baseline conditions within each area.

Overall the project proposals were predicted to have both adverse and positive effects on air quality when benchmarked against a future baseline without the project. The predicted changes were mainly positive to the south of the River Clyde, and particular within the Renfrew town centre AQMA, however potential for adverse effects were predicted north of the river on short stretches of Dumbarton Road / Glasgow Road as a result of redistribution of local traffic following opening of the Clyde Crossing.

11.5 Proposed Scope of Assessment

11.5.1 Proposed Approach to EIA

The assessment of potential effects in ambient air quality will be undertaken to establish the change in ambient NO₂, PM₁₀ and CO concentrations and the potential for exceedance of ambient air quality standards as set out in the National Air Quality Strategy. The relevant air quality objectives are presented in **Table 11.1**.

Table 11.1 Air Quality Objectives for Scotland

Pollutant	Air Quality Objective Concentration	Averaging period
Carbon monoxide (CO)	10 mg/m ³	Maximum daily 8-hour mean
Nitrogen dioxide (NO ₂)	40 µg/m ³	Annual mean
	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
Particles (PM ₁₀)	18 µg/m ³	Annual mean
	50 µg/m ³ not to be exceeded more than 7 times a year	24-hour mean
Particles (PM _{2.5})	10 µg/m ³	Annual mean

The air quality objectives will apply at all identified sensitive air quality receptors, defined as a location where public exposure over a time period equivalent to the air quality objective averaging period will occur. For annual mean concentrations this will include residential properties and institutional buildings, including schools and hospitals. For shorter term objectives (e.g. 1-hour mean NO₂) the objectives will apply to locations where public exposure is likely, including pavements and locations of leisure activities.

11.5.2 Study Area

The project assessment study area is presented in **Figure 11.2**. The study area comprises a wider study area, encompassing all roads potential affected by the project, and a core study area encompassing a 1km buffer area around the locations of project development.

11.5.3 Construction Phase

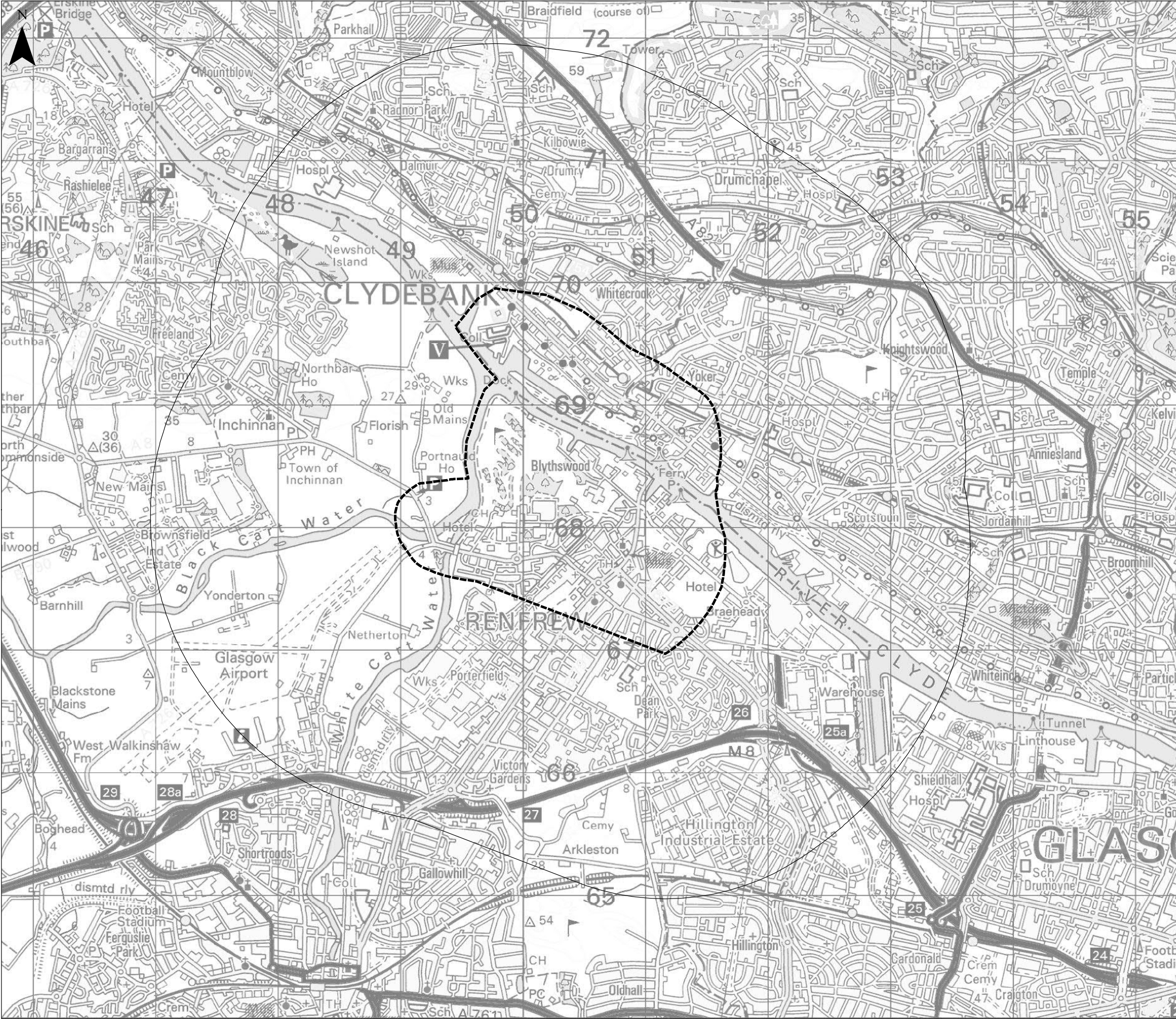
The potential for adverse effects to local air quality and residential amenity during the construction phase of the project will comprise two phases. The initial phase will adopt a screening risk assessment of the potential for adverse effects associated with:

- construction road traffic;
- emissions from construction equipment and temporary power generation; and
- dust generated from construction activities, and the storage and movement of materials.

Where the initial screening assessment identifies the potential for significant effects then a more detailed assessment will be adopted.

Construction road traffic will be assessed based on the predicted traffic movements associated with each phase of the project development. The predicted vehicle movements, including heavy goods vehicle (HGV) movements associated with deliveries and transport of materials will be assessed in accordance with established thresholds in technical guidance, including DMRB and LAQM TG(16) to establish the potential for adverse effects to air quality. Where predicted traffic flows exceed threshold levels, or where potential for significant adverse effects is established, detailed dispersion modelling of traffic emissions will be undertaken to predicted the change in ambient air quality levels.

Similarly, screening assessment of combustion generated emissions from fixed or mobile construction equipment will be undertaken in accordance with relevant technical guidance



Notes

Key

CWRR Core Study Area

CWRR Wider Study Area

00.250.50.751

km

Reference Drawings				
REV	DATE	AMENDMENT DETAILS	ORIG	CHKD
Sweco City Park Suite 3/5 368 Alexandra Parade Glasgow G3 1 3AU Tel: +44 (0)141 414 1700 web: www.sweco.co.uk				
Client		RENFREWSHIRE COUNCIL		
Drawing Status		Suitability		
BIM AUTHORISATION		S6		
Project Title				
CLYDE WATERFRONT AND RENFREW RIVERSIDE PROJECT				
Drawing Title				
Figure 11.2: Core Study Area and Wider Study Area				
Scale	Designed	Drawn	Checked	Approved
1:30,000	JB	JB	SMcG	HC
Original Size	Date	Date	Date	Date
A3	01/09/2016	01/09/2016	01/09/2016	07/09/2016
Drawing Number	Project	Originator	Volume	Location
117086 - SWECO - EAC - 00 - SP - EN - 00003				
Type				Role
Number				Number
Revision				0A

LAQM TG(16). Where potential for significant adverse effects is established then detailed dispersion modelling of emissions will be undertaken to predict the change in ambient concentrations.

Screening assessment of dust generated from construction activities will be undertaken in accordance with relevant IAQM guidance. The potential for significant adverse effects will be assessed based on the potential for emission generation, separation distance between emission sources and receptors, climatic conditions and dust control techniques. Where potential for significant effects are established, a more detailed assessment will be undertaken using dispersion modelling to predict dust migration.

The findings of the assessments will inform the development of the requirement for mitigation and control measures within the Construction Environmental Management Plan (CEMP).

11.5.4 Operational Phase

The assessment of the operational phase of the development will consider the potential for significant changes to air quality from changes to traffic movements on the road network as a consequence of the project. To determine the potential effects of the project the assessment will consider five scenarios, as follows:

- 2015 baseline scenario;
- 2020 future scenario, without project;
- 2020 future scenario, with project;
- 2037 future scenario, without project; and
- 2037 future scenario, with project.

A two-step approach will be undertaken for assessment of road traffic emissions for each scenario. The initial step will be a screening assessment of the changes to road traffic flows to identify roads which will experience a potentially significant change in traffic flows. The screening assessment will focus on identifying roads where:

- a change in traffic flows of greater than 10% is predicted on a road with a baseline traffic flow greater than 5,000 annual average daily traffic (AADT);
- a change in traffic flows of greater than 5% is predicted on a road with a baseline traffic flow greater than 10,000 AADT; or
- an overall change in traffic flows of greater than 1,000 AADT is predicted.

The predicted change in traffic flows will be determined from traffic model predictions. The screening assessment will consider all roads within the Wider Study Area.

Any road identified as having a predicted change to traffic flows above the specified criteria, along with all roads within the core Study Area, will be considered in a detailed assessment utilising dispersion modelling to predict changes to pollutant concentrations.

A dispersion model will be developed of the 2015 baseline traffic scenario. The model will be developed using the proprietary dispersion model ADMS Road, an advance new generation model identified as fit for purpose within LAQM technical guidance. The model will include for a digitised road network, with traffic emissions defined as a series of line emission sources

within the model. The emissions will be calculated based on predicted traffic flows (including traffic speeds and breakdown of vehicle types) on each road and the in-built emissions factor database.

The dispersion model will account for local topography and topology (including street canyons) and will include for meteorological data measured at Glasgow Airport for 2015.

The 2015 baseline model predictions will be verified against local monitoring data from within the study area in accordance with the methods described in LAQM technical guidance. The dispersion model will be refined based on the findings of the verification and a model adjustment factor determined. The adjusted baseline model will be used to establish future pollutant concentrations based on future traffic scenarios.

The dispersion model will be updated for the future scenarios with and without the project. The predicted change in concentrations will be established by the difference in predictions between the 'with and without' project scenarios. The significance of effect will be established based on the magnitude of effect.

11.5.5 Assessment of Significance

The significance of effects will be evaluated based on the magnitude of change in air quality concentrations relative to the relevant air quality objective for the pollutant considered. The significance of effects will be evaluated based on the criteria defined in IAQM guidance for development control.

11.5.6 Mitigation

It is anticipated that appropriate controls and management for the release of dust and other emissions during the construction phase of the project will be specified as part of a Dust and Emissions Management Plan which form part of the CEMP. The Plan will be tailored to the findings of the impact assessment and will follow good practice guidance to minimise potential effects.

The requirement for mitigation for any adverse effects identified for the operational phase of the project will be identified during the detailed air quality impact assessment.

11.5.7 Remaining Surveys

Monitoring of baseline air quality within the study area is ongoing and will continue at least until December 2016 to provide a minimum 6-month period of monitoring (incorporating 3-months of summer and 3 months of autumn/winter). The requirement to extend the monitoring into 2017 will be assessed on completion of the survey and agreed in consultation with the three councils.

11.6 Summary of Proposed EIA scope

The assessment will consider the potential effects to local air quality and residential amenity as a consequence of the construction and operational phases of the project.

The potential for adverse effects during the construction phase will be established through screening risk assessment of potential for adverse effects based on the likely magnitude of emissions, the separation distance between emission sources and receptors, and climatic factors affecting the transport of emissions. Where potential for significant adverse effects is

identified a more detailed assessment will be undertaken to establish the source(s) of locations of concern. The findings of the study will be used to inform the development of appropriate emissions controls and management to mitigate any potential adverse effects.

The assessment of the operational phase will initially consider roads within the Wider Study Area and the predicted change in traffic flows to establish roads which will require further assessment. These roads, along with roads within the Core Study Area, will be considered in detailed dispersion modelling of scenarios, with and without the project. The predicted change in concentrations as a consequence of the project will be established based on comparison of with and without scenarios. The significance of effects will be established based on published industry guidance. The requirement to mitigate significant effects from the operational phase will be considered based on the predicted significance of effects.

12 Climate Change Mitigation & Adaptation

12.1 Introduction

This chapter sets out the proposed scope of the climate change mitigation and adaptation assessment, in accordance with the recent 2014 European Union Directive on EIA³⁵. This Directive focuses greater attention on the threats and challenges that face the environment, requiring the consideration of the potential effects of projects on climate (Article 3) and climatic factors (Annex IV).

The EIA process provides an ideal platform for assessing the potential cumulative effects of a project and future climate change on sensitive receptors. It is accepted that the challenges and opportunities associated with climate change mitigation and adaptation should be considered side by side to optimise integration during the design stage.

Consideration of this project's direct and indirect **impact on** climate change and **resilience to** climate change will be based on the recent IEMA guidance documents:

- Principles on Climate Change Mitigation and EIA (2010); and
- IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (2015).

12.1.1 Climate Change Mitigation

The consequences of climate change have the potential to lead to significant interrelated cumulative environmental effects, including on the different areas considered by this EIA. The UK has legally binding greenhouse gas (GHG) emissions targets most notably a requirement to achieve an 80% reduction in GHG emissions by 2050 compared to a 1990 baseline.

Development projects result in the release of GHGs to the atmosphere, with infrastructure projects, such as this City Deal project, being a particular contributor. Efforts to mitigate these emissions and contribute to the achievement of UK targets should therefore be considered as part of the EIA.

12.1.2 Note on Terminology

The term 'carbon dioxide equivalent' (CO₂e) has been used to simplify comparison of the impact of different greenhouse gas emissions (GHGs) and refers to the equivalent global warming potential of carbon dioxide (CO₂). 'Capital Carbon' refers to the GHG emissions associated with the creation of an asset. 'Operational carbon' describes GHG emissions associated with the operation and maintenance of an asset. 'End-user' carbon describes GHG emissions from the end-users of an asset, e.g. emissions from vehicle exhausts.

³⁵ Directive 2014/52/EU amending the EIA Directive 2011/92/EU

12.2 Consultation

We would propose the following list of organisations would be consulted regarding the carbon assessment during the EIA:

- Renfrewshire Council (Carbon Management & Sustainability Teams);
- Transport Scotland;
- Highways England;
- SNH; and
- SEPA.

12.2.1 Consultation Undertaken to Date

As part of the assessment undertaken to date, Transport Scotland was consulted regarding the capital carbon accounting methodology. Transport Scotland advised that their 2014 Carbon Management System (CMS) tool will shortly be revised, the 2015 version of the tool is anticipated to be available for the EIA for this project.

Highways England (HE) was consulted regarding the end-user carbon assessment undertaken to date. HE advised that the DMRB screening tool used for regional (end-user) carbon assessment is currently being revised and is not available at this time. However, it may be available for the EIA for this project.

12.2.2 Proposed Future Consultation

Transport Scotland and Highways England will be consulted further regarding the carbon assessment methodology. Following the principles of PAS 2080:2016, Carbon Management in Infrastructure, Sweco will also seek to engage early in the process with the potential supply chain regarding project sustainability objectives to minimise whole life carbon.

12.3 Baseline Description

For the capital and operational carbon the EIA baseline is taken as the current situation where none of the proposed infrastructure is built. Impacts from emissions associated with the construction, operation and decommissioning of the road infrastructure are then assessed.

12.4 Potential Effects from Carbon Emissions

12.4.1 Construction

As noted above, according to the Infrastructure Carbon Review (ICR)³⁶, **capital carbon** refers to “*emissions associated with the creation of an asset*” and is applied to the construction phase of the project. It is noted to be comparable to the concept of capital cost.

Activities associated with the construction of the proposed infrastructure elements (roads, structures and earthworks), such as the transport of construction materials on to site and excavation for bridge abutments, will all contribute to the capital carbon emissions of the proposed development. The potential impacts associated with these activities are generally

³⁶ Infrastructure Carbon Review, 2013, Page 7

considered to be long term in nature and contribute to global GHG emissions, intensifying the effects of climate change.

12.4.2 Operation

The Infrastructure Carbon Review (ICR) describes **operational** carbon as “emissions associated with the operation and maintenance of an asset” and is “analogous to operation cost and is quantified in tCO₂e/year”.

The operation and maintenance over the design life of the proposed roads and structures will contribute to the operational carbon emissions of the proposed development, through various activities, e.g. street lighting, resurfacing, replacement of bridge joints, etc. The potential impacts associated with the operation and maintenance of the proposed project elements (roads and bridges) are also generally considered to be long term in nature and contribute to global GHG emissions and climate change.

The Infrastructure Carbon Review (ICR) describes end-user carbon as “emissions from the end-users of infrastructure assets. Although not directly controlled by infrastructure asset owners, end-user carbon can be influenced”. End-user carbon associated with the proposed development particularly refers to vehicle use of the infrastructure elements (roads and structures), therefore it is regarded as a continuous, long term source of GHG emissions.

It is worth noting that the Infrastructure Carbon Review (ICR) defines whole life carbon as the combination of both capital and operational carbon and is “analogous to whole life cost”. Therefore consideration of the end-user carbon emissions associated with changes to traffic flows in the regional network as a result of the project in comparison to the capital and operational carbon emissions is also considered appropriate in assessing the net climate change impact (release of GHGs to the atmosphere) from the proposed project.

12.5 Proposed Scope of Assessment

The goal, scope and boundary of the assessment will be defined in accordance with Clause 7 of PAS 2080:2016 (Quantification of Carbon Emissions).

12.5.1 Guidelines

PAS 2080:2016, the new standard for carbon management in infrastructure, has informed the proposed approach to carbon assessment and reduction to date. The PAS 2080 principles will continue to be applied during the development of the specimen design to establish the baseline setting for the proposed development and will set out the measures taken as part of the carbon management process of the proposed project. Where relevant, how these measures align with the requirements of PAS 2080 will also be made clear.

12.5.2 Methodology

At the specimen design stage, the whole life carbon of the proposed project will be considered in greater detail. The carbon assessment will focus on capital carbon emissions associated with the construction of the road, structures and associated earthworks and operational carbon emissions associated with the operation and maintenance of the roads and structures. The end-user carbon emissions associated with the vehicle use of the transport infrastructure will also be considered.

12.5.3 Proposed Approach

The carbon assessment of the different project infrastructure elements (roads, structures and earthworks), and end-user carbon undertaken in the project to date (i.e. for options assessment), will feed into the carbon baseline and target setting for the design development of the proposed project.

The emission sources considered during the carbon assessment will be assessed in accordance with Clause 7 of PAS 2080.

The latest version available of sector-specific tools that allow for consistent assessment such as Transport Scotland's Carbon Management System (CMS) tool will be applied where possible. Where a GHG quantification is required to be calculated independently of such tools the study shall be conducted using generic, specific or average data from consistent methodologies and emissions factors as appropriate. It shall be applicable to the UK and reflect the technologies used in the supply chain for the project.

12.6 Climate Change Adaptation

Future projections of how our climate is changing are filled with uncertainties regarding the magnitude, frequency and spatial occurrence of how and when these changes will occur, making accurate assessment of potential effects challenging. However, it is vital to consider the potential effects (positive or negative) of how a project, its objectives and viability, will be affected by these potential future changes as well as the potential effects on the resilience of the receiving environment and communities.

The design and assessment stage of a project is widely agreed be crucial in the minimisation of vulnerability, maximising resilience and managing risk. All uncertainties and assumptions used within the EIA assessment, will be set out within the ES, providing a clear assessment methodology.

In order to set out an appropriate proposed approach to this assessment, the following areas are covered in this chapter:

- requirement for assessment;
- identification of key regulations and policies on climate change;
- identification of relevant stakeholders/regulators;
- methodologies that will be adopted for the assessment; and
- identification of a climate change projection for use in the future assessments.

12.6.1 Requirement for Assessment

The key consideration at this scoping stage is whether there is potential significant effects upon the proposed project design arising from climate change to warrant further assessment in the EIA.

The proposed development includes bridge crossings, new roads and cycleways in tidal areas where there is the current potential for flood events. It is recognised that the impacts of climate change, e.g. sea level rise and increased precipitation, has the potential to impact upon the accessibility, use and resilience of the project. Potential increases in temperature could

also impact upon the operational capacity of the infrastructure or the cost of maintenance. These increases could also significantly change the existing ecosystems and biodiversity that are currently present and therefore impact upon future planting or habitat design/management proposals.

Based on these potential effects, it is considered necessary to consider climate change within the EIA process on an interdisciplinary basis and will consider the design, relevant climate parameters and identify suitable mitigation (pre and post design) that will cover the proposed lifespan of the project.

12.6.2 Key Regulations and Policies

Consideration of this project's resilience to climate change will be based on the recent IEMA guidance document IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (2015). The IEMA guidance addresses aspects of the 2014 EIA Directive relevant to climate change adaptation. Other relevant programmes, guidance and policies that will be taken into account in the approach to climate change adaptation on the project include:

- Scotland's Climate Change Adaptation Framework (Scottish Government, 2009);
- Scotland's Climate Change Adaptation Framework: Transport Sector Action Plan (Scottish Government, 2011);
- A Climate Change Risk Assessment for Scotland (Defra, 2012);
- Climate Ready Scotland: Scottish Climate Change Adaptation Programme (The Scottish Government, 2014);
- Climate Ready Clyde Vision Document (Adaptation Scotland, Sniffer);
- Climate Change Adaptation in the GCV (GCV Green Network); and
- Green Infrastructure for Overheating Adaptation in Glasgow (GCV Green Network, 2013).

A regional Climate Change and Strategy Action Plan for Glasgow and the Clyde Valley is understood to be in development and will also be taken into consideration if available at the time of the EIA.

12.6.3 Relevant Stakeholders and Regulators

It is proposed that the following list of organisations will be consulted regarding the climate change projections and to discuss the potential effects to be considered.

- Renfrewshire Council (Carbon Management & Sustainability Teams);
- Glasgow City Council;
- West Dunbartonshire Council;
- Adaption Scotland;
- Central Scotland Green Network;
- Clydeplan, Glasgow and Clyde Valley Strategic Development Planning Authority;
- Forestry Commission;
- SNH; and

- SEPA.

12.6.4 Methodology

Workshops will be held with each of the disciplines inputting into the EIA to establish a consistent approach to consideration of climate change adaptation. The methodology applied will vary for each discipline and will follow the IEMA Guidance.

12.6.5 Climate Change Projection and Baseline

To accurately assess the potential effects arising from climate change, it is important to agree relevant climate change projections that will be applied to the EIA. Projections will be based on the best available scientific information and future projections, based on a range of probabilities, e.g. the Met Office (2009) UKCP09 maps and key findings³⁷. The future environmental baseline will be informed with cognisance of these projections and in accordance with IEMA guidance.

Climate change parameters will be taken into account with particular reference to resilience in the rainfall-related areas of drainage infrastructure and flood risk management. Potential temperature increases will also be considered, noting that SEPA suggests temperatures in Scotland may rise by up to 4 degrees C by the end of the century³⁸.

³⁷ <http://ukclimateprojections.metoffice.gov.uk/21708>

³⁸ <http://www.sepa.org.uk/environment/climate-change/the-effects-of-climate-change/>

13 Proposed Approach to EIA

13.1 Introduction

This section outlines the overall approach which is proposed for the EIA. The following information is presented:

- Section 13.2 provides an overview of the approach to securing the required planning and other consents for the project and how the EIA supports these;
- Section 13.3 highlights the overall methodology for the prediction and assessment of environmental impacts and how the significance of environmental effects is to be evaluated;
- Section 13.4 presents a summary of the proposed approach to assessment and reporting of the potential for cumulative effects of the project with other major development proposals; and
- Section 13.5 sets out the proposed draft structure for the Environmental Statement (ES).

13.2 Planning and Consenting Strategy

It is intended that a planning application (or applications) will be submitted by the Renfrewshire Council City Deal team (the Applicant) for the CWRR project to the three local authorities of Renfrewshire Council, Glasgow City Council and West Dunbartonshire Council and also to Marine Scotland. Consent to develop the project will be sought under the Town and Country Planning (Scotland) Act 1997, as amended by The Planning etc. (Scotland) Act 2006. At this stage it is anticipated that an application for full (detailed) planning consents will be made. An application for tree works consent will also be made to Renfrewshire Council in relation to aspects of the works which require felling of trees protected by a Tree Preservation Order (TPO) in Blythswood.

The proposed development has been positively screened for EIA by these authorities (see Section 1.2) and an EIA will be undertaken in accordance with the requirements of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011. Consultation with Marine Scotland has confirmed that EIA is also required for the CWRR project works with the potential to affect the marine environment under the Marine Works (Environmental Impact Assessment) Regulations 20007 (as amended). The EIA will therefore be undertaken with reference to both sets of EIA Regulations.

At this stage it is not anticipated that a Habitats Regulations Appraisal (HRA) will be required. Consultation with SNH has indicated that they do not consider there is potential for likely significant effects from the proposed development on the two closest Natura sites to the CWRR project (the Inner Clyde Special Protection Area (SPA) and the Back Cart SPA). Consultation with Marine Scotland Science has identified some potential for connectivity between the proposed development and the Endrick Water Special Area of Conservation (SAC), a tributary of Loch Lomond which is connected with the River Clyde via the River Leven which outflows to the Clyde approximately 12km downstream of the CWRR proposals. An HRA screening exercise will be undertaken (following confirmation of the preferred bridge design) in relation to the

potential for likely significant effects on this SAC and the findings agreed with Marine Scotland. If HRA is required then this will be undertaken and the findings captured within the ES.

The proposed development includes proposals for a new bridge crossing of the River Clyde and a number of other development consents are anticipated to be required in addition to planning permission. These may include:

- a Scheme for Crossing of Navigable Waters under Section 73 of the Roads (Scotland) Act;
- a Marine Licence for works to be constructed below Mean High Water Springs; and,
- potentially a Seabed Lease from the Crown Estate.

Other consents which may be required for the proposed development include:

- Harbour Revision Order³⁹;
- Traffic Regulation Orders including Redetermination Orders and Stopping Up Orders;
- Compulsory Purchase Orders;
- Controlled Activities Licences; and
- Protected Species Licences.

Applications for these consents will be progressed in parallel with the planning applications, or on programmes to be defined with the relevant consenting authorities.

13.3 Assessment of Environmental Effects and Significance

The environmental assessment will take account of information on the design and characteristics of each element of the proposed development and its likely construction and operational effects including the potential to change traffic flows on existing roads in the study area⁴⁰. This information will be used to inform the prediction of potential impacts and their likely scale (or magnitude).

The assessment will be undertaken for the preferred scheme taking account of the land required for construction and permanent development of the proposals including mitigation. The EIA process is being integrated with the development of the design for the preferred scheme to help reduce impacts through the design and planning process and the ES will report the predicted effects of the final (frozen) design.

The potential significance of environmental impacts will be determined by taking account of the magnitude of impact in combination with the sensitivity of the baseline (or 'receiving' environment). This will include use of matrices to help inform the evaluation of significant effects which are defined as those which in the judgement of the EIA team should be brought to the attention of decision makers, and which can be thought of as analogous to the concept of material considerations in the development management process. The approach to characterising the baseline and its sensitivity will be supported through the use of a project

³⁹ The requirement for an HRO is currently being discussed with reference to the proposed level of the bridge deck over the River Clyde

⁴⁰ Transport modelling is being undertaken for a series of future year scenarios and the outputs will be used to inform the EIA

GIS-based analysis with respect to surrounding constraints and areas of environmental sensitivity. The predicted environmental effects of the proposal will be reported after assumed key mitigation has been taken into account (i.e. residual effects).

Impact evaluation for each topic area will take account of relevant EIA guidance and will draw on the expertise and professional judgement of key specialists in each relevant discipline. Topic specific consideration of significance will be set out in each key chapter of the ES.

13.4 Cumulative Environmental Assessment

In parallel with the proposed CWRR development, the Applicant is seeking to promote the Glasgow Airport Investment Area (GAIA) City Deal project (see **Section 1.1**). The two projects are adjacent in geographical terms and they have extensive synergies in their objectives and potential impacts. The EIA will take account of the potential for significant cumulative environmental effects across these two projects in particular. A cumulative environmental assessment (CEA) will be undertaken and presented in its own volume of the ES (see **Section 13.5**).

Cumulative effects have been defined as ‘those that result from additive effects caused by other past, present or reasonably foreseeable actions together with the project itself and from synergistic effects, which arise from the reaction between the effects of the project on different aspects of the environment’. This may be summarised as those effects added by, or that result from, the interaction of two or more projects or activities^{41 42}.

The CEA will focus on the prediction of significant cumulative effects taking account of the following ‘scenarios’:

- the predicted environmental effects of the CWRR and GAIA projects when combined including:
 - the physical interventions in each project;
 - the combined effects of the projects on modelled traffic flow changes;
- the predicted effects of the ‘build out’ of residential and commercial development anticipated in the masterplan (see Section 2.7) for City Deal as a result of development of CWRR and GAIA in the longer term; and
- the predicted effects of the CWRR and GAIA projects, plus masterplan build out plus any other reasonably foreseeable major development proposals.

The CEA will identify any ‘step’ changes in significance for the predicted cumulative effects in each of the above three scenarios. The predicted effects of the proposals on noise, local and global air quality in particular due to changes in future traffic flows will draw from traffic modelling. This is likely to be based on an assumed CWRR and GAIA opening year of 2020 and a future assessment year of 2037.

⁴¹ Source: Durning B & Broderick M (2015) Mini Review of Current Practice in the assessment of Cumulative Environmental Effects of UK Offshore Renewable Energy Developments when carried out to aid decision making in a regulatory context. Oxford Brookes University/NERC <http://www.nerc.ac.uk/innovation/activities/infrastructure/offshore/cea-mini/>

⁴² Scottish Government Planning Advice Note 1/2013 (Environmental Impact Assessment) similarly defines two cumulative impact types as ‘impact interactions’ and ‘additive impacts’

The identification of other ‘reasonably foreseeable’ major developments will be agreed with the relevant planning authorities and is proposed to be restricted to a small number of key proposals which are of regional scale i.e. with the potential for significant effects. Developments which have planning consent and are likely to be constructed prior to 2020 will be included as part of the future baseline for the assessment, rather than specifically as ‘cumulative’ projects.

To make the CEA process manageable the focus will be on the prediction and evaluation of *significant* cumulative effects. A focused review of the findings of the CWRR and GAIA EIAs in their own right will inform the consideration of significant effect cumulation when the projects are combined. The CEA will also focus on key receptor groups (sometimes called ‘valued environmental components’) which are the human, physical, cultural and biological receptors which may be significantly affected by cumulative impacts. Defining these groups allows the CEA to focus on key effects/receptors rather than following the baseline topic-led approach in EIA. This also allows for more concise reporting.

The approach to assessing cumulative effects will follow a series of steps anticipated as follows:

- step 1. identification of predicted significant effects from the developing EIAs for CWRR and GAIA together with those from any available documentation for other projects to be considered;
- step 2. based on this review, identify the key receptors/groups with the potential to be significantly affected by cumulative impacts and characterise these receptors including their sensitivity and any relevant environmental thresholds;
- step 3. scope the CEA by listing (e.g. in a matrix) the potentially significant effects from step 1 against the receptor groups in step 2 to identify the potential for significant cumulative effects taking account of both additive and synergistic effects; and
- step 4. evaluating the significance of the predicted cumulative effects which have been scoped into the assessment from step 3 on the key receptor groups, taking account as far as practical of future baseline conditions.

Significance of residual⁴³ cumulative and in-combination environmental effects will be evaluated taking account of mitigation measures developed specifically for each topic area based on the identification and scoping of potentially significant cumulative impacts. This process will take account of mitigation commitments already made for the project EIAs. Measures will therefore be presented as additional commitments in the CEA where these are considered necessary to avoid, reduce or offset potentially significant cumulative effects which cannot be mitigated by measures determined for the individual projects’ effects.

The approach to assessment of environmental effects will follow similar methodologies in each technical (topic) area to the EIA but will be tailored to be proportionate to the overall CEA approach and taking account of the focus on key receptors. This is expected to result in a shorter and more focused assessment than for the EIAs of the individual projects.

The CEA will consider and report the potential for short term cumulative impacts associated with, for example, concurrent construction of CWRR and GAIA (and any other significant

⁴³ Residual effects are those evaluated following mitigation

development proposal). It will then report the longer term potential for the two City Deal projects and the anticipated masterplan development they will stimulate to have cumulative permanent and operational effects.

The CEA will also assess the cumulative predicted socio-economic benefits of the CWRR and GAIA proposals. This assessment will draw on wider work being undertaken to inform the City Deal programme. It will predict the employment and economic impacts of the development which is anticipated (in the masterplan) in the longer term e.g. resulting from the development of commercial and residential development on land opened up as a result of the transport interventions from CWRR and GAIA.

14 Summary of EIA Scoping

14.1 Summary

Renfrewshire Council City Deal Team is seeking permission to develop a bridge crossing over the Clyde, access roads to and from the new bridge and a development road that will link the bridge to Inchinnan Road and Ferry Road.

The proposed development falls within Schedule 2 of the TCP EIA Regulations and under MW EIA Regulations with the potential for significant environmental effects. An EIA will be undertaken, and an environmental statement ES produced to accompany the planning application.

This EIA Scoping Report is a formal request for a Scoping Opinion from all of the competent authorities under Section 14 of the TCP EIA Regulations and under Schedule 4 of the MW EIA Regulations.

Where there are factors which have the potential to cause environmental impacts, these will be examined and the results included within the ES.

The planning application for the proposed development will be accompanied by a supporting Planning Statement as well as the ES.

The ES will draw upon the interactions identified in this Scoping Report, in order to provide an assessment of the scale and significance of the potential impacts which may occur as a result of the proposed development. The ES will propose mitigation measures, as appropriate, to minimise and potential adverse impacts.

As an iterative process, the scope of the assessment will be refined as part of this scoping process but also following consultations with a wide range of authorities, statutory agencies and interested parties.

14.2 Issues to be Scoped Out

This scoping exercise has been undertaken to help enable the project to be designed to avoid or minimise negative environmental impacts and provides an opportunity to incorporate positive environmental enhancements into the project. It has also been completed to focus the scope of the EIA on only those '*likely significant effects*', to provide a more pragmatic approach.

The suggested scope of works for each environmental topic is set out in Chapters 3 to 12 of the Scoping Report. The principal elements that are proposed to be scoped out from further detailed consideration in the EIA are set out in **Table 14.1**.

Table 14.1 Elements to be scoped out of the Environmental Technical Assessments

Topic	Elements to be scoped out
Land use and Communities	<ul style="list-style-type: none"> • impacts upon agricultural land; • impacts upon equestrians; • impacts from demolition of properties, as not required.
Geology, hydrogeology, soils and contaminated land	All potential effects are currently scoped in, however following the completion of the detailed Site Investigation, some of these may not be required. Any changes to proposed scope will be agreed in advance with the consultees.
Water quality, drainage and flood defence	<ul style="list-style-type: none"> • Method A of DMRB would not be undertaken. • No water quality surveys or monitoring are proposed as part of the EIA. • Detailed pollutant transport modelling in line with SEPA's WAT-SG-11 Guidance⁴⁴ is not required as there are no designated shellfish or bathing waters in the vicinity of the proposed project, as agreed with SEPA.
Landscape, townscape and visual impact	Requirement for extensive mitigation planting will be limited and therefore there is no requirement for a Year 15 assessment.
Ecology and nature conservation	<p>Surveys for</p> <ul style="list-style-type: none"> • great crested newts; • breeding birds; • fresh water fish species or habitats; and • NVC surveys. <p>Full Habitats Regulations Assessment (HRA) (although an HRA screening appraisal will be undertaken for River Endrick SAC)</p>
Archaeology and cultural heritage	A desk based assessment is currently being undertaken assessing the potential impacts identified in Chapter 8. If that assessment predicted that some impacts will clearly lead to no effect, or a negligible effect on heritage assets, it is proposed that these will be scoped out of the final environmental statement following further consultation with the consultees.
Noise and vibration	Groundborne vibration is currently proposed to be scoped out but this will be kept under review as the detailed design progresses and if required, this will be assessed.
Air quality	All potential effects are currently scoped in. Further assessment will confirm the need for quantitative assessment of construction related air quality in accordance with relevant technical guidance.

⁴⁴ SEPA Supporting Guidance (WAT-SG-11): Modelling Coastal and Transitional Discharges, v3.0 April 2013

14.3 Format of the Environmental Statement

It is proposed that a single multi-volume ES is prepared to support the planning (and other) applications for the proposed development (CWRR) and which also incorporates the findings of the EIA for the neighbouring GAIA project. This allows for both a 'standalone' presentation of the findings of each project and an integrated approach presenting the cumulative effects assessment for the two projects. This approach has been based on legal advice provided to the Applicant which seeks to provide flexibility through separate presentation of the EIAs for the two projects but which also brings them together to reflect their key inter-relationships and cumulative effects.

The environmental information produced as part of the EIA will be submitted within an ES which will comprise a series of technical reports, figures and appendices combined within four volumes as set out below:

- **Volume 1:** Introductory Sections for the ES and baseline descriptions for the CWRR and GAIA projects;
- **Volume 2:** Reports the findings of the predicted environmental effects of the CWRR project;
- **Volume 3:** Reports the findings of the predicted environmental effects of the GAIA project; and
- **Volume 4:** Reports the findings of the predicted cumulative environmental effects for CWRR and GAIA projects in combination.

This approach is proposed to recognise the geographical proximity of the two Renfrewshire City Deal projects and their potential to be promoted and developed over similar timescales that could result in cumulative effects.

The information provided within the ES will comply with Schedule 4 of the TCP EIA Regs and Schedule 3 of the MW EIA Regs; "Information to be included within an Environmental Statement". The ES will be a publicly available document on the Renfrewshire City Deal website that will be made available on request as hard copy (for a charge) and on display with the scheme documents during the statutory consultation period in locations to be agreed with the relevant EIA competent authorities.

14.4 How to comment?

This Scoping Report has formed a package of information presented to all regulatory authorities (Renfrewshire Council, West Dunbartonshire Council, Glasgow City Council and Marine Scotland) requesting their official EIA Scoping Opinion. This report has also been shared with the list of consultees that are provided in **Appendix 14.1** to gain agreement for the scope of the environmental assessment to be carried out (EIA). Consultee comments will be summarised in the ES with a note on how they have been addressed, and they will be used to help inform the development of the design.

If you have any additional baseline information, you wish to comment on the scope of the assessment or you have any other information that you think is relevant to this project please contact the City Deal team on:

citydeal@renfrewshire.gov.uk

Appendices



Appendix 4.1: Schedule of Historical Contamination Sources

Drawing Source Reference Number	Potential Contamination Source	Historical Map File Reference	Year of First Appearance	Risk Ranking *
1	Railway line	GS-2673721_SS_1_1	1857-1858	Low/Moderate
2	Gasometer	GS-2673721_SS_2_3	1895-1896	High
3	Kilbowie Iron Works	GS-2673721_SS_2_3	1895-1896	Moderate
4	Works	GS-2673721_SS_2_3	1955-1956	Low/Moderate
5	Works	GS-2673721_SS_3_3	1971-1973	Low/Moderate
6	Brickhouse	GS-2673721_SS_2_3	1861	Low/Moderate
7	Chemical Works	GS-2673721_SS_2_3	1895-1896	High
7	Chemical Works & Gravel Pit	GS-2673721_SS_2_3	1915-1920	High
8	Nursery	GS-2673721_SS_3_3	1922-1924	Low/Moderate
9	Clydebank Engineering & Shipbuilding Works	GS-2673721_SS_2_3	1895-1896	Low/Moderate
10	Refuse Destructor	GS-2673721_SS_2_3	1923	Low/Moderate
11	Old Quarry	GS-2673721_SS_3_3	1895-1896	Low/Moderate
12	Old Quarry	GS-2673721_SS_1_3	1857	Low/Moderate
13	Refuse Tip	GS-2673721_SS_2_3	2002	Low/Moderate
14	Goods Shed	GS-2673721_SS_2_3	1923	Low/Moderate
14	Engine Shed & Drill Hall	GS-2673721_SS_2_3	1923	Low/Moderate
15	Dam	GS-2673721_SS_3_3	1861	Low/Moderate
16	Brick & Tile Works	GS-2673721_SS_3_3	1895-1896	Low/Moderate
17	Coal Pit	GS-2673721_SS_3_3	1861	Low/Moderate
18	Sewage Tank	GS-2673721_SS_1_3	1912	Low/Moderate
19	Works	GS-2673721_SS_2_3	1985-1987	Low/Moderate
19	Works	GS-2673721_1250scale_7_11	1982-1986	Low/Moderate
20	Bakery	GS-2673721_SS_2_3	1922-1924	Low/Moderate
20	Depot	GS-2673721_SS_2_3	1985-1987	Low/Moderate
21	Elgin Works (Engineering)	GS-2673721_SS_2_3	1915-1920	Low/Moderate
22	Garage	GS-2673721_SS_1_3	1974-1978	Low/Moderate
23	Curling Pond	GS-2673721_SS_1_3	1895	Low/Moderate
24	Reservoirs	GS-2673721_SS_1_3	1985-1987	Low/Moderate
25	Gravel Pit	GS-2673721_SS_2_3	1911-1914	Low/Moderate
26	Sewage Treatment works	GS-2673721_SS_2_3	1985-1987	Low/Moderate
27	Electricity Generation Station	GS-2673721_SS_2_3	1971-1974	Low/Moderate
27	Fuel Depot	GS-2673721_SS_2_3	2002	High
28	Works (including Cabinet Works)	GS-2673721_SS_2_3	1971-1974	Low/Moderate
30	Corn Mill	GS-2673721_SS_3_3	1861	Low/Moderate
31	Standard Laundry	GS-2673721_SS_3_3	1914	Low/Moderate
31	Motor Works	GS-2673721_SS_3_3	1934	Low/Moderate
31	Factory	GS-2673721_SS_3_3	1971-1973	Low/Moderate
32	Motor works	GS-2673721_SS_3_3	1914	Low/Moderate
32	Albion Works Industrial Estate	GS-2673721_SS_3_3	1983-1987	Low/Moderate
33	Shipbuilding Yard	GS-2673721_SS_2_3	1895	Low/Moderate
33	Timber Dock	GS-2673721_SS_2_3	1895	Low/Moderate
33	Scrap Yard	GS-2673721_SS_2_3	2002	Low/Moderate
34	Flooring Works	GS-2673721_1250scale_8_10	1948-1949	Low/Moderate
34	Asphalt Works	GS-2673721_1250scale_8_10	1966-1969	Moderate
35	Works	GS-2673721_SS_3_3	1914	Low/Moderate
35	Warehouses	GS-2673721_SS_3_3	1934	Low/Moderate
35	Joinery & Cabinet Works	GS-2673721_1250scale_8_10	1948-1949	Low/Moderate
35	Depots & Factory	GS-2673721_1250scale_8_10	1990-1992	Low/Moderate
36	Distillery	GS-2673721_SS_3_3	1857	Low/Moderate
37	Car Breakers Yard	GS-2673721_1250scale_8_10	1990-1992	Low/Moderate
38	Omnibus Depot	GS-2673721_SS_1_3	1939	Low/Moderate
39	Nursery	GS-2673721_SS_2_3	1938-1939	Low/Moderate
40	Spoil Heaps	GS-2673721_SS_2_3	1895-1896	Low/Moderate
41	Quarry	GS-2673721_LS_4_8	1897	Low/Moderate
42	Curling Pond	GS-2673721_SS_2_3	1857	Low/Moderate
42	Curling Pond	GS-2673721_SS_2_3	1861	Low/Moderate
42	Curling Pond	GS-2673721_SS_2_3	1895-1896	Low/Moderate
43	London Works (Shipbuilding & Engineering)	GS-2673721_SS_3_3	1857	Low/Moderate
43	London Works (Shipbuilding & Engineering)	GS-2673721_SS_2_3	1857	Low/Moderate
43	Ship Building Yard	GS-2673721_SS_2_3	1857	Low/Moderate
43	Storage Depot & Factory	GS-2673721_SS_2_3	1973	Low/Moderate
43	Meadowside Industrial Estate	GS-2673721_SS_2_3	1985	Low/Moderate
43	Car Breakers Yard	GS-2673721_1250scale_8_10	1992	Low/Moderate
44	Clyde Trustees Works	GS-2673721_SS_3_3	1857	Low/Moderate
44	Clyde Valley Electrical Power Station	GS-2673721_SS_3_3	1914	Moderate
45	Yoker Mains & Dam	GS-2673721_SS_3_3	1857	Low/Moderate
45	Engine Shed	GS-2673721_SS_3_3	1914	Low/Moderate
45	Yoker Industrial Estate	GS-2673721_SS_3_3	1983-1987	Low/Moderate
46	Works	GS-2673721_SS_1_2	1974	Low/Moderate
46	Works & Factory associated with Inchinnan Industrial Estate	GS-2673721_SS_1_2	1985	Low/Moderate
46	Tyre Works	GS-2673721_SS_1_3	1939	Low/Moderate
46	Factory and Works	GS-2673721_SS_1_3	1985-1987	Low/Moderate
46	Inchinnan Industrial Estate	GS-2673721_SS_1_3	2002	Low/Moderate
47	Allands Nursery	GS-2673721_SS_1_3	1955	Low/Moderate
47	Factory	GS-2673721_SS_1_3	2010	Low/Moderate
48	Tank	GS-2673721_SS_1_2	1985	Low/Moderate
49	Gasholder	GS-2673721_LS_4_7	1895-1897	High
50	Laundry	GS-2673721_SS_2_3	1857	Low/Moderate
50	Gas Works	GS-2673721_SS_2_3	1895	High
51	Sewage Disposal Works	GS-2673721_SS_2_3	1955-1956	Low/Moderate
52	Contractors Yard	GS-2673721_SS_2_3	1971-1974	Low/Moderate
53	Oil Refinery	GS-2673721_SS_3_3	1971-1973	High
54	Metal Works	GS-2673721_SS_3_3	1914	Moderate
55	Bon-Accord Works	GS-2673721_SS_3_3	1914	Low/Moderate

56	Elderslie Brick Works	GS-2673721_SS_3_3	1934	Low/Moderate
57	Works	GS-2673721_SS_3_2	1966	Low/Moderate
57	Docks - works	GS-2673721_SS_3_3	1922-1924	Low/Moderate
57	Elderslie Dockyard	GS-2673721_SS_3_3	1934	Low/Moderate
58	Laboratory	GS-2673721_SS_2_2	1911	Low/Moderate
58	Warehouses	GS-2673721_SS_2_2	1973-1974	Low/Moderate
58	Laboratory	GS-2673721_SS_2_3	1911-1914	Low/Moderate
58	Bonded Warehouses	GS-2673721_SS_2_3	1971-1974	Low/Moderate
58	Tank & Depot	GS-2673721_SS_2_3	1985-1987	Low/Moderate
59	Old Shaft	GS-2673721_SS_2_2	1895-1896	Low/Moderate
60	Gas Works	GS-2673721_SS_3_3	1857	High
60	Gas Works	GS-2673721_SS_3_3	1914	High
61	Clyde Navigation Works (Shipbuilding)	GS-2673721_SS_3_2	1911-1914	Low/Moderate
61	Clyde Navigation Works (Shipbuilding)	GS-2673721_SS_3_3	1914	Low/Moderate
62	Yacht Works	GS-2673721_SS_3_2	1938	Low/Moderate
62	Boatbuilding Works	GS-2673721_SS_3_2	1956	Low/Moderate
62	Boatbuilding Yard	GS-2673721_SS_3_3	1955-1956	Low/Moderate
63	Factory	GS-2673721_SS_3_2	1956	Low/Moderate
63	Factory (Animal Feeding Stuffs)	GS-2673721_SS_3_3	1955-1956	Low/Moderate
64	Goods Shed	GS-2673721_SS_2_2	1924	Low/Moderate
65	Chemical Works	GS-2673721_SS_2_2	1857	High
66	Depot	GS-2673721_SS_3_2	1987	Low/Moderate
67	Factory	GS-2673721_SS_3_2	1956	Low/Moderate
67	Travelling Crane and Coal Conveyors	GS-2673721_LS_8_6	1955	Low/Moderate
68	Spoil Heap	GS-2673721_1250scale_10_8	1968	Low/Moderate
69	Yarrow's Shipbuilding Works	GS-2673721_SS_3_2	1911-1914	Low/Moderate
70	Albion Motor Car Works	GS-2673721_SS_3_2	1911-1914	Low/Moderate
71	Cement Works	GS-2673721_SS_2_2	1955-1956	Low/Moderate
71	Garage	GS-2673721_SS_2_2	1955-1956	Low/Moderate
72	Refuse Heap	GS-2673721_LS_6_6	1949	Low/Moderate
73	Engineering Works	GS-2673721_1250scale_8_8	1972	Low/Moderate
74	Garage	GS-2673721_1250scale_8_8	1972	Low/Moderate
75	Workshop	GS-2673721_1250scale_8_8	1972	Low/Moderate
76	Goods Shed & Electricity Sub Station	GS-2673721_LS_7_6	1913	Low/Moderate
77	Power Station	GS-2673721_SS_3_2	1966	Moderate
78	Braehead Works	GS-2673721_SS_3_2	1956	Low/Moderate
79	Coventry Ordnance Works	GS-2673721_SS_3_2	1911-1914	Moderate
79	Diesel Engine Works	GS-2673721_SS_3_2	1934	Low/Moderate
80	Balmoral Iron Yard	GS-2673721_SS_3_2	1911-1914	Low/Moderate
81	Iron Works	GS-2673721_SS_3_2	1911-1914	Moderate
82	Roxburgh Works	GS-2673721_SS_3_2	1911-1914	Moderate
83	Scotstoun Iron Works	GS-2673721_SS_3_2	1911-1914	Moderate
84	Scotstoun Shipbuilding Yard	GS-2673721_SS_3_2	1895-1896	Low/Moderate
85	Glasgow Airport	GS-2673721_SS_1_2	1968	Low/Moderate
86	Engineering Works	GS-2673721_SS_2_2	1911	Low/Moderate
87	Rifle Range	GS-2673721_SS_2_2	1911	Moderate
88	Camtyne Steel Foundry	GS-2673721_SS_2_2	1911	Moderate
89	Works	GS-2673721_SS_2_2	1973-1974	Low/Moderate
89	Albert Laundry	GS-2673721_SS_2_2	1924	Low/Moderate
90	Garage	GS-2673721_1250scale_8_7	1982-1984	Low/Moderate
91	Works	GS-2673721_SS_3_2	1987	Low/Moderate
92	Braehead Transit Depot	GS-2673721_SS_3_2	1956	Low/Moderate
93	Nursery	GS-2673721_1250scale_8_7	1949	Low/Moderate
94	Old Corn Mill	GS-2673721_SS_3_2	1857	Low/Moderate
95	Dye Works	GS-2673721_SS_3_2	1857	High
96	Works	GS-2673721_SS_3_2	1973	Low/Moderate
97	Gasometer	GS-2673721_SS_1_2	1857	High
98	Brick Works	GS-2673721_SS_1_2	1895	Low/Moderate
98	Walkinshaw Colliery & Shaft	GS-2673721_SS_1_2	1895	Moderate
99	Works	GS-2673721_SS_2_2	1955-1956	Low/Moderate
100	Renfrew Forge & Steel Works	GS-2673721_SS_2_2	1895-1896	Moderate
101	Albert Cabinet Works	GS-2673721_SS_2_2	1895-1896	Low/Moderate
101	Chy Works	GS-2673721_SS_2_2	1973-1974	Low/Moderate
102	Rubber Works	GS-2673721_SS_2_2	1939	Low/Moderate
103	Refuse Destructor	GS-2673721_SS_3_2	1939	Low/Moderate
104	Reservoir	GS-2673721_SS_3_2	1857	Low/Moderate
104	Meadowside Works & Tanks	GS-2673721_SS_3_2	1956	Low/Moderate
104	Renfrew Airport	GS-2673721_SS_3_2	1966	Low/Moderate
105	Cable Works	GS-2673721_SS_3_2	1939	Low/Moderate
106	Deanside Depot	GS-2673721_SS_3_2	1911-1914	Low/Moderate
107	Bonded Warehouses	GS-2673721_SS_3_2	1987	Low/Moderate
108	Goods Shed	GS-2673721_SS_3_2	1934	Low/Moderate
108	Goods Shed	GS-2673721_SS_3_2	1956	Low/Moderate
108	Goods Shed	GS-2673721_SS_3_2	1973	Low/Moderate
109	Thistle Works (Shipbuilding & Engineering)	GS-2673721_SS_2_2	1895-1896	Low/Moderate
109	Depot	GS-2673721_SS_2_2	1955-1956	Low/Moderate
109	Thistle Works (Engineering & Shipbuilding)	GS-2673721_SS_1_2	1895	Low/Moderate
110	Engineering Works	GS-2673721_SS_2_2	1939	Low/Moderate
110	Moorpark Works	GS-2673721_SS_2_2	1939	Low/Moderate
110	Works & Factory	GS-2673721_SS_2_2	1985-1987	Low/Moderate
111	Tramway Depot	GS-2673721_SS_2_2	1911	Low/Moderate
112	Moorpark Mill (Corn)	GS-2673721_SS_2_2	1857	Low/Moderate
112	Cotton Spinning Factory	GS-2673721_SS_2_2	1895-1896	Low/Moderate
113	Poultry Packing Station	GS-2673721_SS_1_2	1974	Low/Moderate
114	Walkinshaw Pit (Ironstone)	GS-2673721_SS_1_2	1857	Low/Moderate
114	Old Shaft	GS-2673721_SS_1_2	1895	Low/Moderate

115	Paisley Foundry	GS-2673721_SS_2_2	1911-1914	Moderate
115	Possible Spoil Deposition	GS-2673721_SS_2_2	1973-1974	Low/Moderate
116	St Rollox Works (Soap & Candle)	GS-2673721_SS_2_2	1934-1939	Low/Moderate
116	Preserve Factory	GS-2673721_SS_2_2	1934-1939	Low/Moderate
116	Reservoir	GS-2673721_SS_2_2	1934-1939	Low/Moderate
116	Depot & Mill	GS-2673721_SS_2_2	1973-1974	Low/Moderate
117	Shipbuilding Yard	GS-2673721_SS_2_2	1895-1896	Low/Moderate
117	Shipbuilding Yard	GS-2673721_SS_1_2	1895	Low/Moderate
118	Sewage Works	GS-2673721_SS_2_2	1973-1974	Low/Moderate
118	Sewage Works	GS-2673721_SS_2_2	1985-1987	Low/Moderate
119	Abattoir	GS-2673721_SS_2_2	1973-1974	Moderate
119	Sub Station	GS-2673721_SS_2_2	1985-1987	Low/Moderate
120	North Sandyford Works (Cement)	GS-2673721_1250scale_4_4	1948	Low/Moderate
121	Brittannia Works	GS-2673721_SS_2_2	1939	Low/Moderate
121	St Andrews Works	GS-2673721_SS_2_2	1955-1956	Low/Moderate
122	New Mains	GS-2673721_SS_2_2	1939	Low/Moderate
122	Tanks	GS-2673721_SS_2_2	1955-1956	Low/Moderate
123	Engineering Works	GS-2673721_SS_3_2	1939	Low/Moderate
123	Engineering Works	GS-2673721_SS_3_2	1956	Low/Moderate
123	Sternette Works & Kelvin Works	GS-2673721_SS_3_2	1956	Low/Moderate
123	Nursery	GS-2673721_SS_3_2	1956	Low/Moderate
124	Deanside Transit Depot	GS-2673721_SS_3_2	1956	Low/Moderate
125	Dock Saw Mills	GS-2673721_SS_3_2	1911-1914	Moderate
126	Timber Yard	GS-2673721_SS_3_2	1987	Moderate
127	Bogmoor Road Storage Yard	GS-2673721_SS_3_2	1956	Low/Moderate
127	Depot	GS-2673721_SS_3_2	1966	Low/Moderate
128	Shieldhall Saw Mills	GS-2673721_SS_3_2	1934	Moderate
129	Shieldhall Co-operative Works	GS-2673721_SS_3_2	1911-1914	Low/Moderate
130	Boghead Pit (Ironstone)	GS-2673721_SS_1_1	1857-1858	Low/Moderate
130	Walkinshaw Brick Works	GS-2673721_SS_1_1	1895-1896	Low/Moderate
131	Hermand Oil Works	GS-2673721_SS_1_1	1895-1896	High
132	Warehouse	GS-2673721_SS_1_2	1974	Low/Moderate
132	Phoenix Industrial Estate	GS-2673721_SS_1_2	1985	Low/Moderate
133	Brick Works	GS-2673721_SS_1_1	1895-1896	Moderate
133	Works	GS-2673721_SS_2_2	1934-1939	Low/Moderate
134	Phoenix Works (Shipbuilding & Engineering)	GS-2673721_SS_1_1	1912-1916	Low/Moderate
134	Phoenix Works (Shipbuilding & Engineering)	GS-2673721_SS_2_1	1895-1896	Low/Moderate
134	Phoenix Works (Shipbuilding & Engineering)	GS-2673721_SS_2_2	1895-1896	Low/Moderate
134	Phoenix Works	GS-2673721_SS_1_2	1895	Low/Moderate
135	Sandyford Works (Chemical)	GS-2673721_SS_2_2	1934-1939	High
135	Works	GS-2673721_SS_2_2	1955-1956	Low/Moderate
135	Abbotsinch Industrial Estate	GS-2673721_SS_2_2	1985-1987	Low/Moderate
136	Printing Works	GS-2673721_SS_2_1	1971-1976	High
137	Arkleston Print Works	GS-2673721_SS_2_1	1857-1858	Moderate
137	Arkleston Print & Dye Works	GS-2673721_SS_2_1	1911-1916	High
138	Reservoirs	GS-2673721_SS_2_1	1896	Low/Moderate
138	Old Quarries	GS-2673721_SS_2_1	1896	Low/Moderate
139	Brick Works	GS-2673721_SS_1_1	1895-1896	Low/Moderate
140	Rope Works	GS-2673721_SS_1_1	1895-1896	Low/Moderate
141	Marchfield Works	GS-2673721_SS_1_1	1938-1939	Low/Moderate
142	Laundrette	GS-2673721_SS_1_1	1895-1896	Low/Moderate
143	Saw Mills	GS-2673721_SS_1_1	1895-1896	Moderate
144	Clay Pit	GS-2673721_SS_1_1	1895-1896	Low/Moderate
145	Slaughter House	GS-2673721_SS_1_1	1857-1858	Low/Moderate
145	Slaughter House	GS-2673721_LS_2_2	1858	Moderate
146	Bellfield Nursery	GS-2673721_SS_1_1	1895-1896	Low/Moderate
147	Shipbuilding Yard & Works	GS-2673721_SS_1_1	1857-1858	Moderate
147	Nethercommon Print Works	GS-2673721_SS_2_1	1857-1858	Moderate
148	Harbour Saw Mills	GS-2673721_SS_2_1	1911-1916	Moderate
149	Warehouses & Factory	GS-2673721_SS_2_1	1971-1976	Low/Moderate
150	Carpet Works	GS-2673721_SS_1_1	1912-1916	Low/Moderate
150	Cement Works	GS-2673721_SS_1_1	1938-1939	Low/Moderate
151	Albion Works	GS-2673721_SS_2_1	1911-1916	Low/Moderate
151	Laighpark Foundry	GS-2673721_SS_2_1	1934-1939	Low/Moderate
151	Works	GS-2673721_SS_2_1	1955	Low/Moderate
152	Dye Works	GS-2673721_SS_2_1	1895-1896	High
153	Works	GS-2673721_SS_1_1	1968	Low/Moderate
154	Abercorn Rope Works	GS-2673721_SS_1_1	1895-1896	Low/Moderate
155	Abercorn Oil Works	GS-2673721_SS_1_1	1895-1896	High
156	Chemical Works	GS-2673721_SS_1_1	1895-1896	High
157	Preserve Works	GS-2673721_SS_1_1	1895-1896	Low/Moderate
158	Starch Works	GS-2673721_SS_1_1	1895-1896	Low/Moderate
159	Retorts Works	GS-2673721_SS_1_1	1895-1896	High
160	Oil Works	GS-2673721_SS_1_1	1895-1896	High
160	Victoria Foundry	GS-2673721_LS_2_2	1897-1898	Low/Moderate
160	Saw Mills & Timber Yard	GS-2673721_LS_2_2	1897-1898	Moderate
160	Bitumen Works	GS-2673721_LS_2_2	1949-1951	Low/Moderate
160	Cabinet Works	GS-2673721_LS_2_2	1949-1951	Low/Moderate
161	Caledonian Brick & Drain Tile Works	GS-2673721_SS_1_1	1857-1858	Low/Moderate
161	Clay Pits	GS-2673721_SS_1_1	1857-1858	Low/Moderate
161	Fire Clay Works	GS-2673721_SS_1_1	1895-1896	Low/Moderate
162	Burgh Slaughter House	GS-2673721_LS_2_2	1913	Moderate
162	Burgh Abattoir & Cold Stores	GS-2673721_LS_2_2	1938	Moderate
163	North Caledonian Brick Works & Clay Pits	GS-2673721_LS_2_2	1858	Low/Moderate
164	Chemical Works	GS-2673721_SS_1_1	1924	High
164	Chemical Works	GS-2673721_SS_2_1	1924	High

165	Cartside Dye Works	GS-2673721_SS_2_1	1857-1858	High
166	Snowdown Soap Works	GS-2673721_SS_2_1	1857-1858	Low/Moderate
167	Builders Yard	GS-2673721_SS_1_1	Current	Low/Moderate
168	Adelphi Cotton Mill	GS-2673721_SS_2_1	1857-1858	Low/Moderate
169	Thread Factory	GS-2673721_SS_2_1	1857-1858	Low/Moderate
170	Rope Works and Engine & Machine Works	GS-2673721_LS_3_2	1897	Low/Moderate
170	Lairpark Engineering Works	GS-2673721_LS_3_2	1950	Low/Moderate
171	Earth Works on Byres Hill	GS-2673721_SS_2_1	1911-1916	Low/Moderate
172	Clay Pits	GS-2673721_SS_1_1	1857-1858	Low/Moderate
173	Works	GS-2673721_SS_1_1	1983-85	Low/Moderate
174	Refuse Destructor	GS-2673721_SS_1_1	1912-1916	Low/Moderate
175	Hot House Works	GS-2673721_SS_1_1	1895-1896	Low/Moderate
176	Caledonian Print Works & Clay Pit	GS-2673721_SS_1_1	1857-1858	Moderate
176	Saw Mills	GS-2673721_LS_2_1	1897	Moderate
177	Dye Works	GS-2673721_SS_1_1	1857-1858	High
178	Saw Mills & Wood Yard	GS-2673721_SS_1_1	1857-1858	Moderate
179	Warehouses & Depots	GS-2673721_SS_1_1	Current	Low/Moderate
180	Timber Yards	GS-2673721_LS_3_2	1858	Moderate
181	Thread Mill	GS-2673721_SS_2_1	1857-1858	Low/Moderate
181	Imperial Starch Works	GS-2673721_SS_2_1	1857-1858	Low/Moderate
181	Station & Works	GS-2673721_LS_3_2	1897	Low/Moderate
182	Works	GS-2673721_SS_1_1	Current	Low/Moderate
182	Nursery & Manure Yard	GS-2673721_LS_2_1	1858	Low/Moderate
183	Brick Works & Clay Pits	GS-2673721_SS_1_1	1857-1858	Low/Moderate
183	Starch Works	GS-2673721_SS_1_1	1857-1858	Low/Moderate
183	Engine Works	GS-2673721_SS_1_1	1895-1896	Moderate
184	Coal Depots	GS-2673721_SS_1_1	1857-1858	Moderate
185	Saw Mills	GS-2673721_SS_1_1	1895-1896	Moderate
186	Aerated Water Factory	GS-2673721_LS_2_1	1950	Low/Moderate
187	Timber Yard	GS-2673721_SS_1_1	1857-1858	Moderate
187	Iron Works	GS-2673721_LS_3_1	1897	Moderate
188	Brass Foundry	GS-2673721_LS_3_1	1913	Low/Moderate
188	Sheet Metal Works	GS-2673721_LS_3_1	1950	Low/Moderate
189	Coachbuilding Works	GS-2673721_LS_3_1	1950	Low/Moderate
189	Mill	GS-2673721_LS_3_1	1962	Low/Moderate
190	Dye Works & Oil Works	GS-2673721_SS_2_1	1857-1858	High
190	Mill	GS-2673721_SS_2_1	1955	Low/Moderate
190	Weaving Mill	GS-2673721_LS_3_1	1938	Low/Moderate
191	Vulcan Foundry (Iron)	GS-2673721_SS_2_1	1857-1858	Moderate
192	Vulcan Works (Engineering)	GS-2673721_SS_2_1	1857-1858	Low/Moderate
192	Starch Works	GS-2673721_SS_2_1	1895-1896	Low/Moderate
192	Goods Station	GS-2673721_SS_2_1	1895-1896	Low/Moderate
193	Timber Yard	GS-2673721_LS_3_1	1858	Moderate
194	Sewage Works	GS-2673721_SS_1_1	1912-1916	Low/Moderate
195	Old Quarries	GS-2673721_SS_1_1	1857-1858	Low/Moderate
196	Chemical Works	GS-2673721_SS_1_1	1857-1858	High
197	Gasworks	GS-2673721_SS_1_1	1857-1858	High
198	Dye Works	GS-2673721_SS_1_1	1895-1896	High
199	Underwood Cotton Mill	GS-2673721_SS_1_1	1857-1858	Low/Moderate
200	Coal Depot	GS-2673721_SS_1_1	1857-1858	Moderate
201	Timber Yard	GS-2673721_SS_1_1	1857-1858	Moderate
202	Print Works	GS-2673721_LS_3_1	1858	Moderate
203	Paisley Foundry (Iron)	GS-2673721_LS_3_1	1858	Moderate
203	Coal Yard	GS-2673721_LS_3_1	1858	Moderate
204	Soap Works	GS-2673721_LS_3_1	1858	Low/Moderate
205	Shipbuilding Yard	GS-2673721_LS_3_1	1897	Low/Moderate
206	Abercorn Timber Yard	GS-2673721_LS_3_1	1858	Moderate
207	Abercorn Works (Engineering)	GS-2673721_LS_3_1	1858	Low/Moderate
208	Works	GS-2673721_LS_3_1	1897	Low/Moderate
209	Smithhills Dye Works	GS-2673721_LS_3_1	1858	High
210	Smithy	GS-2673721_LS_3_1	1913	Low/Moderate
211	Newtown Foundry (Iron)	GS-2673721_LS_3_1	1858	Low/Moderate
211	Abbey Works	GS-2673721_LS_3_1	1858	Low/Moderate
212	Timber Yard & Saw Mill	GS-2673721_LS_3_1	1858	Moderate
213	Timber Yards & Saw Mills	GS-2673721_LS_3_1	1858	Moderate
213	Walneuk Saw Mills	GS-2673721_LS_3_1	1950	Moderate
214	Print Works	GS-2673721_SS_2_1	1857-1858	Moderate
214	Print Works	GS-2673721_LS_3_1	1858	Moderate
214	Timber Yard	GS-2673721_LS_3_1	1858	Moderate
215	East Greenlaw Nursery	GS-2673721_SS_2_1	1857-1858	Low/Moderate
216	Liquor Works	GS-2673721_SS_1_1	1857-1858	High
217	Dye Works	GS-2673721_SS_1_1	1857-1858	High
218	Thread Mill	GS-2673721_SS_1_1	1895-1896	Low/Moderate
218	Store	GS-2673721_SS_1_1	1983-85	Low/Moderate
219	Coal Depot	GS-2673721_LS_2_1	1858	Moderate
219	Timber Yard	GS-2673721_LS_2_1	1858	Moderate
220	Timber Yard & Saw Pit	GS-2673721_LS_2_1	1858	Moderate
221	Brediland Chemical Works	GS-2673721_SS_1_1	1895-1896	High
222	Fireclay Works	GS-2673721_SS_1_1	1857-1858	Low/Moderate
223	Thread Works	GS-2673721_SS_1_1	1857-1858	Low/Moderate
223	Goods Shed, tank	GS-2673721_SS_1_1	1895-1896	Low/Moderate
223	Thread Works	GS-2673721_SS_1_1	1895-1896	Low/Moderate
224	Dye Works	GS-2673721_SS_1_1	1895-1896	High
225	Starch Works	GS-2673721_SS_2_1	1895-1896	Low/Moderate
226	Castlehead Colliery	GS-2673721_SS_1_1	1857-1858	Low/Moderate
227	Lady Lane Works	GS-2673721_SS_1_1	1857-1858	Low/Moderate

228	George Street Powerloom Factory	GS-2673721_SS_1_1	1857-1858	Low/Moderate
229	Quarry	GS-2673721_SS_2_1	1857-1858	Low/Moderate
229	Steam Mills (Flour): Tank	GS-2673721_SS_2_1	1857-1858	Low/Moderate
230	Bladda Dye Works	GS-2673721_SS_2_1	1857-1858	High
231	Tannery	GS-2673721_SS_2_1	1857-1858	Moderate
231	Factory	GS-2673721_SS_2_1	1857-1858	Low/Moderate
232	Engineering Works	GS-2673721_SS_2_1	1895-1896	Low/Moderate
232	Works	GS-2673721_SS_2_1	1983-1987	Low/Moderate
233	Williamsburgh Works	GS-2673721_SS_2_1	1857-1858	Low/Moderate
233	Waste & Sponge Cloth Works	GS-2673721_SS_2_1	1896	Low/Moderate
233	Brick & Tile Works, Clay pits	GS-2673721_SS_2_1	1911-1916	Low/Moderate
234	Ladyburn Dye Works	GS-2673721_SS_2_1	1895-1896	High
235	Bakers Mill	GS-2673721_SS_1_1	1857-1858	Low/Moderate
236	Coal Depot	GS-2673721_SS_1_1	1857-1858	Moderate
237	Goods Shed	GS-2673721_SS_1_1	1912-1916	Low/Moderate
238	Works	GS-2673721_SS_1_1	1983-85	Low/Moderate
239	Brewery & Distillery	GS-2673721_SS_2_1	1857-1858	Low/Moderate
239	Soap Works	GS-2673721_SS_2_1	1911-1916	Low/Moderate
239	Bus Depot	GS-2673721_SS_2_1	1983-1987	Low/Moderate
240	Ship Carpenter's Workshop	GS-2673721_SS_2_1	1857-1858	Low/Moderate
241	Espedair Dye Works	GS-2673721_SS_2_1	1857-1858	High
242	Mills (Thread)	GS-2673721_SS_2_1	1857-1858	Low/Moderate
242	Bleach Works & Filtering tanks	GS-2673721_SS_2_1	1857-1858	Low/Moderate
242	Finishing Works (Dress & Weaving Material)	GS-2673721_SS_2_1	1895-1896	Low/Moderate
242	Anchor Mills (Thread)	GS-2673721_SS_2_1	1895-1896	Low/Moderate
242	Works & Mills	GS-2673721_SS_2_1	1955	Low/Moderate
243	Lonend Dye Works	GS-2673721_SS_2_1	1857-1858	High
244	Blackhall Factory	GS-2673721_SS_2_1	1857-1858	Low/Moderate
244	Tapestry Works	GS-2673721_SS_2_1	1895-1896	Low/Moderate
245	Bleach Works	GS-2673721_SS_2_1	1938-1939	Low/Moderate
245	Mills (Thread)	GS-2673721_SS_2_1	1955	Low/Moderate
246	Blackhall Reservoir	GS-2673721_SS_2_1	1857-1858	Low/Moderate
247	Sanitary Engineering Works	GS-2673721_SS_2_1	1896	Low/Moderate
247	Engineering Works	GS-2673721_SS_2_1	1896	Low/Moderate
247	Works	GS-2673721_SS_2_1	1955	Low/Moderate
247	Laundry	GS-2673721_SS_2_1	1955-56	Low/Moderate
247	Works	GS-2673721_SS_2_1	1971-1976	Low/Moderate
247	Tanks	GS-2673721_SS_2_1	1983-1987	Low/Moderate
248	Depot & Works	GS-2673721_SS_2_1	1966-69	Low/Moderate

Low/Moderate risk of potentially significant contamination constraints which may require some remediation depending on the sensitivity of proposed use.

Moderate risk of potentially significant contamination constraints which may require some remediation.

High risk of potentially significant contamination constraints which is likely to require some remediation.

Appendix 6.1: LVIA Methodology

Appendix 6.1 – Proposed LVIA Methodology

The purpose of a Landscape and Visual Impact Assessment (LVIA) is to identify and describe the likely landscape and visual effects of a development and to determine whether or not they would be significant. The LVIA will consider the effects of the proposed development on both the landscape as an environmental resource and on people's visual amenity. The intended use of this environmental information is to inform stakeholders and to assist decision making. An LVIA is undertaken in a sequence of iterative stages:

- Identification of aspects of the development that may give rise to significant effects on the landscape resource or on visual amenity;
- Description of baseline landscape and visual conditions: for the landscape assessment this provides an understanding of the character and value of the landscape resource and for the visual assessment this identifies the people in specific locations that may be visually affected;
- Identification of the landscape and visual receptors that may be affected by the development and an initial assessment of the likely significant effects upon them;
- Identification of mitigation measures appropriate to the development and its landscape context; and
- Assessment of the residual landscape and visual effects of the development incorporating mitigation and categorisation of their significance to decision makers.

The significance of the likely effects of the proposed development on identified landscape and visual receptors will be assessed using professional judgement. This professional judgement may take into account a number of different considerations including: the susceptibility of different receptors to the likely changes that would be associated with the scheme; the value or importance that is attached to the landscape receptor or a particular view; and the degree, geographical extent, duration and reversibility of the change that is likely to arise. The relevance and weighting of these many considerations will vary depending on the type of receptor being assessed.

As has been stated previously within this report, the LVIA will also include a townscape assessment..

1.1.1 Guidance

The LVIA will be carried out in accordance with all current and relevant advisory guidelines comprising:

- *Guidelines for Landscape and Visual Impact Assessment, 3rd Edition* (2013) E & FN Spon, Copyright the Institute of Environmental Assessment and the Landscape Institute
- *Landscape Character Assessment – Guidance for England and Scotland* (2002) Prepared on behalf of the Countryside Agency and Scottish Natural Heritage by Land Use Consultants; and

- Advice Note 01/09 - Use of Photography and Photomontages in Landscape and Visual Impact Assessment (2009) Landscape Institute; and
- *DMRB Volume 11, Section 3, Part 5 Landscape Effects (1993) (hereafter referred to as DMRB) The Highways Agency.*

Reference to DMRB relates to the stages of assessment through which the project has developed and not the specific approach to LVIA.

1.1.2 Assessing the level and significance of landscape effects

The level and significance of the likely effects of the proposed development on identified landscape receptors will be assessed using professional judgement. This professional judgement may take into account a number of different considerations including:

- The susceptibility of different landscape receptors to the likely changes that would be associated with the Proposed Development;
- The value or importance that is attached to them; and
- The degree, geographical extent, duration and reversibility of the change to the landscape that is likely to arise.

Considerations of susceptibility and value may both be considered as the 'sensitivity' of landscape receptors. Considerations of degree, geographical extent, duration and reversibility of landscape change, may be considered as the 'magnitude of landscape change' that may arise due to the proposed development.

The level of landscape effect is categorised using a four point scale: major; moderate; minor; and negligible. The level of effect is assessed by combining all of the considerations and criteria set out above. This is described by GLVIA3 as an 'overall profile' approach to combining judgements and requires that all the judgements against each of the identified criteria (i.e. susceptibility; value; degree of change; extent of change; duration of change; and reversibility of change) are utilised to allow a reasoned professional assessment of the overall level of landscape effect.

The relative weight attributed to each consideration is a matter of professional judgement and will vary depending on the specific landscape receptor being assessed. For example, susceptibility is more relevant to landscape character than to the removal of landscape elements such as tree cover and short term reversible effects on the landscape may still be judged to be significant by the decision makers.

Where possible to do so with a reasonable level of professional objectivity the effects of the proposed development on the landscape are identified as likely to be generally considered positive (beneficial), neutral or negative (adverse).

The significance of landscape effects is categorised as 'significant' or 'not significant'. The judgement on the significance of effect is informed directly by the level of effect that is identified as follows:

- A major or moderate level of effect is considered to be significant; and
- A minor or a negligible level of effect is considered to be not significant.

GLVIA3 states the following with regard to the judgement of significant landscape effects:

“There are no hard and fast rules about what makes a significant effect, and there cannot be a standard approach since circumstances vary with the location and landscape context and with the type of proposal. At opposite ends of a spectrum it is reasonable to say that:

- *Major loss or irreversible negative effects, over an extensive area, on elements and/or aesthetic and perceptual aspects that are key to the character of nationally valued landscapes are likely to be of the greatest significance;*
- *Reversible negative effects of short duration, over a restricted area, on elements and/or aesthetic and perceptual aspects that contribute to but are not key characteristics of the character of landscapes of community value are likely to be of the least significance and may, depending on the circumstances, be judged as not significant;*
- *Where assessments of significance place landscape effects between these extremes, judgements must be made about whether or not they are significant, with full explanations of why these conclusions have been reached.”*

1.1.2.1 Susceptibility of Landscape and Townscape Receptors to Change

The susceptibility of the landscape refers to its ability to accommodate the changes likely to be brought about by the proposed development without undue consequences for the maintenance of the baseline situation. Tables 6.2 and 6.3 provides a list of key characteristics and attributes that will be used in this assessment as indicators of levels of landscape and townscape susceptibility. The tables are indicative rather than prescriptive and the susceptibility of the landscape or townscape is categorised as High, Medium or Low using professional judgement.

Table 6.2 – Susceptibility of landscape character to change

Key characteristics	Attributes indicating higher susceptibility to change		Attributes indicating lower susceptibility to change
Scale	Small-scale landform/landcover; fine grained; enclosed; sheltered	<--->	Large-scale landform/land cover; coarse grained
Enclosure	Open	<--->	Enclosed
Landform	A flat, uniform landscape	<--->	An undulating landscape
Landcover and Pattern	Complex, irregular or intimate landscape patterns; diverse land cover	<--->	Simple, regular landscape patterns; uncluttered, sweeping lines; consistent land cover
Engineered / Built Influences	General absence of strongly engineered, built or manmade influences such as: electrical	<--->	Engineered forms/land use pattern; frequent presence of man-made elements, brownfield or industrial

Key characteristics	Attributes indicating higher susceptibility to change		Attributes indicating lower susceptibility to change
	infrastructure, roads, a geometric field pattern or man-made watercourses. Predominance of traditional or historic settlements, buildings and structures		landscapes; presence of contemporary built structures; electrical infrastructure; man-made watercourses; and commercial forestry
Naturalness and Tranquillity	Landscape with predominance of perceived natural features and forms. Sense of peace and isolation; remote and empty; little or no built development	<--->	Non-natural landscape; busy and noisy; human activity and development; prominent movement

Table 6.3 – Susceptibility of townscape character to change

Key characteristics	Attributes indicating higher susceptibility to change		Attributes indicating lower susceptibility to change
Structure	Strong and legible	<--->	Weak and confused
Scale	Fine grained and consistent	<--->	Coarse grained and/or varied
Uniformity of built form	Consistency of built form including regular and consistent facades and rooflines	<--->	Variety of built form including irregular and inconstant facades and rooflines
Uniformity of appearance	Consistency of appearance and limited range of traditional materials and colours	<--->	Diverse and innovative use of materials and colours in building appearance
Uniformity of period	Buildings broadly dating from a similar historical period with general absence of late twentieth century modern and twenty-first century contemporary	<--->	Buildings dating from a variety of periods including modern and contemporary
Building height	Low rise (generally fewer than five storeys)	<--->	Varied building height including buildings of equivalent 15 storey height or greater
Density of built development	Open and fragmented	<--->	Enclosed and continuous
Streetscape enclosure	Open with frequent views between buildings of street frontages	<--->	Enclosed with tightly channelled views and vistas
Presence of open spaces	Frequent open spaces	<--->	Few open spaces
Tree cover	Few mature street trees	<--->	Frequent mature street trees

1.1.2.2 Landscape and Townscape Value

The value of a landscape may reflect communal perception at a local, regional, national or international scale and may be informed by a number of factors including scenic beauty, tranquillity, wildness, cultural associations or other conservation or recreation interests. It

is also the case that a landscape with characteristics that suggest relatively low susceptibility to change may be judged to be of high value because of special values attached to it. Although landscape value or importance is usually determined by reference to statutory or local planning policy designations, an absence of such does not automatically imply a lack of value as other factors, for example scarcity, may be considered relevant. The value or importance of landscape elements is also considered. The degree of landscape value or importance is therefore a matter for reasoned professional judgement. Where relevant to the assessment, the value or importance of landscape elements, character areas or designated resources is categorised as either:

- High: which may refer to: an international designated landscape (rare cases only) – e.g. World Heritage Site; or a nationally designated site, e.g. National Park, AONB, Registered Historic Park or Garden;
- Medium: which may refer to a locally designated landscape, i.e. it has been identified by local planning authorities with a local plan policy or landscape character assessment as demonstrating a particular value; or
- Low: which may refer to a landscape which is valued at a local scale by local communities but has no documented evidence of value (i.e. in a policy, designation or character assessment).

1.1.2.3 Degree of Landscape Change

The degree of likely landscape change is assessed as High, Medium or Low by reference to the criteria set out in Table 6.4.

Table 4 – Degree of landscape/townscape change criteria

Degree of change	Definition
High	The Proposed Development will form a prominent landscape/townscape element, or will result in a substantial alteration to key landscape/townscape characteristics
Medium	The Proposed Development will form a conspicuous landscape/townscape element, or will result in a partial loss of or alteration to key landscape/townscape characteristics
Low	The Proposed Development will form an apparent, small landscape/townscape element, or will result in a minor alteration to key landscape/townscape characteristics
Negligible	The Proposed Development will be a barely perceptible landscape/townscape element, or will not change the key landscape/townscape characteristics

1.1.2.4 Geographical Extent of Landscape Change

This is based on an informed professional judgement and the extent of the change will vary depending on the nature of the proposal. The geographical extent of a landscape effect is assessed as:

- Extensive – the change may influence an extensive area, possibly including several landscape types and/or character areas;

- Medium – the change may influence the wider landscape type and/or character area within which the Proposed Development is located; and
- Localised – the change may be within the PDA itself and its immediate setting.

1.1.2.5 Duration of Landscape Change

For this scheme the following categories of duration of landscape effect have been adopted:

- Short term – an effect likely to last up to five years;
- Medium term – an effect likely to last between five and fifteen years; and
- Long term – an effect likely to last longer than fifteen years.

1.1.2.6 Reversibility of Landscape Change

In terms of the reversibility of landscape change, the following categories have been adopted:

- Reversible – an effect which is entirely reversible, i.e. the landscape can be restored to its original state prior to the development occurring;
- Partially reversible – the landscape can be partially restored to its original state prior to the development occurring; and
- Irreversible – the landscape is considered to be irreversibly altered following the occurrence of the development.

It should be noted however that Duration of Change and Reversibility of Change are linked considerations and where it is deemed that landscape change due to a proposed development is permanent in duration, it is not necessary to consider the reversibility of that change.

1.1.3 Level and Significance of Visual Effects

The significance of the likely visual effects of the proposed development on identified receptors will also be assessed using professional judgement. This professional judgement may take into account a range of considerations including:

- the susceptibility of people in different contexts to the likely visual changes that would be associated with the scheme;
- the value or importance that they are considered likely to attach to the existing view; and
- the degree, geographical extent, duration and reversibility of the visual change that is likely to arise.

As was the case for the landscape assessment approach, considerations of susceptibility and value may be considered as comprising the 'sensitivity' of visual receptors. Considerations of degree, geographical extent, duration and reversibility of visual change, may be considered as the 'magnitude of visual change'.

The significance of visual effects is categorised as ‘significant’ or ‘not significant’. Significance is assessed by combining all of the considerations and criteria set out previously. The relative weight attributed to each consideration is a matter of professional judgement and will vary depending on the specific visual receptor being assessed. For example, the geographical extent of visual change is more relevant to an area or route than to a fixed viewpoint and short term reversible visual effects may still be judged to be significant to decision makers.

Where possible to do so with a reasonable level of professional objectivity the visual effects of the proposed development are identified as likely to be considered positive (beneficial), neutral or negative (adverse).

1.1.3.1 Susceptibility of Visual Receptors to Change and Value Attributed to a View

People’s susceptibility to visual change varies depending on their purpose for being in a particular location (principally whether for residence, recreation, travel or employment). The susceptibility to change of different categories of visual receptor is assessed on a scale of High, Medium or Low and is typically defined based on the categories of viewer set out in Table 6.5.

Table 6.5 – Susceptibility of visual receptor types to change

Level of susceptibility	Typical receptors
High	<p>People with a particular interest in the available view or with prolonged viewing opportunities, such as:</p> <ul style="list-style-type: none"> • Promoted viewpoints (often recognised by the provision of interpretation), promoted scenic drives or tourist routes; • Tourist, visitor and/or heritage destinations providing a specific, important and highly valued view; • Recreational hilltops and peaks; • Residential locations; • Ornamental parks and public open spaces; and • Nationally or locally named trails and cycle routes
Medium	<p>People with a general interest in their surroundings or with transient viewing opportunities, such as:</p> <ul style="list-style-type: none"> • General and incidental footpaths and rights of way; • Residential distributor and local road network; and • General public open spaces, recreation grounds and play areas
Low	<p>People with a limited or passing interest in their surroundings, such as:</p> <ul style="list-style-type: none"> • Places of employment; • Major highways (sensitivity may be higher in scenic locations);

Level of susceptibility	Typical receptors
	<ul style="list-style-type: none"> Commercial and industrial buildings; Indoor facilities; and Commuters

An assessment of visual amenity value or importance refers to the judgement of whether any particular value or importance is likely to be attributed by people to their available views. For example, views experienced by travellers on a highway may be considered to be more highly valued due to the scenic context or views experienced by residents of a particular property may be considered to be less valued or important due to a degraded visual setting. The degree of value or importance is therefore a matter for reasoned professional judgement. Where relevant to the assessment, the value or importance of visual amenity is categorised as either: High; Medium; or Low.

Considerations of visual susceptibility and value overlap, which is in contrast to the equivalent landscape considerations which are more distinct. This is because indicators of landscape value are more readily available, for example documentary evidence of a designation. In the case of visual value, documentary evidence relating to views which are particularly valued exists, however value is more likely to relate to a reasoned judgement, as set out in the previous paragraph. Therefore the judgement as to whether a view is categorised as having high, medium or low value will be applied as a modifier to the judgement of susceptibility to give a combined sensitivity of high, medium or low. For example, a visual receptor may be judged as being of low susceptibility and high value. In this instance it may be appropriate to conclude that this receptor is of medium susceptibility, with the consideration of value being used to modify the original assessment of susceptibility.

1.1.3.2 Degree of Visual Change

The degree of likely visual change is assessed as High, Medium, Low or Negligible by reference to the criteria set out in Table 6.6.

Table 6.6 – Degree of visual change criteria

Degree of change	Definition
High	The visual changes associated with the Proposed Development will form a prominent element within the view, resulting in a prominent change to the quality and character of the view.
Medium	The visual changes associated with the Proposed Development will form a conspicuous element within the view, resulting in a conspicuous change to the quality and character of the view.
Low	The visual changes associated with the Proposed Development will form an apparent small element within the view, without affecting the overall quality and/or character of the view.

Negligible	The visual changes associated with the Proposed Development will result in a barely perceptible change in the view, or will cause 'no change' to the existing view.
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1.1.3.3 Geographical Extent of Visual Change

The geographical extent of a visual effect is assessed as: Extensive; Medium; and Localised. This is based on an informed professional judgement and reflects the extent of the area over which the changes will be visible.

However, this consideration is not applicable when the assessment refers to a single visual receptor, such as a single residential property. Geographical extent would apply when assessing the visual effects on multiple users of an extent of road or groups of properties within a settlement for example.

1.1.3.4 Duration of Visual Change

For this scheme the following categories of duration of visual effect have been adopted:

- Short term – an effect likely to last up to five years;
- Medium term – an effect likely to last between five and fifteen years; and
- Long term – an effect likely to last longer than fifteen years.

1.1.3.5 Reversibility of Visual Change

In terms of the reversibility of visual change, the following categories have been adopted:

- Reversible – an effect which is entirely reversible, i.e. the view can be restored to that which was experienced prior to the occurrence of the development;
- Partially reversible – the view can be partially restored to that which was experienced prior to the occurrence of the development; and
- Irreversible – the view is considered to be irreversibly altered following the occurrence of the development.

It should be noted however that Duration of Change and Reversibility of Change are linked considerations and where it is deemed that visual change due to a proposed development is permanent in duration, it is not necessary to consider the reversibility of that change.

1.1.4 Cumulative Assessment

An assessment of likely significant landscape and visual cumulative effects will be undertaken. A list of schemes relevant to the landscape and visual assessment will be agreed in advance with Renfrewshire Council. However, this will comprise developments within the study area which are of a similar: size; appearance; or use. Examples of types of developments which may be considered within the cumulative assessment would be: road developments, including bridges; industrial developments; and medium to large-scale residential developments.

Appendix 7.1: Ecology Survey Methodology

Appendix 7.1 Ecology Survey Methodology

Vegetation Surveys

Phase 1 Habitat Survey

A Phase 1 Habitat Survey was undertaken in February/March 2016 and is scheduled to be updated in August 2016. The surveys will be undertaken in accordance with JNCC's 'Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit' (JNCC, 2007), taking recognisance of best practice guidelines (CIEEM, 2006).

Collectively, the surveys will seek to establish the ecology baseline of the proposed project and wider study area and a 100m zone of influence, which will be used to inform the ecological impact assessment in terms of permanent and temporary habitat loss.

The surveys will catalogue habitats and where applicable, record target notes using the DAFOR scale regarding the abundance of plant species.

Aerial photographs and OS maps will additionally be consulted (where appropriate) to identify potential habitats areas of nature conservation importance within the proposed project and zone of influence.

The Phase 1 Habitat survey additionally seek to identify the presence of non-native invasive species within and adjacent to the proposed project, with particular regard to those species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

Protected Species Surveys

Further detailed species specific surveys will be undertaken during the optimal season, in accordance with the following methods.

Badger Survey

All suitable habitats within the proposed project and 100 m zone of influence will be surveyed in October 2016 by an experienced ecologist for signs of badger following Harris et al. (1989).

As part of the survey, all hedgerows, field boundaries, watercourses, paths and other linear features will be walked to locate badger field signs including but not limited to: badger setts, badger paths, evidence of foraging and dung pits. In addition, all areas of woodland and scrub will be systematically searched for evidence of badger activity.

Where applicable, badger paths will be identified through the observation of field signs including prints, badger hairs on barbed wire or vegetation, dung pits and scratching posts. Similarly, the interiors of fields will be surveyed, in addition to their boundaries, where they exhibit evidence of badger foraging or where badger paths pass through them.

Other areas offering the potential to support badger setts, identified during survey and from OS maps, will be actively searched, where practicable.

Otter Survey

All watercourses and water features within the proposed project and 250 m zone of influence (up and downstream of identified watercourses) were surveyed in June 2016 by an experienced ecologist for signs of otter. Where possible, surveys were conducted from within the water channel, along the river bank and on ground within 10 m of watercourses.

The survey focussed on identifying the presence of otter signs, which included: spraint (droppings) and footprints. Resting sites, for example, holts, couches and hovers, were also

identified following 'Ecology of the European Otter: Conserving Natura 2000 Rivers Ecology Series No.10' (Chanin, 2003), in addition to potential signs of otter activity including runs or other well-used access points to watercourses (slides), feeding remains e.g. fish carcasses and sightings, including otter road accident causalities.

Additional survey effort for otter (following the above methods) will be undertaken in autumn 2016 to account for seasonal variation in the use of the River Clyde and White/Black Cart Waters.

Water Vole Survey

All suitable watercourses and water features within the proposed project and 100-200m zone of influence (up and downstream of identified watercourses) will be surveyed in August 2016 by an experienced ecologist for signs of water vole taking cognisance of Strachan & Moorhouse (2006) and Dean et al. (2016).

Survey effort will focus on suitable riparian and/or terrestrial habitats and will seek to determine the presence of the following field signs:

- burrows with entrances surrounded by grazed 'lawns';
- runs through vegetation;
- feeding stations (characterised by neatly chopped pieces of grass, sedge, or rush up to 10 cm long); and
- latrines.

As part of the above proposed methods, it should be noted that following completion of the otter survey, the River Clyde, White Cart Water and Black Cart Water were assessed as being un-suitable for water vole and therefore will not be subject to any further investigation for this species as part of on-going and future survey effort.

Bat Survey

Aerial photographs and topographical maps were used to identify areas of potential habitat for bats and to make an initial evaluation of the proposed project and wider study area.

The following survey methods are proposed, which were developed according to good practice standards taking cognisance of the document 'Bat Survey - Good Practice Guidelines' (Bat Conservation Trust, 2016).

Preliminary Roost Assessment

In line with the above best practice guidelines, a Preliminary Roost Assessment (comprising an initial daytime walkover survey) was undertaken by an appropriately qualified bat worker (consultant) to identify potentially valuable foraging, commuting and roosting features for bats within the proposed project and the following zones of influence, which were discussed through consultation with SNH (Graeme Heenan – Operations Officer, Pers. Com., 8 June 2016):

30m - urban/built-up areas and all habitats adjacent to proposed cycleway infrastructure; and

100m - semi-natural areas (including woodland habitats).

As part of the survey, where possible/practicable an external inspection of all suitable structures was undertaken, in addition to a systematic search for evidence of bats (using binoculars where appropriate), for example: live bats, bat corpses, droppings, feeding remains, scratch marks, and urine and grease staining. However, where access was not available e.g.

private third-party residential property, such structures were assessed from areas of public access, with any additional examination undertaken following landowner consent.

Bat Activity Surveys

The above good practice guidelines were consulted to establish survey methods and effort for the Bat Activity Surveys, taking into consideration factors such as likely species present, survey area location, habitat type and presence of suitable features.

Walked Transects

Based on an initial examination of the Extended Phase 1 Habitat Survey data, two walked transects were established along the route of the proposed project and wider study area (one to the north and one to the south of the River Clyde).

Surveys along each of the two transects will be completed by two surveyors (for health and safety purposes) on six occasions between April to September 2016 ensuring that at least one of the surveys for each transect comprises a dusk and pre-dawn survey separate by less than 24 hours.

Each of the transects will be walked at a steady pace from sunset for a period of up to 2-3 hours after sunset; dawn transects will commence approximately 3-2 hours before sunrise and concluded at sunrise. Each transect will be walked in an alternative direction (clockwise/anti-clockwise) to allow for different emergence times of bat species and to provide a comprehensive representation of habitat use throughout the survey period.

A series of five-minute pre-determined point counts will be incorporated into each of the two transects to allow for a sample of bat activity to be taken within a range of habitat types (including habitats which are considered to be of minimum value to bats). Where possible, listening points will be sampled at the same locations continuously throughout the active season.

Survey data will be recorded using a Batbox Duet, which uses both frequency division and heterodyne functions, and a Tascam DR-07 recording device, using the reference button to provide survey notes.

Data will be stored onto a compact flash card and analysed using BatSound software under the supervision of a licensed bat worker. Where there is any doubt or uncertainties regarding bat echolocation calls, British Bat Calls: A Guide to Species Identification (Russ, 2012) will be consulted as a reference tool.

Automated Surveys

Due to the medium value of the habitats within and adjacent to the proposed project and in line with the requirements of the above good practice guidance, two Songmeter SM2 static detectors will be erected on 1.5m poles (to reduce animal interference) and will be left at two pre-determined positions along each of the two proposed transects – making sure that detector locations are not easily discovered by members of the public due to the highly urbanised nature of the survey areas. However, it should be noted that if detectors are removed and cannot be located, consultation will be undertaken with SNH to determine an alternate means of provided static data.

The static detectors will be programmed to record over a minimum of five consecutive nights during the above survey period (April to September 2016). Survey locations will be selected to

provide a representative sample of all the habitats present within the proposed project and wider study area, in addition to locations along features likely to provide value for bats such as, riparian and edge habitats. Each device will be programmed to record all bat activity from 15 minutes before sunset to 15 minutes after sunrise. Devices will be rotated around each static detector location in accordance with best practice guidelines in order to reduce data errors caused by mechanical differences and failures.

All data collected by the static devices will be converted to zero crossing files and analysed using Analook. British Bat Calls: A Guide to Species Identification (Russ, 2012) was used to aid identification of sonograms.

Bat Surveys: Tree Surveys

Where trees are assessed as having the potential to support bat roost based on the presence of potential roosting features, 'at height' inspection surveys will be completed by licenced and trained tree climbers using an endoscope to inspect trees for current and/or historical presence of roosting bats.

Where evidence of bats is recorded, additional bat roost surveys will be undertaken (as outlined below). However, it should be noted that where it is considered trees of moderate to high suitability are unsafe to climb, emergence surveys will be completed as outlined below.

Bat Roost Surveys: Emergence and Re-entry

Where suitable structures/trees and/or evidence of roosting bats is identified by the Preliminary Roost Assessment, dusk emergence and dawn re-entry surveys were carried out under the supervision of a licenced ecologist (at ground level) by a sufficient number ecologists in order to allow complete visual coverage of the properties, associated buildings and trees.

In line with the above good practice guidelines, surveys will be undertaken as per the following:

- Low roost suitability: one survey required between May and August (excluding trees);
- Moderate roost suitability: two surveys required between May and August;
- High roost suitability: three surveys required, with at least two surveys completed between May and August.

Dusk surveys will begin 15 minutes before sunset and continue for 2 hours (weather dependent) after sunset. Dawn re-entry surveys will begin 2 hours before sunrise and will conclude 15 minutes at sunrise or 10 minutes after the last bat had returned to its roost after sunrise.

As outlined above, the surveys will be recorded using Batbox Duets and Tascam DR-07 recorders and analysed using BatSound software using Russ (2012) as a reference tool.

Appendix 14.1 Agreed List of Scoping Report Consultees

Proposed Consultees

Consenting Authorities

Renfrewshire Council
Glasgow City Council
West Dunbartonshire Council:
Marine Scotland (MS Lot)

Statutory/Non-Statutory Consultees

SEPA
Scottish Natural Heritage
Historic Environment Scotland
Scottish Water
Transport Scotland
HSE
Forestry Commission
Sustrans
Glasgow & the Clyde Valley Green Network
SPT
Cycling Scotland
Civil Aviation Authority
Crown Estate
Visit Scotland
Central Scotland Green Network
Clyde River Foundation
NATs
RSPB Scotland
Scottish Rights of Way & Access Society
Scottish Wildlife Trust
Glasgow Airport Safeguarding
West of Scotland Archaeology Service
Clydeplan

Landowners/Key Stakeholders

Glasgow Airport
Christies
Peel Holdings (Land and Property) Limited
Peel Ports
Turnberry Homes
Renfrew Golf Club
Crown Estate
Clydebelt
MCA
NLB
Clydeport
Clyde Fishermen's Association
Association of Salmon Fishery Boards
British Shipping
UK Chamber of Shipping
DIO

Marine Safety Forum
RYA
SFF
SFO
WDCS
Ayr Fishery Office

Directly Affected Community Councils

Garscadden/ Scotstounhill Area Partnership
Clydebank East Community Council
Renfrew Community Council
Inchinnan Community Council
Renfrew & Gallowhill Local Area Committee
Paisley North Community Council
Yoker Community Council
Scotstoun Community Council