MOTT MACDONALD

Colwyn Bay Coastal Defence and Active Travel Scheme Environmental Statement

Volume 1: Main Text

July 2020

Mott MacDonald
Mott MacDonald House
5 Woodland Road West
Colwyn Bay LL29 7DH
United Kingdom

T +44 (0)1492 534601
mottmac.com

Conwy County Borough Council
Environment, Roads & Facilities
Swyddfeydd Mochdre
Ffordd Conway
Mochdre
Bae Colwyn
LL28 5AB

Colwyn Bay Coastal Defence and Active Travel Scheme Environmental Statement

Volume 1: Main Text

July 2020

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
P01	July 2020	Co-ord: N. Spofforth (Ch1-6, 15-17)	C. Williams	C. Williams	First Issue
		G. Cotter (Ch7)	J. Brooks		
		L. Woolley (Ch8) E. Haggett	N. Shelton R. Byrne		
		B. Skinner (Ch 9)	A. Greenwood		
		A. Jones (Ch10) N. Spofforth	V. Deakin B. Riley		
		R. Dale (Ch11)	P. Wyeth		
		A. Symeonidis (Ch12)	A. Manns		
		C. Ho (Ch13)	A. Monk Steel R. Perkins		
		C. Marti (Ch14)	I. Scott		

Document reference: 415437-MMD-00-XX-RP-N-1719

Information class: Standard

Contents

Acronyms and Abbreviations 1

1 Introduction 4
1.1 Overview 4
1.2 Scheme Location 4
1.3 The EIA Process 11
1.4 EIA Method of Assessment 13
1.5 Environmental Statement Structure and Content 19
1.6 Statement on Competent Expertise 22
1.7 Limitations 24
1.8 Drawings 24
1.9 List of Documents Included in ES Volume 2: Technical Appendix 1. 27

2 Need for Scheme, Assessment of Alternatives and Basis of Design 28
2.1 History of Coastal Defence in Colwyn Bay 28
2.2 Need for the Scheme 31
2.3 Identified Scheme Objectives 35
2.4 Do Nothing Option (Walkaway) 36
2.5 Do Something Options 38
2.6 Option Comparison Summary 40
2.7 Design Basis 47
2.8 Design Development 53
2.9 Drawings 53
2.10 List of Documents Included in ES Volume 2: Technical Appendix 2 54

3 Scheme Description 55
3.1 Environmental Sensitivity 55
3.2 Scheme Description 58
3.3 Ecological and Educational Enhancement 63
3.4 Management and Maintenance 65
3.5 Drawings 66
3.6 List of Documents Included in ES Volume 2: Technical Appendix 3 74

4 Scheme Construction 75
4.1 Assumptions 75
4.2 Construction Overview 75
4.3 Key Dates and Phasing 76
4.4 Minimisation of Disruption Due to Construction 78
4.5 Construction Traffic 79

4.6 Traffic Management, Closures and Diversions 81
4.7 Public Rights of Way, Public Access Areas and National Cycle Route 5 Closures and Diversions 82
4.8 Construction Working Hours 84
4.9 Piling 85
4.10 Construction Compounds 85
4.11 Pre-Construction and Mobilisation 85
4.12 Key Construction Plant 86
4.13 Construction Flood Risk Management 89
4.14 Materials 90
4.15 Construction Lighting 90
4.16 Drawings 90
4.17 List of Documents Included in ES Volume 2: Technical Appendix 4 92

5 Consultation 93
5.1 Consultation on the Colwyn Bay Waterfront Project 93
5.2 Phasing Review Consultation 93
5.3 Scheme Specific Early Consultation 95
5.4 Scoping Consultation 96
5.5 Community Consultation 102
5.6 Covid-19 102
5.7 Drawings 102
5.8 List of Documents Included in ES Volume 2: Technical Appendix 5 103

6 Policy Context 104
6.1 National Policy 104
6.2 Local Policy 108
6.3 Drawings 109
6.4 List of Documents Included in ES Volume 2: Technical Appendix 6 109

7 Air Quality 110
7.1 Introduction 110
7.2 Legislative and Policy Framework 110
7.3 Study Area 115
7.4 Assessment Methodology 116
7.5 Baseline Conditions 128
7.6 Consultation 130
7.7 Potential Impacts (Pre-Secondary Mitigation) 131
7.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures 134
7.9 Assessment of Likely Significant Effects 136
7.10 Requirements for Tertiary Mitigation/Monitoring 138
7.11 Conclusions 138
7.12 Drawings 138
7.13 List of Documents Included in ES Volume 2: Technical Appendix 7 138

8 Biodiversity (Marine and Terrestrial) 139
8.1 Introduction 139
8.2 Legislative and Policy Framework 139
8.3 Study Area 142
8.4 Assessment Methodology 143
8.5 Baseline Conditions 150
8.6 Consultation 160
8.7 Potential Impacts (Pre-Secondary Mitigation) 160
8.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures 174
8.9 Assessment of Likely Significant Effects 182
8.10 Requirements for Tertiary Mitigation/Monitoring 190
8.11 Conclusions 191
8.12 Drawings 191
8.13 List of Documents Included in ES Volume 2: Technical Appendix 8 194

9 Climate 195
9.1 Introduction 195
9.2 Legislative and Policy Framework 195
9.3 Assessment Methodology 198
9.4 Baseline Conditions 200
9.5 Consultation 201
9.6 Potential Impacts (Pre-Secondary Mitigation) 201
9.7 Design Mitigation (Secondary Mitigation) and Enhancement Measures 202
9.8 Assessment of Likely Significant Effects 204
9.9 Requirements for Tertiary Mitigation/Monitoring 207
9.10 Conclusions 207
9.11 Drawings 207
9.12 List of Documents Included in ES Volume 2: Technical Appendix 9 207

10 Coastal Processes and Flood Risk 208
10.1 Introduction 208
10.2 Legislative and Policy Framework 208
10.3 Assessment Methodology 212
10.4 Study Area 216
10.5 Baseline Conditions 216
10.6 Consultation 229
10.7 Potential Impacts (pre Secondary Mitigation) 229
10.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures 233
10.9 Assessment of Likely Significant Effects 235
10.10 Requirements for Tertiary Mitigation/Monitoring 241
10.11 Conclusions 241
10.12 Drawings 242
10.13 List of Documents Included in ES Volume 2: Technical Appendix 10 244

11 Landscape 245
11.1 Introduction 245
11.2 Legislative and Policy Framework 245
11.3 Study Area 246
11.4 Assessment Methodology 247
11.5 Baseline Conditions 253
11.6 Consultation 256
11.7 Potential Impacts (Pre-Secondary mitigation) 256
11.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures 257
11.9 Assessment of Likely Significant Effects 258
11.10 Requirements for Tertiary Mitigation/Monitoring 262
11.11 Conclusion 262
11.12 Drawings 262
11.13 List of Documents Included in ES Volume 2: Technical Appendix 11 263

12 Materials 264
12.1 Introduction 264
12.2 Legislative and Policy Framework 264
12.3 Study Area 271
12.4 Assessment Methodology 272
12.5 Baseline Conditions 274
12.6 Consultation 276
12.7 Potential Impacts (Pre-Secondary mitigation) 276
12.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures 278
12.9 Assessment of Likely Significant Effects 280
12.10 Requirements for Tertiary Mitigation/Monitoring 284
12.11 Conclusions 284
12.12 Drawings 285
12.13 List of Documents Included in ES Volume 2: Technical Appendix 12 285

13 Noise and Vibration 286
13.1 Introduction 286
13.2 Legislative and Policy Framework 286
13.3 Study Area 291
13.4 Assessment Methodology 293
13.5 Baseline Conditions 296
13.6 Consultation 299
13.7 Potential Impacts (Pre-Secondary Mitigation) 300
13.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures 317
13.9 Assessment of Likely Significant Effects 319
13.10 Requirements for Tertiary Mitigation/Monitoring 322
13.11 Conclusions 322
13.12 Drawings 322

13.13 List of Documents Included in ES Volume 2: Technical Appendix 13 322

14 Population and Health 323

14.1 Introduction 323
14.2 Legislative and Policy Framework 323
14.3 Study Area 326
14.4 Assessment Methodology 327
14.5 Baseline Conditions 330
14.6 Consultation 334
14.7 Potential Impacts (Pre-Secondary Mitigation) 334
14.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures 337
14.9 Assessment of Likely Significant Effects 338
14.10 Requirements for Tertiary Mitigation/Monitoring 344
14.11 Conclusions 344
14.12 Drawings 344
14.13 List of Documents Included in ES Volume 2: Technical Appendix 14 344

15 Other Environmental Disciplines 345

15.1 Geology and Soils 345
15.2 Traffic and Transport 345
15.3 Archaeology and Cultural Heritage 346
15.4 Risk of Major Accidents and Disasters 346
15.5 Outline Environmental Management Plan 347
15.6 Drawings 348
15.7 List of Documents Included in ES Volume 2: Technical Appendix 15 348

16 Cumulative Effects 349

16.1 Overview 349
16.2 Methodology 349
16.3 Assumptions and Limitations 351
16.4 Study Area 352
16.5 Baseline Conditions 352
16.6 Assessment of Likely Significant Effects 354
16.7 Conclusion 365
16.8 Drawings 366
16.9 List of Documents Included in ES Volume 2: Technical Appendix 16 366

17 Summary 367

17.1 Outcome of EIA 367
17.2 Summary of Monitoring Requirements 381

Acronyms and Abbreviations

AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekday Traffic
AEP	Annual Exceedance Probability
AONB	Area of Outstanding Natural Beauty
AQAL	Air Quality Assessment Level
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
BGS	British Geological Society
BS	British Standard
C&D	Construction and Demolition
CAS	Clean Air Strategy
CCBC	Conwy County Borough Council
CEcol	Chartered Ecologist
CEEQUAL	Civil Engineering Environmental Quality Assessment and Award Scheme
CEMP	Construction Environmental Management Plan
CE	Chartered Environmentalist
CIEEM	Chartered Institute of Ecology and Environmental Management
CIEH	Chartered Institute of Environmental Health
CL:AIRE	Contaminated Land Applications in Real Environments
CMP	Carbon Management Plan
CO2	Carbon Dioxide
CoP	Code of Practice
CPAT	Clwyd-Powys Archaeological Trust
CRN	Calculation of Railway Noise
CRTN	Calculation of Road Traffic Noise
D4RE	Design for Resource Efficiency
Defra	Department for Environment, Food & Rural Affairs
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DoW:CoP	Definition of Waste: Code of Practice
EC	European Commission
EcIA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
EFT	Emission Factor Toolkit
EIA	Environmental Impact Assessment
END	European Noise Directive
EPA	Environmental Protection Agency
EPUK	Environmental Protection UK
ES	Environmental Statement

ESIA	Environmental and Social Impact Assessment
EU	European Union
FCA	Flood Consequence Assessment
GHG	Greenhouse Gases
GLVIA	Guidelines for Landscape and Visual Impact Assessment
HDV	Heavy-Duty Vehicle
HGV	Heavy Goods Vehicle
HMSO	Her Majesty's Stationery Office
HRA	Habitats Regulations Assessment
IAQM	Institute of Air Quality Management
IBA	Important Bird Area
IOA	Institute of Acoustics
ISO	International Organisation for Standardisation
IUCN	International Union for the Conservation of Nature
JNCC	Joint Nature Conservation Committee
LAQM	Local Air Quality Management
LBAP	Local Biodiversity Action Plan
LCA	Landscape Character Area
LDP	Local Development Plan
LDV	Light-Duty Vehicle
LEMP	Landscape and Ecological Management Plan
LIA	Local Impact Area
LNR	Local Nature Reserve
LOAEL	Lowest Observed Adverse Effects Level
LT	Long Term
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
MAGIC	Multi-Agency Geographical Information for the Countryside
MCA	Marine Character Area
MCAA	The Marine and Coastal Access Act 2009
MCIWM	Member of the Chartered Institution of Wastes Management
MCZ	Marine Conservation Zone
MLWS	Mean Low Water Springs
MMP	Materials Management Plan
mOD or mAOD	Meters referenced to Ordnance Datum or Above Ordnance Datum
MPA	Marine Protection Area
MTAN	Minerals Technical Advice Note
NAEI	National Atmospheric Emissions Inventory
NNR	National Nature Reserve
NO2	Nitrogen Dioxide
NOx	Oxides of Nitrogen
NPA	National Park Authority
NRW	Natural Resources Wales

NWC	North Wales Coast (Railway line)
PAS	Publicly Available Specification
PEAR	Preliminary Ecological Appraisal Report
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 microns
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 microns
PPG	Planning Practice Guidance
PPV	Peak Particle Velocity
PPW	Planning Policy Wales
RAWP	Regional Aggregates Working Parties
RDB	Red Data Book
RICS	Royal Institute of Chartered Surveyors
RLDP	Replacement Local Development Plan
RTS	Regional Technical Statements
SAC	Special Area of Conservation
SOAEL	Significant Observed Adverse Effect Level
SPA	Special Protection Area
SPL	Sound Pressure Level
SSSI	Site of Special Scientific Interest
ST	Short Term
SWMP	Site Waste Management Plan
TAN	Technical Advice Note
tCO2e	Tonnes of CO2 equivalents
UK	United Kingdom
VDV	Vibration Dose Value
WCA	Wildlife and Countryside Act
WaFD	Waste Framework Directive
WFD	Water Framework Directive
WHO	World Health Organisation
WIA	Wider Impact Area
WNMP	Welsh National Marine Plan
ZOI	Zone of Influence
ZTV	Zone of Theoretical Visibility

1 Introduction

1.1 Overview

1.1.1 This Environmental Statement (ES) has been prepared on behalf of Conwy County Borough Council (CCBC) Environment, Roads and Facilities Team (hereafter referred to as "the Applicant") by Mott MacDonald Ltd in support of planning consent and a Marine Licence for the Old Colwyn Coastal Defence and Active Travel Scheme (hereafter referred to as the "Scheme"). The Scheme, located in the Old Colwyn area of Colwyn Bay, North Wales, comprises coastal defence works in the form of a new rock revetment and Promenade raising, in combination with Promenade improvements to facilitate active travel.

1.1.2 The Environmental Impact Assessment (EIA) process is required to identify, predict and evaluate any impacts on the environment associated with the Scheme, so that design development and consenting requirements of the proposals are undertaken in the full knowledge of any significant effects. The findings of the EIA process are recorded within this ES.

1.2 Scheme Location

Colwyn Bay

1.2.1 Colwyn Bay (Bae Colwyn) is a seaside town in Conwy County Borough on the North Wales coastline. Principal settlements comprise Rhos-on-Sea to the west, the town of Colwyn Bay in the centre and Old Colwyn to the east. The A55 Expressway passes through the town, running parallel to and south of, the London to Holyhead mainline railway (referred throughout this document as the North Wales Coast (NWC) Railway Line), both of which separate Old Colwyn and Colwyn Bay town from the waterfront.

1.2.2 A long Promenade and associated National Cycle Route 5 follow the waterfront from Rhos-on-Sea past the former location of the Victorian pier (proposed to be the site for a new truncated pier for which preparatory works are currently being completed) in the centre of the bay and round to Old Colwyn.

Old Colwyn Waterfront Area – Overview

1.2.3 The Scheme is located along the easternmost section of the Promenade at Old Colwyn, from the eastern side of Porth Eirias in the west to Splashpoint in the east. The Scheme footprint is divided into two principal areas:

- Area 1 – From the picnic area to the east of Porth Eirias car park (approximate National Grid Reference (NGR) 285822, 378870) to the east of Rotary Way (approximate NGR 286347, 378756) where the road currently reduces in height from the junction back down to Promenade level; and
- Area 2 – From the eastern edge of Area 1 (approximate NGR 286347, 378756) to Splashpoint in the far east (approximate NGR 287029, 378701).

1.2.4 The red line boundary has been extended beyond the footprint as shown in Figure 1.1 to allow for access during construction.

Figure 1.1: Location of the Scheme

Source: Adapted from Red Line Boundary Plan Drawing 415437-MMD-00-XX-DR-N-1707

1.2.5 Scheme areas as shown on the Red Line Boundary Plan Drawing 415437-MMD-00-XX-DR-N-1707 and Area of Permanent Construction Drawing 415437-MMD-00-XX-DR-N-1708 located in Section 1.8 are summarised in Table 1.1.

Table 1.1: Approximate Scheme Areas

Area Boundary	Marine (north of sea wall) (ha)	Terrestrial (south of sea wall) (ha)	Grand Total (ha)
Area of Permanent Construction	3.6	3.0	6.6
Ecological Enhancements Only	0.3	0.7	1.0
Total	**3.9**	**3.7**	**7.6**
Red Line Boundary*	**30.2**	**4.9**	**35.1**

Source: Mott MacDonald Ltd, 2020: Note: Other than a working buffer approximately 20m-30m north of the marine area of permanent construction (revetment area), the remainder of the intertidal area only needs to be accessed for revetment stone deliveries by sea (*if* revetment stone is to be delivered by barge) and for ecological enhancements.

1.2.6 The frontage at Old Colwyn covers around 1.15km of coastline and comprises a near vertical masonry sea wall that abuts a generally sandy foreshore, locally mixed, with natural gravels particularly along the toe of the wall.

1.2.7 A view across the Scheme area is provided on Photo 1.1.

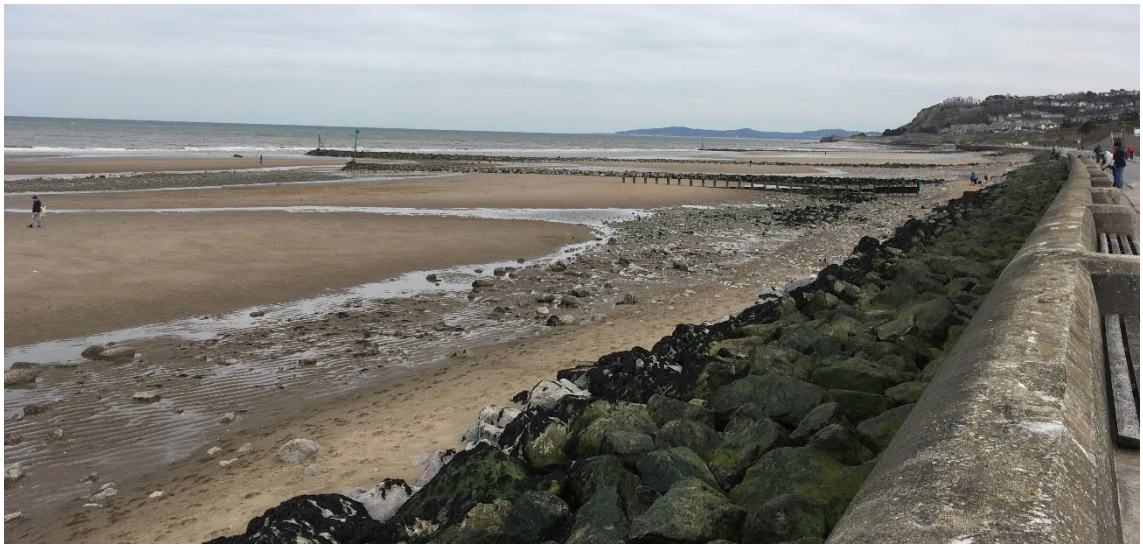
Photo 1.1: Looking East Across Scheme Area from Porth Eirias Roof Viewing Area

Source: Mott MacDonald Ltd, 2020

1.2.8 The toe of the sea wall has been protected from erosion and undermining by a variety of constructions. Across the first 750m west to east through Area 1 and into Area 2, rock armour has been placed directly in front of the wall (Photo 1.2 and Photo 1.3).

1.2.9 Over the remainder to the east, the toe has been protected either by reinforced concrete aprons or steel sheet piling (Photo 1.4).

Photo 1.2: Looking North-East from Area 1 Promenade Across Old Colwyn Beach



Source: Mott MacDonald Ltd, 2020

Photo 1.3: Looking North-West from Area 1 Promenade Across Old Colwyn Beach

Source: Mott MacDonald Ltd, 2020

Photo 1.4: Looking West Along Sea Wall in Area 2 with Toe Protection Visible

Source: Mott MacDonald Ltd, 2020

1.2.10 Across the westernmost 200m of frontage the wall has a recurved section with the Promenade lower to the rear. Over the remainder of the frontage there is no recurve and the crest level is the same as the Promenade.

1.2.11 There are slipways located at Porth Eirias to the immediate west of the Scheme footprint and Splashpoint in the far east for beach access along with four sets of pedestrian access steps in various states of disrepair with some currently deemed unsafe and blocked-off. Rock groynes are present at four locations, outfalls are culverted beneath two groynes while other outfalls currently discharge directly to the beach (Photo 1.5).

Photo 1.5: Looking North-East At Splashpoint Outfall During Revetment Construction

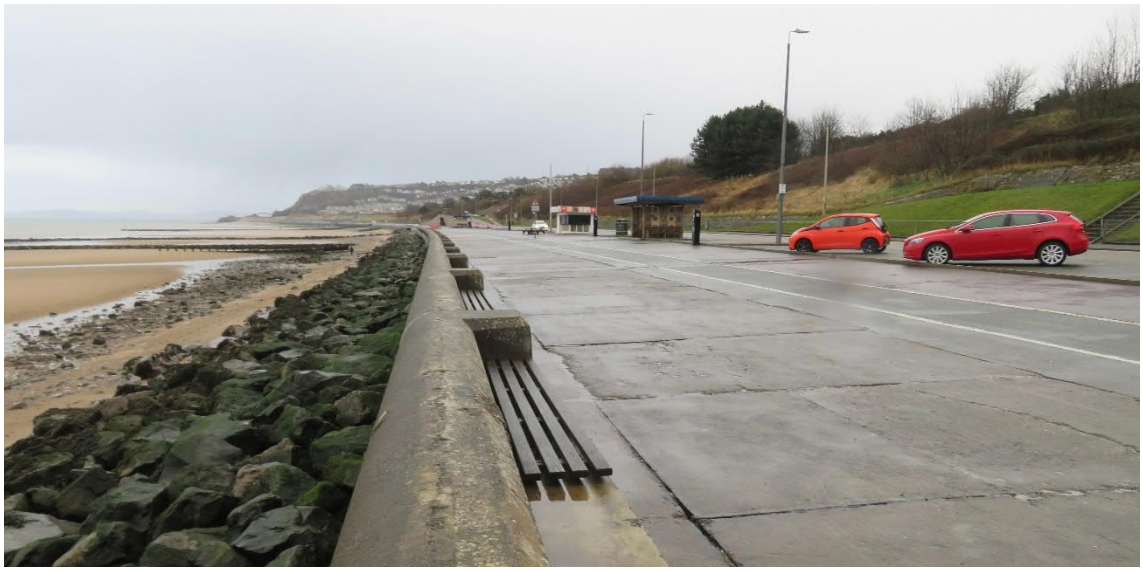
Source: Mott MacDonald Ltd, 2020

1.2.12 Immediately landward of the wall is a part paved/part tarmac surfaced dual usage (pedestrian and cycle path) Promenade, which adjoins the Promenade highway (Photo 1.6 and Photo 1.7). Moving west to east through Area 1, the Promenade highway increases in height to meet the incoming link road from Old Colwyn (Rotary Way) which provides access to the A55 Expressway (Junction 22) before dropping down to the same level in Area 2 as the top of the sea wall over the remainder of the length. In Area 2 the Promenade narrows and the dual usage path has to navigate numerous obstacles including lighting columns, poorly parked vehicles and anglers, This area is extremely popular with the angling community.

Photo 1.6: Looking West along Promenade South of Rotary Way

Source: Mott MacDonald Ltd, 2020

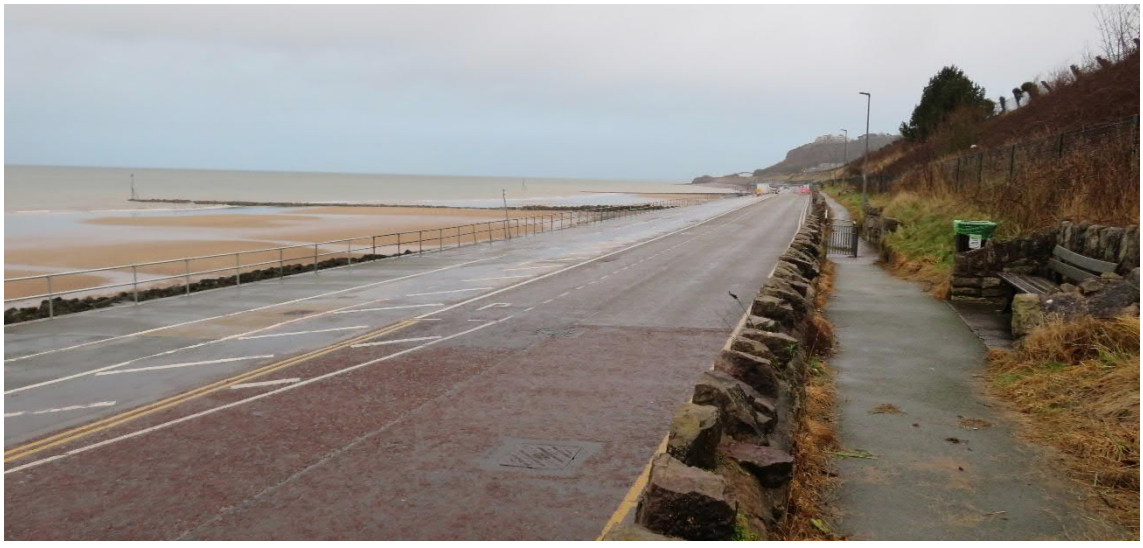
Photo 1.7: Looking East Along Promenade in Area 1



Source: Mott MacDonald Ltd, 2020

1.2.13 Landward of the Promenade is the NWC Railway Line, located approximately 10m-15m above the highway supported on an embankment. A masonry wall demarcates railway property from the public highway across the entire length (Photo 1.8 and Photo 1.9). To the north of this wall is a pedestrian footpath with regular Promenade access points and benches set back from the path into the embankment both supported by retaining walls. Landward of the railway is the A55 Expressway with Eirias Park beyond within Area 1 and residential properties of Old Colwyn beyond within Area 2.

Photo 1.8: Looking East Along Promenade in Area 2 with NWC Railway Embankment to Right



Source: Mott MacDonald Ltd, 2020

Photo 1.9: Looking South at Splashpoint Sea Wall with NWC Railway Bridge to Rear

Source: Mott MacDonald Ltd, 2020

1.2.14 To the immediate west of the Scheme, a section of rock revetment approximately 30m wide with a 1:3 gradient has already been constructed against the sea wall in association with Phase 1 of the Colwyn Bay Waterfront Project and the Porth Eirias control structure as shown in Photo 1.10.

Photo 1.10: Panoramic Looking North-East Across the Transition between the Existing Porth Eirias Revetment and the Scheme Area 1

Source: Mott MacDonald Ltd, 2020

1.2.15 In addition, in the far east, as part of the Splashpoint Project a short rock revetment section of similar width with a 1:2.5 slope was constructed earlier in 2020 (Photo 1.11) to curve around the eastern corner of the Promenade at the point in which it makes a right angle turn southwards beneath the A55 Expressway and NWC Railway Line towards Beach Road/Cliff Gardens (Splashpoint).

Photo 1.11: Looking South-East Across the Transition between the Existing Splashpoint Revetment (Area 2) and the Area to the East of the Scheme

Source: Mott MacDonald Ltd, 2020

1.2.16 Within Area 2, overtopping of the Promenade during storm events is a common occurrence which results in the closure of the highway and frequent (and increasing with deteriorating condition) damage to the sea wall, Promenade and the NWC Railway Line embankment.

1.3 The EIA Process

EIA Directive

1.3.1 The amended EIA Directive (2014/52/EU) (hereafter referred to as the EIA Directive) requires an EIA to be carried out in support of an application for development consent for categories of project listed in the Directive at Annexes 1 and 2. For schemes included within Annex 1, EIA is mandatory, while within Annex 2, an EIA is required if the development is likely to have significant effects on the environment.

EIA Regulations

1.3.2 The Scheme requires consent under the Town and Country Planning Act 1990 and must be assessed under the Town and Country Planning (EIA) (Wales) Regulations 2017.

1.3.3 In addition, the Marine Works EIA Regulations 2007 (as amended) transpose the EIA Directive so that where applicable, EIAs are carried out prior to granting permission for the deposit of substances or articles within UK waters or UK controlled waters, either in the sea or under the sea bed, from various structures, vessels, containers or structures on land, or anywhere in the sea (where a Marine Licence is required). UK Waters include any area which is submerged at mean high water spring tide. A Marine Licence is required for the elements of the Scheme below mean high water and consideration is necessary under the MW EIA Regulations.

1.3.4 Please note, the Town and Country Planning (EIA) (Wales) Regulations 2017 and the Marine Works EIA Regulations 2007 (as amended) are hereafter referred to throughout this document together as the ‘EIA Regulations’, (unless specific reference needs to be made to one or the other specifically, in which case they will be referred to as the “T&CP EIA Regulations” and the ‘MW EIA Regulations’ respectively).

1.3.5 The EIA Regulations state that EIA is a process consisting of:

- *"(1) (a) The preparation of an environmental statement by the person seeking or initiating planning permission.*
- *(2) The environmental impact assessment must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of proposed development on the following:*
  - *(a) population and human health;*
  - *(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC(1) and Directive 2009/147/EC(2);*
  - *(c) land, soil, water, air and climate;*
  - *(d) material assets, cultural heritage and the landscape; and*
  - *(e) the interaction between the factors listed in sub-paragraphs (a) to (d)".*

EIA Stages

1.3.6 In general, the main stages in the EIA process are as follows:

- Screening – determine whether EIA is required;
- Data Review – draw together and review available data;
- Scoping – identify significant issues and determine scope of EIA;
- Baseline Surveys – undertake baseline surveys and monitoring where necessary;
- Assessment and iteration – assess likely significant effects of development, evaluate alternatives, provide feedback to the design team on adverse effects, incorporate any necessary mitigation, assess effects of mitigated development; and
- Preparation of the ES.

EIA Screening

1.3.7 The Scheme does not fall within Annex 1 of the EIA Directive (Schedule A1 of the MW EIA Regulations, Schedule 1 of the T&CP EIA Regulations), within which EIA would be mandatory.

1.3.8 However, the Scheme does fall under Annex 2 of the EIA Directive (Schedule A2(69) in the MW EIA Regulations, Schedule 2 Clause 10(m) of the T&CP EIA Regulations) – Infrastructure Projects, which includes certain coastal works (including land reclamation):

- *"Coastal work to combat erosion and maritime works capable of altering the coast through the construction, for example, of dykes, moles, jetties and other sea defence works, excluding the maintenance and reconstruction of such works".*

1.3.9 While in the EIA Regulations for coastal works there is no minimum area limit for triggering EIA (all development has to be considered), Welsh Office Circular 11/99 identifies the 'Indicative Thresholds and Criteria for identification of Schedule 2 Development Requiring EIA' determining significant effects as detailed in Table 1.2.

Table 1.2: Indicative Criteria and Threshold

Development Type	Schedule 2 Criteria and Thresholds	Indicative Criteria and Threshold
Coastal works to combat erosion and maritime works capable of altering the coast	All development	Works would exceed 1ha.

Source: Welsh Office Circular 11/99

Therefore, the requirement for EIA needed to be established, based on whether the Scheme is considered to have potential 'significant' effects on the environment.

A screening opinion was requested from CCBC on 29th February 2020 and a response was received on 12th March 2020 confirming that an EIA would be required for the Scheme for the following reasons:

I. *"The area of the proposal exceeds the 1ha threshold above which paragraph A29 of Welsh Office Circular 11/99 advises that an EIA is more likely to be required.*
II. *The area of the proposal is situated on and above the intertidal zone, which is of biodiversity interest, and is close to the Liverpool Bay SPA. The proposal is likely to have significant effects on biodiversity interests within and neighbouring the development site, including potential impacts on the SPA (subject to further Habitat Regulations Assessment Screening).*
III. *The Promenade and beach form recreational and tourism assets which are significant to the economic and social well-being of Colwyn Bay. The proposal could have potentially significant impacts on the appearance, amenity and accessibility of those assets".*

1.3.10 A copy of the Screening Letter is included in ES Volume 2, Technical Appendix 1.1 and the CCBC Screening Opinion in ES Volume 2, Technical Appendix 1.2.

EIA Scoping

1.3.11 EIA Scoping forms the second stage in the EIA process after Screening and involves identifying the environmental disciplines that should be considered further within the EIA through the consideration of environmental factors and potential existing and/or new receptors. EIA scoping initiates the process of defining the potential for significant effects, which in turn results in the identification of the environmental factors which require consideration and assessment as part of the EIA.

1.3.12 Under the EIA Regulations "*a person who is minded to make an EIA application may ask the appropriate authority to state in writing their opinion as to the scope and level of detail of the information to be provided in the environmental statement*" (a Scoping Opinion).

1.3.13 A Scoping Report was prepared for the Scheme at the end of April 2020 and submitted to CCBC on 15th May 2020. A copy is provided as ES Volume 2, Technical Appendix 1.3. A response was received on 17th June 2020 from CCBC and the statutory consultees confirming the required scope of the EIA, included as ES Volume 2, Technical Appendix 1.4. Comments received during the scoping report consultation process and where they have been addressed within this ES are detailed in Chapter 5 Consultation Section 5.4.

1.4 EIA Method of Assessment

Content of ES

1.4.1 In accordance with the EIA Regulations, this ES includes:

- *"(a) a description of the proposed development comprising information on the site, design, size and other relevant features of the development;*
- *(b) a description of the likely significant effects of the proposed development on the environment;*
- *(c) a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*

- *(d) a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment;*
- *(e) a non-technical summary of the information referred to in sub-paragraphs (a) to (d); and*
- *(f) any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected".*

Technical Content

1.4.2 An ES must include a description of the aspects of the environment, which are likely to be significantly affected by the Scheme. The technical content of this ES was determined following the scoping stage (taking scoping responses into consideration) and is summarised in Table 1.3.

Table 1.3: Disciplines Scoped In/Out of the ES

Topic	Construction	Operation
Air Quality	IN	OUT
Archaeology and Cultural Heritage	OUT[i]	OUT
Biodiversity	IN	IN
Climate: Climate Change	IN	IN
Climate: Resilience	OUT[ii]	OUT[ii]
Coastal Processes (including Water Quality) and flood risk	IN	IN
Geology and Soils	OUT	OUT
Landscape and Visual	IN	OUT[iii]
Materials and Waste: Materials	IN	OUT
Materials and Waste: Waste	OUT	OUT
Noise and Vibration: Noise	IN	OUT
Noise and Vibration: Vibration	IN	OUT
Population and Health	IN	IN
Traffic, Transport and Access	OUT[iv]	OUT
Cumulative Impacts	IN	IN
Risk of Major Accidents and Disasters	OUT	OUT

i An archaeological watching brief would be required for ground investigation (GI) works to confirm the absence of notable deposits. Should any be encountered, a standalone assessment would be undertaken.
ii Mitigation for climate resilience embedded into design as primary mitigation.
iii Via the Landscape and Visual Impact Assessment (LVIA) process
iv A standalone Transport Statement (TS) is being produced in support of the Scheme.

Temporal Scope of ES

Environmental Baseline

1.4.3 As a general principle, environmental effects have been assessed by comparing the predicted state of the environment without the Scheme for the year 2020 and the state of the environment with the Scheme assuming construction commencement in 2021 for completion in 2023 (exact timescales would depend on the receipt of Scheme funding).

Duration of Effects

1.4.4 Environmental effects have been classified as either permanent or temporary, as appropriate. Permanent changes are those which are irreversible or would last for the foreseeable future. Environmental effects that occur during the operation of the Scheme would typically be permanent or “long-term”.

1.4.5 Certain environmental effects would only occur during construction of the Scheme and would cease once construction activities have finished. These would typically be the temporary effects of the Scheme and have been described as “short-term”.

1.4.6 Where environmental effects would be infrequent or intermittent this has been noted in the ES and the frequency considered in the assessment.

Spatial Scope of ES

1.4.7 The spatial extent of each of the technical discipline assessments varies in accordance with the relevant policy and guidance for the assessment of that discipline as detailed. Typically, the study area comprises the site and those areas that are surrounded by the site but excluded from it. For some disciplines it has been extended further from the site boundary where there is the potential for effects to be significant over a wider area.

1.4.8 The study area for each technical assessment has been identified and described as appropriate in each of the technical discipline chapters of this ES.

Assessment of Alternatives

1.4.9 The EIA process provides an opportunity to influence the design evaluation of a development taking potential environmental constraints and opportunities into consideration before a final decision is taken on design. Early consideration of potential alternatives to the Scheme have been considered to ensure minimisation of risks and avoidance of likely environmental effects.

1.4.10 In accordance with the EIA Regulations, this ES has considered the reasonable alternatives to the preferred Scheme and has compared the effects with other alternatives qualitatively at high level using professional judgment, including the “do nothing” scenario.

Assessment of Effects

Defining Impacts and Effects

1.4.11 Distinction is drawn between characteristics of “impacts” and the significance of “effects” as follows:

- Impacts are the predicted changes to the baseline environment attributable to the development; while
- Effects are consequences of impacts on environmental resources or receptors of a particular value, sensitivity or importance.

Identifying Effects

1.4.12 According to the EIA Regulations, the requirement for EIA is set out on the basis of:

1. The characteristics of the development;
2. The environmental sensitivity of geographical areas likely to be affected by development; and
3. The types and characteristics of the potential impact to identify the likely significant effects of the development on the environment.

1.4.13 The process followed in the production of this ES has therefore been to identify the value, sensitivity or importance of the aspects of the environment (where they are likely to be affected by the Scheme), characterise the nature of any impacts on these aspects of the environment, and then assess the overall significance of the effect that would result if left unmitigated.

Types of Effects

1.4.14 This ES has reported on the likely significant effects for both the construction and operational phases of the Scheme. Account has been taken as appropriate as to whether effects are:

- Direct Effects – effects that are caused by activities which are an integral part of the Scheme;
- Indirect Effects – effects arising indirectly from the construction or use of a development;
- Secondary Effects – arising in consequence of indirect effects;
- Cumulative Effects – effects that result from different sources but which affect a common receptor resulting in a greater combined effect;
- Transboundary Effects – effects caused by a Scheme that are experienced across a boundary;
- Temporary Effects – Environmental effects that occur during the construction of a project would typically be temporary;
- Permanent Effects – Permanent effects are those which are irreversible, would last for the foreseeable future or are effects considered to last greater than ten years;
- Beneficial Effects – Effects that have a positive influence on the environment; and
- Adverse Effects – Effects that have a negative influence on the environment.

Assessment of Effect Significance

1.4.15 The method for assessing significance of effects varies between environmental disciplines.

1.4.16 In principle, as this is a linear scheme with highway elements, the overarching environmental assessment methodology followed has been the one outlined in the Design Manual for Roads and Bridges (DMRB) document LA104[1] . For many chapters, the assessment methodology has been based on the environmental sensitivity (or value/importance) of a receptor and the magnitude of change from the baseline conditions as represented by the significance of effect matrix in Table 1.4.

1.4.17 It should be noted that the assignment of significance has been based on professional judgement and the matrix below is only a tool to assist with the process.

[1] DMRB LA104 Environmental Assessment and Monitoring Revision 1, July 2019

Table 1.4: Significance of Effect

		Value/Sensitivity of Effect				
		Very High	**High**	**Medium**	**Low**	**Negligible**
Magnitude of Effect	**Major**	Very Large	Large to Very Large	Moderate to Large	Slight to Moderate	Slight
	Moderate	Large to Very Large	Moderate to Large	Moderate	Slight	Neutral to Slight
	Minor	Moderate to Large	Slight to Moderate	Slight	Neutral to Slight	Neutral to Slight
	Negligible	Slight	Slight	Neutral to Slight	Neutral to Slight	Neutral
	No change	Neutral	Neutral	Neutral	Neutral	Neutral

Source: DMRB LA104

1.4.18 Where the significance of effect can be summarised as follows:

- Very Large: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category;
- Large: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process;
- Moderate: These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor;
- Slight: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project; and
- Neutral: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

1.4.19 For some specific discipline assessments, guidance or the nature of the effect requires that differing criteria or scales for determining significance are to be used, however, wherever possible there has been consistency of terminology and conclusions would tie in with the above.

1.4.20 Effects that are described as '**Very Large'**, '**Large**' or '**Moderate'** (either adverse or beneficial) are determined to be **significant**; and effects that are described as '**Minor**' or '**Negligible**' are determined to be **not significant**.

Mitigation and Enhancement

1.4.21 One of the most important functions of the EIA process is to identify ways to mitigate adverse environmental effects and identify opportunities that the Scheme may have for environmental enhancements.

1.4.22 For mitigating significant adverse effects, in order of preference the following hierarchy has been followed:

- Avoidance – designing the Scheme in such a way that avoids effects on the environment;

- Reduction – designing the Scheme or employing construction methodologies such that significant effects identified are reduced;
- Remediation – where adverse effects are unavoidable, introducing management measures to limit their influence; and
- Compensation – Providing off-site enhancement to compensate for where onsite mitigation has not been possible.

1.4.23 Where positive effects have been voluntarily introduced without the requirement to mitigate an effect, this has been termed 'enhancement'.

1.4.24 Consideration to mitigation has been undertaken from the earliest possible design stage, after the collection of baseline data, and throughout the EIA process.

1.4.25 EIA mitigation can be characterised depending on the stage of the assessment when it is considered[2]:

- Primary mitigation measures (impact avoidance measures embedded in design);
- Secondary mitigation (identified during the EIA assessment process, iterative design process to reduce or eliminate effects); and
- Tertiary mitigation measures in relation to residual effects (follow up measures, where necessary).

Residual Effects and Monitoring

1.4.26 Environmental effects remaining after secondary mitigation measures have been incorporated are termed residual effects and these have been fully described in the ES.

1.4.27 The EIA Regulations require "*the monitoring of any significant adverse effects on the environment of proposed development*". It is important to note that the EIA Regulations only require the monitoring of effects that are both Significant and Adverse. The ES has therefore made it clear to the reader which, if any, effects are both adverse and significant and may therefore require monitoring and has provided a schedule of proposed monitoring to clearly identify the monitoring that is proposed in relation to any significant adverse effects that have been identified.

Impact Interactions (Cumulative Effects)

1.4.28 The EIA Regulations require the consideration of the potential impact of inter-relationships between the development and effects of existing and/or approved development.

1.4.29 This ES has considered as appropriate the potential for impact interactions leading to a cumulative environmental effect on a receptor being greater than each of the individual effects that have been identified (see Chapter 16, Cumulative Effects).

Technical Appendices (ES Volume 2)

1.4.30 This ES Volume 1, Main Text is supported by a large quantity of supporting information including consultation documents, technical reports, drawings and background data. These are included in the ES Volume 2, Technical Appendices as referenced at the end of each chapter.

[2] IEMA (2016) Environmental Impact Assessment Guide to Shaping Quality Development. https://www.iema.net/assets/uploads/iema_guidance_documents_eia_guide_to_shaping_quality_development_v7.pdf, accessed June 2020

Non-Technical Summary (ES Volume 3)

1.4.31 The Non-Technical Summary (NTS) (provided as ES Volume 3), is intended to inform those who have an interest in the development but who are not concerned with the detail of the technical assessment provided in the ES.

1.4.32 It provides a succinct summary of the Scheme, the likely significant environmental effects and the proposed mitigating measures in non-technical language.

1.5 Environmental Statement Structure and Content

1.5.1 The main text of the ES is organised by environmental discipline. For each discipline, a brief overview of the legislative and planning policy context has been provided to set the context of the chapter. The topic-specific baseline conditions that have been used to inform the assessment are described and the potential impacts and likely significant effects of the proposals on the environment have been identified for each discipline. These have been assessed on the basis of the EIA Scoping plus any new relevant additional information available. Mitigation measures have been proposed to reduce the significance of effects where appropriate, and the resulting residual effect has been reported. The general approach to EIA has been iterative, whereby the findings of assessment together with ongoing consultation with stakeholders has influenced the design of the development proposals.

1.5.2 According to the EIA Regulations, the ES must contain the information relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected. Table 1.5 sets out the sections of the ES in which this information is addressed.

Table 1.5: Information for Inclusion in ES and Location

Required Information (as detailed in EIA Regulations)	Location in ES
1. Description of the development, including in particular: (a) a description of the location of the development; (b) a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works and the land-use requirements during the construction and operational phases; (c) a description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; and (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, oil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operational phases.	• Chapter 2 Need for Scheme, Assessment of Alternatives and Basis of Design, Section 1.2 (location). • Chapter 3 Scheme Description. • Chapter 4 Scheme Construction. • Details for each environmental discipline scoped in within Chapters 7 to 14: – Chapter 7 Air Quality; – Chapter 8 Biodiversity (Marine and Terrestrial); – Chapter 9 Climate; – Chapter 10 Coastal Processes and Flood Risk; – Chapter 11 Landscape; – Chapter 12 Materials; – Chapter 13 Noise and Vibration; – Chapter 14 Population and Health; and – Chapter 17 Summary.
2. A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the applicant or appellant which are relevant to the proposed development and its specific characteristics and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	• Chapter 2 Need for Scheme, Assessment of Alternatives and Basis of Design.

Required Information (as detailed in EIA Regulations)	Location in ES
3. A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.	• Chapter 1 Introduction, Section 1.2. • Info used for the Basis of Design Chapter 2 Need for Scheme, Assessment of Alternatives and Basis of Design, Section 2.7. • Detailed baseline for each environmental discipline scoped in within Chapters 7 to 14.
4. A description of the factors specified in regulation 4(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.	• Details for each environmental discipline scoped in within Chapters 7 to 14 and summarised in Chapter 17. • Chapter 16 Cumulative Effects.
5. A description of the likely significant effects of the development on the environment resulting from, *interalia*: • (a) the construction and existence of the development, including, where relevant, demolition works; • (b) the use of natural resources in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources; • (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances and the disposal and recovery of waste; • (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters); • (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; • (f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; and • (g) the technologies and the substances used. The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at European Union or Member State level which are relevant to the project.	
6. A description of the forecasting methods or evidence used to identify and assess the effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	• Details for each environmental discipline scoped in within Chapters 7 to 14.

Required Information (as detailed in EIA Regulations)	Location in ES
7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.	• Details for each environmental discipline scoped in within Chapters 7 to 14. and summarised in Chapter 17.
9. A non-technical summary of the information provided under paragraphs 1 to 8.	• ES Volume 3, Non-Technical Summary
10. A reference list detailing the sources used for the descriptions and assessments included in the environmental statement.	• Included both as references to documents contained within the ES Volume 2, Technical Appendices and footnotes throughout the ES Volume 1, Main Text.

Source: EIA Regulations

1.5.3 The overall structure of the ES is detailed below:

1. Introduction;
2. Need for Scheme, Assessment of Alternatives and Basis of Design;
3. Scheme Description;
4. Scheme Construction;
5. Consultation;
6. Policy Context;
7. Air Quality;
8. Biodiversity (Marine and Terrestrial);
9. Climate;
10. Coastal Processes and Flood Risk;
11. Landscape;
12. Materials;
13. Noise and Vibration;
14. Population and Health;
15. Other Environmental Disciplines;
16. Cumulative Effects; and
17. Summary.

1.5.4 For consistency, each environmental topic chapter is structured with the following headings (with some discipline-specific minor adjustments):

- Introduction;
- Legislative and Policy Framework;
- Study Area;
- Assessment Methodology;
- Baseline Conditions;

- Consultation;
- Potential Impacts (Pre-mitigation);
- Design Mitigation (Secondary Mitigation) and Enhancement Measures;
- Assessment of Likely Significant Effects;
- Requirements for Tertiary Mitigation/Monitoring;
- Conclusions;
- Drawings; and
- List of Documents Included in ES Volume 2: Technical Appendices.

1.6 Statement on Competent Expertise

1.6.1 EIA Regulations require that, to ensure the completeness and quality of environmental statements, "*the developer must ensure that the environmental statement is prepared by competent experts*".

1.6.2 The EIA Regulations require that the ES must "*set out a statement by or on behalf of the applicant or appellant describing the expertise of the person who prepared the environmental statement*" in order to confirm an appropriate level of technical competence.

1.6.3 This ES has been prepared by a multi-disciplinary team of environmental specialists. An overview of each key expert's qualifications, professional accreditations and experience is provided in Table 1.6.

Table 1.6: Competent Expert Evidence

EIA Chapter	Competent Expert
1. Introduction 2. Need for Scheme, Assessment of Alternatives and Basis of Design 3. Scheme Description 4. Scheme Construction 5. Consultation 6. Policy Context 15. Other Environmental Disciplines 16. Cumulative Effects 17. Summary	The competent expert holds a masters level degree in Earth Sciences and also in Water Resources Technology and Management, is a Chartered Water and Environment Manager with the Chartered Institute of Water and Environmental Management (CIWEM), Chartered Scientist and Chartered Environmentalist. The competent expert has over 13 years' experience as an environmental consultant, with 11 years' experience in the production of ESs.
7. Air Quality 16. Cumulative Effects	The competent expert has a masters level degree in Environmental Science and is a member of the Institute of Environmental Sciences and the Institute of Air Quality Management. The competent expert has 12 years of professional experience in the field of air quality including the preparation of ES chapters and has acted as an Expert Witness in Development Consent Order (DCO) applications for other road schemes.
8. Biodiversity 16. Cumulative Effects	Terrestrial Ecology (General): The competent expert holds a bachelor's degree in Biological Sciences (BA Hons MA Oxon) and a masters level degree in Ecology and Environmental Management (MRes). They are also a Chartered Ecological (CEcol) and Environmentalist (CEnv) and a Full Member of the Chartered Institute for Ecology and Environmental Management (MCIEEM). The competent expert has over 10 years' postgraduate experience as professional ecologist, during which time they have completed numerous ecology technical ES chapters for housing, road and rail schemes. The competent expert has also acted on

EIA Chapter	Competent Expert
	behalf of clients to review other ecology technical chapters and provide comment. Terrestrial Ecology (Ornithologist): The competent expert has over 25 years' experience as an ecologist, with 13 years spent working for Natural England in a senior role. They have a strong specialism in ornithology and wide experience in assessing impacts of activities on coastal water birds at local sites through to UK wide population level, for both licensing and Habitats Regulations Assessments (HRAs). The competent expert is a technical principal ecologist, regularly reviewing and providing expert technical advice on EcIA, EIA and HRA. They are qualified to masters degree level and are a full Member of the Institute of Fisheries Management. Marine Ecology: The competent expert Is a Fellow of the Royal Society of Biology (RSB) and a Chartered Scientist since 2014, and Mott MacDonald Marine Ecology Technical Principal & Technical Team Leader, while also Divisional Professional Excellence Lead on Senior Management Team with over 25 years' of commercial and field experience in the UK and 18 other countries globally. The competent expert has also acted on behalf of numerous national and international clients to review other ESIA, EIA, HRA, marine ecology technical chapters and provides comment and specifically designed, implemented and monitored ecological enhancement projects globally.
9. Climate 16. Cumulative Effects	The competent expert holds a masters level degree in Environmental Management, is a Chartered Environmentalist and a Full member of the Institute of Environmental Management and Assessment. The competent expert has over 12 years' postgraduate experience as a sustainability and carbon specialist, with 8 years' experience in the production of sustainability and climate change technical chapters (climate change chapters being a consideration since the updated EIA Directive in May 2017).
10. Coastal Processes and Flood Risk 16. Cumulative Effects	The competent expert is an experienced coastal scientist and project manager with a masters level degree in Engineering in the Coastal Environment and over 12 years' experience in the management and assessment of coastal projects. Experience includes the production of ES chapters, marine licensing, flood defence consenting and wave and hydrodynamic modelling, with a specialist interest in the coastal zone and its evolution with regards to climate change.
11. Landscape 16. Cumulative Effects	The competent expert is a chartered landscape architect with 25 years' experience of landscape design and assessment. They have been chartered with the Landscape Institute since 2005 and have 10 years' experience writing ES chapters.
12. Materials 16. Cumulative Effects	The competent expert is a Principal Waste Consultant, with over 18 years' combined practical and technical environmental and waste management experience in the UK and overseas, including over six years' experience in authoring Waste and Material Resource Chapters for ESs and EIA Reports including major infrastructure projects. They are a Chartered Waste Management professional and a Qualified Person under the CL:AIRE Definition of Waste: Development Industry Code of Practice.
13. Noise and Vibration 16. Cumulative Effects	The competent expert holds a bachelor honours degree in ElectroAcoustics, a Chartered Acoustic Engineer and is an honorary fellow member of Institute of Acoustics. The competent expert has over 25 years' experience in multi-disciplinary acoustics, noise & vibration consultancy. The competent expert has been the lead acoustician on many high-profile transportation, buildings, industrial noise and environmental projects in the UK and abroad.
14. Population and Health 16. Cumulative Effects	The competent expert holds a masters level degree in Environmental Assessment and is a member of the Institute of Environmental Assessment and Management. The competent expert has twenty years

EIA Chapter	Competent Expert
	post-graduate experience, incorporating 10 years' experience in assessing and reporting the human and social impacts of development.
Technical Review	The competent expert is a Chartered Geologist with 28 years' of consultancy experience. They are registered as a specialist in land condition, a suitably qualified and experienced person under the National Quality Mark Scheme and CL:AIRE Definition of Waste Development Industry Code of Practice qualified person. The competent expert is highly experienced in EIA, SEA, and HRA for a wide variety of projects.

1.7 Limitations

Covid-19 Pandemic

1.7.1 Due to the government restrictions in place relating to Covid-19, some site survey visits from March 2020 onward were suspended. Some assessments (information provided within the relevant chapters) were undertaken by specialists using detailed photographic surveys completed by an experienced local environmental consultant. Subsequent interpretation was completed by experienced environmental specialists combining the photographic information with existing information and professional judgement and experience. Outcomes were interpreted on a precautionary basis where relevant.

1.7.2 Covid-19 also resulted in non-normal conditions during the planned baseline traffic and noise assessment period meaning these surveys could not be completed. Therefore alternative approaches were agreed with the CCBC Principal Environment Officer for the air quality assessment and with the CCBC Environmental Health Officer for the noise assessment. A response from CCBC Highways had not been received at the time of writing, however a conservative approach has been completed for the Transport Statement using scaling factors for existing (pre-Covid-19) data. See Chapter 5 Consultation for more information.

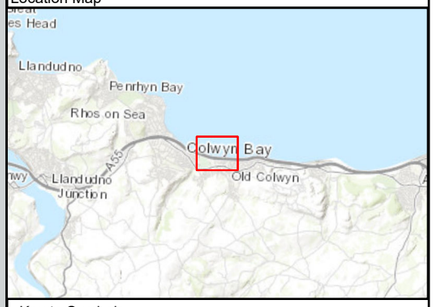
1.8 Drawings

1.8.1 Key drawings in support of this Chapter are included here and comprise the following:

- Drawing 415437-MMD-00-XX-DR-N-1707 – Red Line Boundary; and
- Drawing 415437-MMD-00-XX-DR-N-1708 – Area of Permanent Construction.

1.8.2 Other drawings are included within ES Volume 2: Technical Appendix 1 as listed in Section 1.9.

Location Map



Key to Symbols

Red line boundary

Notes

1. For information only, not for construction.
2. Contains Ordnance Survey data © Crown copyright and database rights 2019 Ordnance Survey. All rights reserved.
3. Contains OS data © Crown Copyright and database right 2020
Contains data from OS Zoomstack, Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	23/07/20	MH	For information	NS	CW

MOTT MACDONALD

Mott MacDonald House
5 Woodland Road West
Colwyn Bay
LL29 7DH
T +44 (0)2920 467800
W www.mottmac.com

Client

CONWY
CYNGOR BWRDEISTREF SIROL
COUNTY BOROUGH COUNCIL

Conwy County Borough Council

Title

Old Colwyn Coastal Defence and Active Travel Scheme
Anticipated principal working area buffer (approximate only)
Red Line Boundary

Designed	N Spofforth	NS	Eng. Check	N Spofforth	NS
Drawn	M Hayward	MH	Coordination	N Spofforth	NS
GIS Check	G O'Donovan	GO	Approved	C Williams	CW

Scale at A3	Status	Rev	Security
1:5,000	INF	P1	STD

Drawing Number
415437-MMD-00-XX-DR-N-1707

0 100 200 300 400 500 Meters

C:\Users\ANS90589\Mott MacDonald\410895 - Colwyn Bay Waterfront Phase 2b - GIS\MXD\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620.aprx

Porth Eirias

Splashpoint

Location Map

Key to Symbols

- Red line boundary
- Area of permanent construction
- Ecological enhancements only

Notes

1. For information only, not for construction.
2. Contains Ordnance Survey data © Crown copyright and database rights 2019 Ordnance Survey. All rights reserved.
3. Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	23/07/20	SA	For information	NS	CW

MOTT MACDONALD

Mott MacDonald House
5 Woodland Road West
Colwyn Bay
LL29 7DH
T +44 (0)2920 467800
W www.mottmac.com

Client

CONWY CYNGOR BWRDEISTREF SIROL COUNTY BOROUGH COUNCIL

Conwy County Borough Council

Title Old Colwyn Coastal Defence and Active Travel Scheme
Area of Permanent Construction

Designed	N Spofforth	NS	Eng. Check	N Spofforth	NS
Drawn	S Anstice	SA	Coordination	N Spofforth	NS
GIS Check	G O'Donovan	GO	Approved	C Williams	CW

Scale at A3	Status	Rev	Security
1:5,000	INF	P1	STD

Drawing Number
415437-MMD-00-XX-DR-N-1708

0 100 200 300 400 500 Meters

C:\Users\ANS90589\Mott MacDonald\410895 - Colwyn Bay Waterfront Phase 2b - GIS\MXD\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620.aprx

1.9 List of Documents Included in ES Volume 2: Technical Appendix 1.

1.9.1 List of Documents Included in ES Volume 2: Technical Appendix 1.

- Appendix 1.1: Screening Letter;
- Appendix 1.2: Screening Opinion Response from CCBC;
- Appendix 1.3: Scoping Report; and
- Appendix 1.4: Scoping Opinion Response from CCBC and Stakeholders.

2 Need for Scheme, Assessment of Alternatives and Basis of Design

2.1 History of Coastal Defence in Colwyn Bay

Colwyn Bay

2.1.1 The Colwyn Bay coastline between Rhos Point and Tan Penmaen Head is approximately 3.5km in length. Defences were constructed for the majority of the coastline in the late nineteenth century comprising vertical sea walls in general composed of either masonry or concrete with the general timings as follows[3]:

- Construction of the Promenade had commenced by 1898 and by this time a Promenade existed across the majority of the frontage from Penrhos College in the west, to the current location of Rotary Way;
- The Promenade was extended eastwards to its current eastern extent during the first decade of the 20th century and was shown to be complete on the historical map from 1911; and
- In places, the Promenade appears to have been constructed to the seaward side of the high water mark of medium tides on areas that were formerly beach, indicating that land was reclaimed from the sea. The location and near vertical profile of the wall were contributory factors to the lowering of beach levels in front of the defences that subsequently occurred and the resulting increased exposure conditions that have applied across the frontage to the present day[4].

2.1.2 Due to the construction of these defences, during the 20th century, a gradual lowering of beach levels was experienced adjacent to the defences which resulted in continual maintenance and repairs to the toe of the defences to ensure their integrity and stability. In response to beach lowering, timber groynes were constructed in the 1950s to help retain the sand, however these generally failed or became redundant. This has resulted in a thin, sandy beach with a shallow gradient overlying fluvio-glacial sands, gravel and glacial tills with some sand, shingle and cobbles as reported in the Phase 3 Phasing Review[4] (ES Volume 2, Technical Appendix 2.1).

Old Colwyn[4,5]

2.1.3 As described within the Colwyn Bay Waterfront 2010 ES Volume 1 (ES Volume 2, Technical Appendix 2.2), the Victorian built coastal defences have suffered from undermining, corrosion and degradation since their construction in the late 19th and early 20th centuries.

2.1.4 It is not known if the current wall section is the original but the construction suggests it is likely. HR Wallingford's (HRW) Colwyn Borough Sea Defence Review[6] identifies that the recurve section at the western end was added in the 1950s and that the first instance of undermining occurred in the 1930s requiring concrete toe extensions and sheet piles which are still visible today.

[3] Old Maps Historical Map Archive website: https://www.old-maps.co.uk/, accessed June 2020

[4] Colwyn Bay Waterfront project Phase 3 – Phasing Review, Draft Report for Stakeholder Distribution, Coastal Engineering UK Ltd, August 2019

[5] Colwyn Bay Waterfront Phase 1 Engineering Works Environmental Statement, Volume 1, Mott MacDonald Ltd, October 2010

[6] Colwyn Borough Sea Defence Review, Report EX2367, HR Wallingford, October 1991

2.1.5 In the late 20th century, localised works were completed in an effort to extend the life of the existing sea walls with a 650m rock revetment being constructed in 1987 along the worst affected stretch and a series of low-level rock groynes which were constructed in 1990 to replace some of the timber groynes between Rhos-on-Sea and Old Colwyn to encourage beach stabilisation.

2.1.6 Following a storm in February 2005, a new section of sheet pile and concrete toe was installed to the west of the steps between Rotary Way and Beach Rd/Cliff Gardens, following reductions in beach levels of about 1m and following similar beach losses during a further storm in March 2010, rock armour was installed along the toe over approximately 150m immediately east of the steps between Rotary Way and Beach Rd/Cliff Gardens.

2.1.7 As part of the Phase 1b Waterfront works in 2013, the rock armour toe protection across the eastern half of the Old Colwyn frontage was reconstructed to a uniform profile comprising a 3.5m-wide crest at 4.0mOD and a 1 in 2.5 slope to seaward, utilising existing rock supplemented by imported material as necessary.

2.1.8 In the Old Colwyn area, emergency works comprising the addition of further piled and rock toes was carried out in response to rapid lowering of beach levels following severe storms.

2.1.9 From January-April 2020, the Splashpoint Project was completed which involved the construction of a short 30m deep rock revetment against the sea wall at the location identified as being at highest risk – the easternmost section of the Promenade (where a revetment was previously currently absent) known as ‘Splashpoint’. The revetment was designed to reduce the energy from storm waves reaching the Promenade, providing passive resistance against the existing wall to significantly reduce the risk of its failure.

2.1.10 Routine maintenance of existing structures is currently being undertaken by CCBC on a reactionary basis to extend structure life.

The Colwyn Bay Waterfront Project

2.1.11 The Colwyn Bay Waterfront Project was conceived in 2007 as a result of the Strategic assessment of options for future flood and coastal erosion risk management (CCBC, October 2007)[7]. During the strategic assessment process it was identified that maintaining or improving the aging defences alone would not attract people to Colwyn Bay as this approach would not address the low beach levels present and there was strong public support to determine a more robust solution to be used as the catalyst for regeneration within the wider Colwyn bay area.

2.1.12 The North Wales coast was defined as a Strategic Regeneration Area (SRA) in 2008 and in 2009, CCBC established the Bay Life+ Programme[8], providing the framework for development of the Colwyn Bay Waterfront Project, combining coastal defence with regeneration in order to create a sustainable, modern and attractive waterfront. CCBC commissioned further studies to establish detailed proposals for the different elements of the Colwyn Bay Waterfront Project, identifying three predominant phases of work - Phase 1, Phase 2 and the Old Colwyn Waterfront Coastal Defence and Active Travel Scheme (formerly Phase 3).

2.1.13 A summary of the works completed at each stage to date is provided in Table 2.1 to aid understanding of the Scheme background.

[7] Colwyn Bay Coastal Defence Strategy Plan, CCBC, October 2007

[8] Bay Life Regeneration Programme Website: https://www.conwy.gov.uk/en/Business/Regeneration/Colwyn-Bay-Regeneration/Bay-Life-Regeneration-Programme/Bay-Life-Regeneration-Programme.aspx, accessed June 2020

Table 2.1: Colwyn Bay Waterfront Project Background Summary

Phase	Stage	Description	Completion Date
1	General	Phase 1 of the scheme was carried out in three stages covering approximately 35,000 m^2. The site was located within the central section of the frontage either side of Victoria Pier from the section of seafront in the vicinity of Marine Road to the west, to the section of seafront parallel to the J22 eastbound slip road of the A55 Expressway to the east.	October 2014
1	a	Phase 1a of the scheme encompassed engineering works and environmental improvements. The engineering works comprised a 150m rock groyne structure perpendicular to the shoreline, with a short length of linear rock revetment to the east of the groyne, along with the construction of a sheet pile wall. A short section of concrete stepped revetment was also constructed along the western edge of the Promenade. Existing slipway access at this location was raised and extended to follow the design of the new structures. The environmental works comprised the construction of Porth Eirias, a new multi-use water sports building, and landscaping works.	Engineering works – March 2012 Environmental works – April 2013
1	b	The coastal defence works primarily comprised beach recharge to the west of Porth Eirias, to bring beach levels up to the level of the existing Promenade (approximately 5.0mOD) but below the existing sea wall crest (at approximately 6.15mOD). Beach recharge was also undertaken between Cayley Promenade and Eirias Park, sourced from Liverpool Bay. Promenade enhancement was carried out to the west of the completed Porth Eirias Phase 1a works up to the pier area and extending below the Network Rail over-bridge as far as the interface with the train station. Enhancement works included: Improvements to the Promenade consisted of: Stepped revetment structures, 'headland' structures, access ramp, cycle ramp, car parking, Promenade raising, secondary sea defence wall, streetlighting, street furniture and new town centre link works.	Coastal defence works – May 2013 Promenade enhancement works – October 2014
1	c	Coastal defences consisting of beach recharge (totalling 220,000m^3 dredged beach material) and associated infrastructure works, including extending surface water outfalls, repairs to the existing sea wall and removal and replacement of rock armour. Works were completed in parallel with the Phase 1b Promenade enhancements.	Coastal defence works – October 2014
2	a	Regeneration of two areas of coastline (Areas A and B) located between Victoria Pier and Cayley Embankment. • Area A extended approximately 430m westwards from Victoria Pier to Princess Court apartments. Works comprised improved recreational opportunities and enhanced coastal defences across the site. This involved widening and raising the existing Promenade and highway by constructing a new sea wall approximately 7m seaward of the existing sea wall, with three new headlands. • Area B extended approximately 420m westwards from the Princess Court apartments to Rydal boat store near Cayley Embankment. Works included improved slipway access, beachfront access compliant with the Equalities	September 2017

Phase	Stage	Description	Completion Date
		Act 2010, car parking changes, seating, planting, railings, street furniture and lighting changes.	
2	b	Phase 2b works would be undertaken along the coastline from the Rydal Boat Store to Rhos-on-Sea Harbour for the Promenade works and Horizon Shine kiosk to Rhos-on-Sea Harbour for beach recharge.	Future phase, TBC
Splashpoint (Colwyn Bay Coastal Defence and Active Travel Scheme area)		Emergency works completed, comprising a 30m deep rock revetment against the sea wall at the location identified as being most vulnerable (where the A55 Expressway bridge is located immediately north of the railway bridge) – the easternmost section of the Promenade (where a revetment is currently absent) known as 'Splashpoint'.	July 2020
Old Colwyn Coastal Defence and Active Travel Scheme		Current Scheme.	TBC

Source: Mott MacDonald Ltd Records

2.1.14 To date, the Phase 1a/b/c and 2a coastal defence and waterfront regeneration works have been completed at a total cost of approximately £28.6 million.

2.2 Need for the Scheme

Strategic Context

2.2.1 The current Shoreline Management Plan (SMP2)[9], which includes the CCBC shoreline east of the Great Orme at Llandudno, was completed in 2010 and subsequently adopted by CCBC.

2.2.2 In the SMP2 Colwyn Bay is located within policy unit 11a.2 PU2.2 – Rhos-on-Sea to Llanddulas. The agreed future policies and approaches for management across this frontage are:

- *"0-20 years: Hold the Line – by maintaining and improving/raising the existing defences. A strategic study needs to be undertaken to confirm the long term economic viability;*
- *20-50 years: Hold the Line – by maintaining and improving/raising the existing defences, subject to confirmation through the strategy study; and*
- *50-100 years: Hold the Line – by maintaining and improving/raising the existing defences, subject to confirmation through the strategy study".*

2.2.3 The justification in the SMP for these policies is as follows:

- Socially the policy manages risk to the railway and other infrastructure as well as other assets in the erosion risk zone, including the cycleway and coastal path;
- Environmentally, no conservation designations are present and local opportunities for environmental improvements and the layout and size of the groynes are identified; and
- Economically, the viability of the policy depends on the estimated costs for relocating railway and road infrastructure which would be at long term risk.

Current Overtopping Conditions and Storm Damage

2.2.4 As early as 1991, the Colwyn Borough Sea Defence Review identified that "*Overtopping, which occurs regularly when onshore winds coincide with spring tides, results in large quantities of shingle and cobbles being thrown over the wall. The road.…is closed up to a dozen times a*

[9] North West England and North Wales Shoreline Management Plan SMP2, Halcrow Group Ltd, February 2011

year for several days at a time while the shingle is cleaned back onto the beach". Conditions, which have continued to the present day with increasing frequency and severity[4].

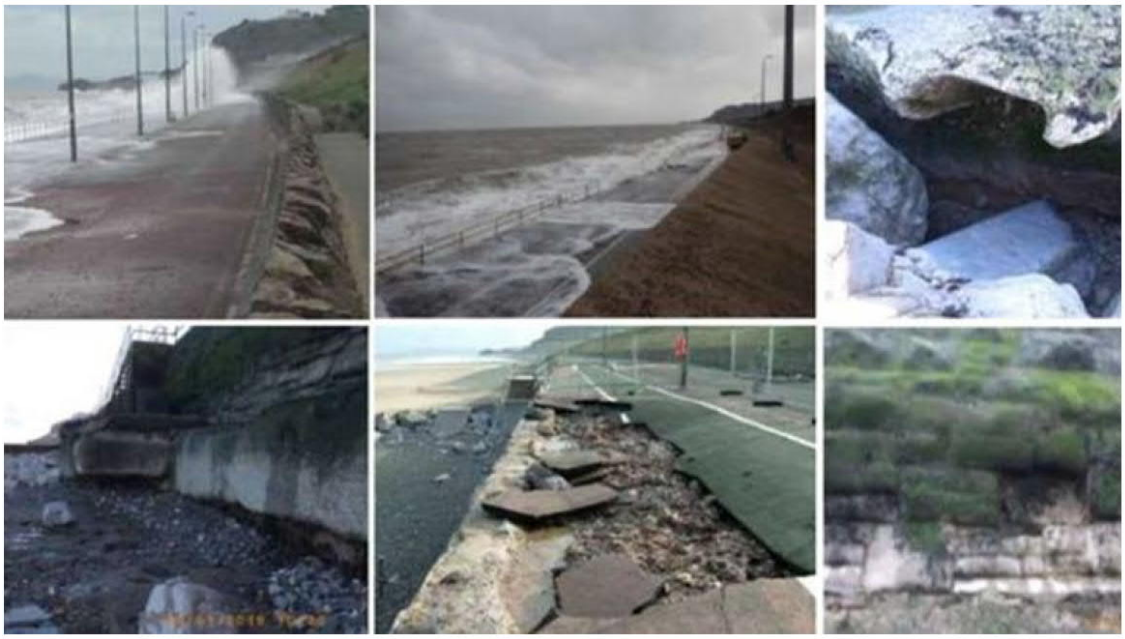
2.2.5 The impact of present day conditions is shown in visual and recorded evidence from more recent storm events – February 2005, March 2007, March 2010, December 2013, December 2016, December 2017, February/March 2018, January 2019 etc[4], which confirms the overtopping behaviour identified by HRW but also identifies the following as taking place:

- Damage/Loss of Railings;
- Damage to Promenade/highway surfacing and removal of fill behind sea wall;
- Damage to boundary wall and erosion at toe of NWC Railway Line embankment;
- Lowering of beach levels in front of the wall;
- Undermining of sea wall; and
- Removal of facing blocks to the sea wall.

2.2.6 Examples of this damage are provided in Figure 2.1 and Figure 2.2.

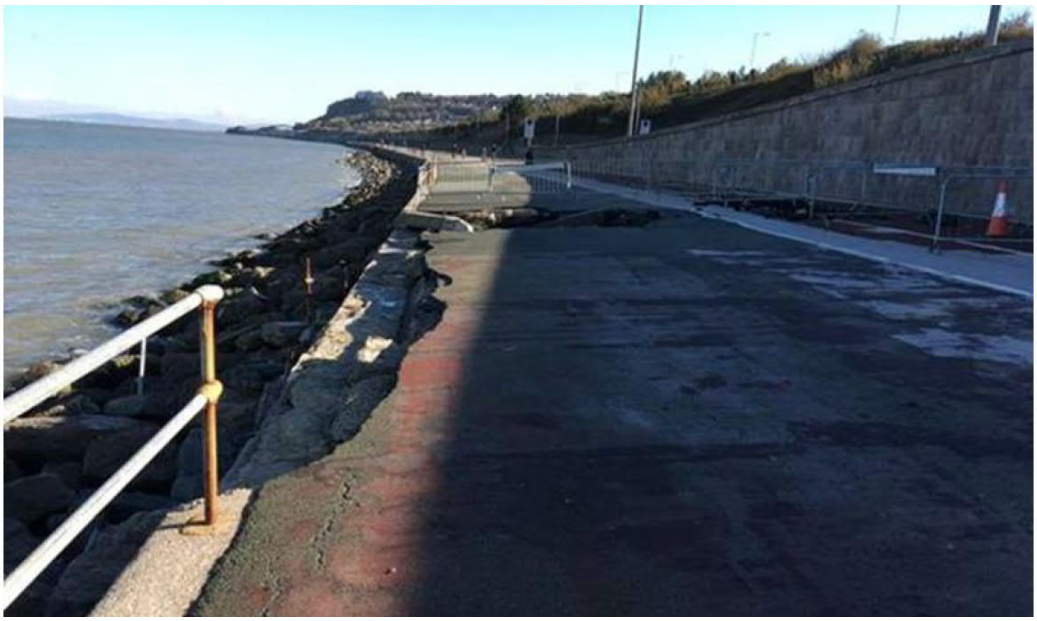
2.2.7 Furthermore, with sea levels predicted to rise in the future, due to anticipated climate change, by the end of the 21st century the tide is anticipated to reach approximately the crest of the current wall on each spring tide i.e. every 2 weeks. This means that the wall along the toe of the NWC Railway Line embankment would be impacted by waves rather than water that overtops the sea wall, as at present.

Figure 2.1: Examples of Old Colwyn Promenade Storm Damage



Source: CCBC records

Figure 2.2: Example of Old Colwyn Promenade Storm Damage



Source: CCBC records

Assets Protected

2.2.8 The current sea wall provides protection to the following assets:

1. The pedestrian Promenade and designated cycle path, which is part of the National Cycle Network Route 5;
2. The Promenade highway, linking Old Colwyn to Rhos-on-Sea;
3. The NWC Railway Line;
4. The A55 Expressway; and
5. Utilities services buried underneath the Promenade (highway and pedestrian area) surfacing (as summarised in Table 2.2).

Table 2.2: Summary of Services Present Beneath Old Colwyn Promenade[4]

Services	Details
Welsh Water	A large and varied number of services running along the length of (and crossing the) Promenade highway including: • A number of different combined sewers from 450mm up to 1500mm in diameter; • Surface water services up to 1800mm in diameter; and • Foul services up to 600mm in diameter.
Scottish Power	There is a Low Voltage underground Scottish Power (SP) service running along the landward Promenade footpath to just west of Rotary Way where it crosses over to the seaward footpath for the remainder of the frontage before moving inland under the NWC Railway Line embankment and A55 Expressway at Beach Rd/Cliff Gardens. In addition, there is a spur about halfway between Rotary Way and Beach Rd/Cliff Gardens that runs under the embankment and A55 connecting to the housing estate at Min-Y-Don.
Street Lighting	There are street lighting and illuminated signs located along the frontage, which are fed from a Scottish Power service, which are the responsibility of CCBC.

Source: Colwyn Bay Waterfront project Phase 3 – Phasing Review, Draft Report for Stakeholder Distribution, Coastal Engineering UK Ltd, August 2019

Current Coastal Defence Condition

2.2.9 In 2010, prior to commencement of Phase 1 of the Colwyn Bay Waterfront Project, a structural condition assessment of the existing walls was undertaken[10]. Overall, this identified the existing walls along the Phase 3 frontage as being generally in poor condition with numerous defects noted. With regard to structural stability, the report identified the following:

- Undermining of sea wall foundations is more likely due to falling beach level providing less scour protection to the sea wall base. This would not only increase the risk of the actual wall collapsing but also could cause the road or footpaths along the Promenade to collapse, because the backfill material from behind the wall could be washed out;
- The passive resistance of the sea wall is being reduced by toe erosion; therefore the sea walls susceptibility to sliding failure has increased;
- The retained height is increased by toe erosion; therefore the overall susceptibility of the sea to overturning failure is significantly greater;
- Where steel sheet piles have been installed with an upper portion of concrete encasement, once the beach level falls below that encasement, then the rate of steel degradation would be higher than originally considered (due to cyclic wetting by sea water and direct abrasion by foreshore particles); and
- Where steel sheet piles have been installed for additional sliding resistance and scour protection, once the beach level has fallen below the underside of the concrete foundation, the sheet piles are induced to additional lateral earth pressure and bending moments. This would increase the stresses in the steel piles, which would also accelerate the corrosion rate.

2.2.10 Additionally, toe erosion has had a detrimental effect on the sea defending capacity of the sea wall due to the following reasons:

- The falling beach level has exposed a greater vertical extent of wall which can be impacted from direct wave action (increased instability due to total load);
- The backfill material behind the sea wall can potentially be washed out, compromising the passive resistance of the sea wall to withstand wave action and increasing risk of collapse; and
- The lowering of the slope of the adjacent beach can decrease the dissipation of energy from the waves, increasing the wave force on the sea wall. The greater reflective extent of wall would cause further acceleration of toe erosion.

2.2.11 Since 2010 and as discussed in Section 2.1, some limited scale formal rock armour has been placed across the western half of the Old Colwyn frontage (Area 1, extending slightly into Area 2), which provides additional passive resistance in front of the wall, dissipating some of the wave energy decreasing loading on the wall and provides a better interface between the defences and the beach, reducing scour at the toe.

Notwithstanding the above, there is still a significant length of wall at the eastern end within Area 2, where the risks to wall integrity identified in 2010 remain.

[10] Principal Inspection of Colwyn Bay Sea Wall, Mott MacDonald Ltd, September 2010

Current CCBC Management Arrangements

2.2.12 The current actions undertaken in relation to managing the coastal defences and the risk to hinterland assets and the general public are as follows:

- Regular monitoring of beach topography;
- Use of NRW flood warning system to close the public highway between Rotary Way and Beach Rd/Cliff Gardens, using the existing gates;
- Pro-active maintenance of railings, sea wall and Promenade identified during coastal defence asset inspections by Authority staff; and
- Reactive maintenance to damaged railings, sea wall and Promenade surfacing following storms, including provision of additional toe works as necessary e.g. as carried out in 2005.

2.2.13 CCBC have a current operational procedure in relation to managing the risk to Promenade users from high tides and or damage[11], the key elements of which are summarised below:

- The trigger conditions for potential closure of the Promenade is a tide level of 3.9mOD or greater, which typically is predicted to occur for periods of up to 7 days at a time, 1-2 times per month, concurrently with strong onshore winds, from directions north-west to north-east (onshore);
- Following review of the data the decision for closure is taken by Council staff from the Flood Risk and Infrastructure (FR&I), Open Spaces (OS) and Harbourmaster (HM) departments. County Councillors for the immediate location are informed directly and CCBC's marketing department inform the general public via social media;
- The road barrier at Cliff Gardens is closed first, followed by a walk through the Promenade length to inform remaining cars, followed by closure of the road barrier at Rotary Way junction;
- When the high tide has passed, an inspection of the coastal defence is carried out by FR&I to record condition and to ensure that the Promenade is safe to re-open. Any debris thrown up onto the Promenade during the storm is cleared before re-opening; and
- County Councillors for the immediate location are informed directly and CCBC's marketing department inform the general public via social media that the Promenade has been re-opened.

2.2.14 During autumn and winter seasons when there are consecutive days of high tides and onshore winds, or when repairs are required following storm damage, the Promenade can remain closed for a few days or longer at a time.

2.2.15 In the near future, it is highly likely that a decision would have to be made as to whether to continue to carry out repairs and should the decision be that repairs would not sustain the defences further then a decision to permanently shut the Promenade, with the associated consequences for general users and, particularly the emergency services, would have to be made (this is known as the "Do Nothing" scenario).

2.3 Identified Scheme Objectives

2.3.1 The primary function of works across the Old Colwyn frontage is to safeguard the integrity of the shoreline, provide protection to local and national infrastructure and safeguard life.

2.3.2 The primary objectives associated with the Scheme are therefore[5]:

[11] Closure and Re-Opening Procedure for old Colwyn Promenade, CCBC, May 2017

- To limit overtopping of the existing defences to appropriate levels commensurate with the primary hinterland receptors;
- To mitigate the risk of failure of the coastal defences and the erosion of the shoreline that would take place without on-going shoreline management;
- To safeguard the active travel routes, utilities, rail and transport infrastructure at risk from damage resulting from overtopping and/or erosion; and in addition
- To regenerate the Promenade area and provide environmental enhancements along with improved amenity commensurate with the overarching Waterfront Regeneration Plan.

2.4 Do Nothing Option (Walkaway)

2.4.1 In this scenario, no further capital or maintenance investment is carried out on the defences.

2.4.2 In 2010, utilising additional data collected, including the structural condition assessment, the preliminary PAR[12] was updated as part of the formal submission to Welsh Government for Grant Aid in October 2010[13] (ES Volume 2, Technical Appendix 2.3) with the following future behaviour assessment provided:

2.4.3 *"The recession lines from the Draft PAR have been updated on the basis of a greater understanding of the frontage developed from new studies including the SMP2, modelling reports and ground investigations".*

2.4.4 Up to year 5 it is assumed that regular overtopping would occur causing damage to structures and temporary closures of the Promenade to traffic.

2.4.5 "*The existing defences are considered to have failed in Year 5. After this, it can be anticipated that the ground behind will quickly suffer the effects of washing out as it comprises mainly made ground under the existing Promenade and road. Access along the Promenade road for traffic… will be prevented. It is assumed that this also occurs in Year 5 as once the defences have failed the Promenade and Promenade road cannot be considered safe for use".*

2.4.6 *"The railway embankment to the rear of the Promenade road comprises earthworks and is therefore vulnerable to the effects of inundation and erosion following the collapse of the Promenade and Promenade road. This is therefore considered to be unsafe for use once the coastline has reached within 5.0m of its base. It is considered that this will be in Year 10.*

2.4.7 *From Year 20 onwards, the new erosion rate presented for Colwyn Bay in the SMP2 of 0.3m per year until Year 50 and then 0.7m per year from 50-100 has been applied. This results in the loss of the A55 in Year 55".*

2.4.8 With the construction of phase 1 of the Waterfront project there would be some modification of the above, considering the Scheme on a stand-alone basis. However, given that there has been no change in conditions applying across the eastern half of the Old Colwyn frontage (Area 2), the risks associated with the defences remain as previously identified and outlined above:

- Regular overtopping of defences causing damage to the sea wall structures and Promenade surfacing, exposing fill material, requiring temporary closure of the Promenade to traffic in the first instance and, if repairs cannot sustainably be carried out, total closure of Promenade access to pedestrians, cycles and vehicles (including emergency services);
- Failure of defences arising from storm damage, with damage spreading rapidly longshore;

[12] Colwyn Bay Waterfront, Coastal Defence Improvements – Project Appraisal Report, Coastal Engineering, August 2008
[13] Colwyn Bay Waterfront, Coastal Defence Improvements – Project Appraisal Report Update, Mott MacDonald Ltd, September 2010

- Loss of utilities' services buried beneath the Promenade, including major pollution event/s in relation to damage to Welsh Water sewerage infrastructure and direct discharge to the Old Colwyn intertidal area;
- Loss of boundary wall and erosion of the embankment and bridges supporting the NWC Railway Line leading to closure of the railway;
- Loss of access/egress to the A55 Expressway from the Promenade; and
- Loss of the A55 Expressway. The area where there is the greatest risk to this would be at the eastern end where the bridge supports are immediately to landward of the NWC Railway Line bridge.

Indirect Implications of Lack of Investment

2.4.9 As well as the specific local impacts on infrastructure identified above there are significant wider local, regional and national impacts that the complete failure of the defences would have.

2.4.10 Both the NWC Railway Line and the A55 Expressway are of regional and national importance in the conveyancing of both freight and passengers to/within North Wales, both commercially and from a commuter/tourism/amenity perspective.

2.4.11 Both of these pieces of infrastructure provide a significant link between the UK and the Republic of Ireland, with Holyhead the 3rd ranked port in Wales for tonnage of freight handled (3 million tonnes per annum in 2012). At that time there were over 8,000 average daily HGV/LGV traffic movements on the A55 Expressway near Colwyn Bay and over 6,000 on the same road to the west near Bangor, contributing approximately 20% of all traffic movements on the A55[4].

2.4.12 The NWC Railway Line provides an important route for passengers with hourly direct or connecting services to/from London Euston via Chester as well as commuter routes connecting the North Wales coast to the urban conurbations of Liverpool and Manchester particularly. The railway is also an important freight asset with up to four trains a day transporting ballast, from the quarry at Penmaenmawr, through Colwyn Bay for use on the UK rail network[4].

2.4.13 North Wales attracts 3% of domestic tourism nights and accounts for around a third of tourism in Wales, which is more than any other region in Wales[14]. In 2018 tourism generated around £887 million to the CCBC economy – tourism is a major factor in the economy of North Wales and tourists coming into the area predominantly use the NWC Railway Line or the A55 Expressway. In 2017, the Conwy Borough attracted 6.71 million tourism day visitors (STEAM data 2017)[15] with associated annual expenditure of over £200 million. More than 60% of this expenditure is associated with the wider Llandudno, Colwyn Bay and Conwy area, all of which require access to be gained through Colwyn Bay.

2.4.14 In 2018 annual average daily traffic flows on the A55 Expressway J20 and J23 comprised 51,438 and 56,230 respectively[16] and estimates from 2014 suggest around 90,000 people commuted from Wales into England on a daily basis[4], whilst this covers the whole of Wales, thousands of people in North Wales are estimated to use the NWC Railway Line and A55 for this purpose, as well as people making the reverse journey.

2.4.15 In April 2012 the MV Carrier grounded on the coastal defences which protect the A55 Expressway at Llanddulas to the east of Colwyn Bay necessitating the A55 to be closed in both

[14] Chapter 5 Population and Human Health

[15] North Wales STEAM (Scarborough Tourism Economic Activity Monitor Assessment) Data 2017

[16] Department for Transport Road Traffic Statistics website: https://roadtraffic.dft.gov.uk/manualcountpoints/40529 and https://roadtraffic.dft.gov.uk/manualcountpoints/75450, accessed June 2020

directions for over 24 hours[17]. The disruption this caused in terms of congestion on local roads and increased journey times had a significant effect on both the local population and the movement of freight vehicles.

2.4.16 It is clear from the above that any disruption to the A55 Expressway and/or the NWC Railway Line would have a significant economic impact on both the local community as well as the wider regional economy of the area should the defences at Old Colwyn be allowed to fail.

2.5 Do Something Options

Do Minimum Scenario

Option 1. Business as Usual Scenario

2.5.1 For this option, CCBC continues its current management regime. In this case it would involve the existing reactive emergency response in relation to closure of the public highway during storm events regular monitoring and reactive maintenance of the sea wall and Promenade, generally following storm damage.

2.5.2 Effectively this option delays the onset of the Do Nothing Option, by extending the life of the defences until such time that the approach is unsustainable in economic or operational terms.

2.5.3 There is only a finite time (probably less than 5 years based on condition assessments of the existing defences and likely storm frequency) that CCBC are going to be able to continue their current policy of “make do and mend” and decide that this approach is no longer sustainable financially. In such a case the decision would have to be made to close the Promenade permanently and nature would take its course requiring the other stakeholders to adopt their own action plans to protect their infrastructure.

Revetment Extension Scenarios

2.5.4 The 2010 PAR[13] identified two options to be taken forward for consideration:

- Improvement of the current standard of defence through the construction of a linear rock revetment along the frontage; and
- Improvement of the current standard of defence through beach recharge works and construction of associated beach control structures and a short stretch of revetment.

2.5.5 Following which they identified the following for the area formerly known as Phase 3 (Old Colwyn) as the preferred option following an options appraisal:

- An extension of 1122m to the rock revetment to the east of the proposed (Porth Eirias) rock groyne and the raising of the Promenade.

Option 2. Continuation of Do Minimum Scenario Plus Extension of the Existing Depth of Rock Armour along the Entirety of the Frontage

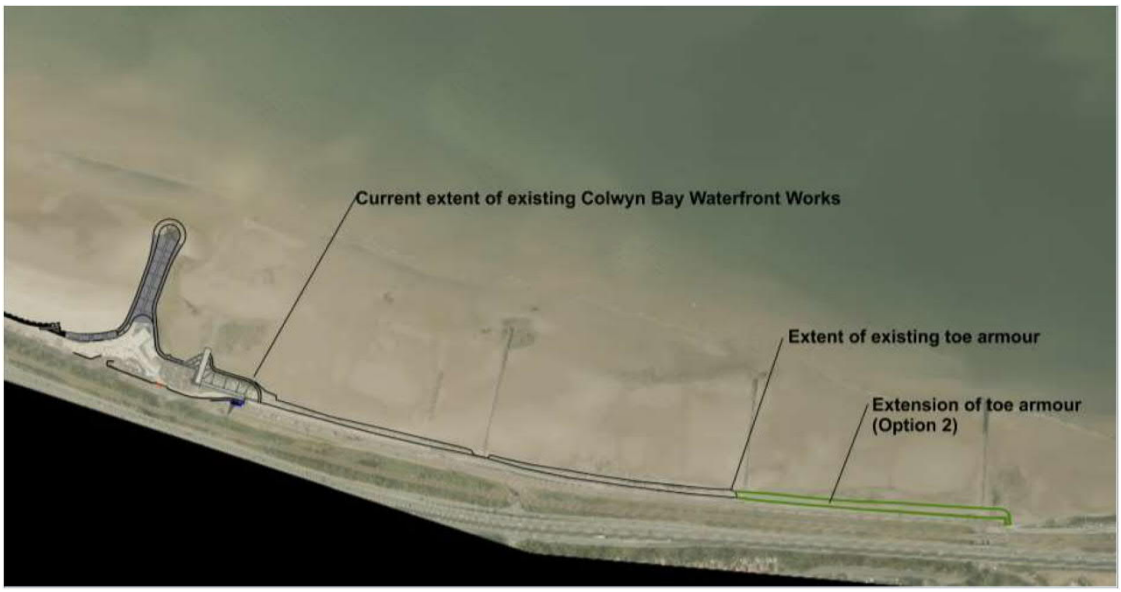
2.5.6 Option 2 has a twofold benefit compared to Option 1 in that it:

- Would provide additional passive resistance in front of the wall that would reduce the risk of failure/collapse; and

[17] BBC News Website: https://www.bbc.co.uk/news/uk-wales-north-west-wales-17634400, accessed 02/07/20

- May reduce the frequency of road closures required in respect of the typical events that occur year on year. However, under more extreme events, whilst mean overtopping rates would be expected to be lower the overall impacts expected would be similar.

Figure 2.3: Option 2 – Continuation of Do Minimum Scenario Plus Extension of the Existing Depth of Rock Armour along the Entirety of the Frontage



Source: Colwyn Bay Waterfront project Phase 3 – Phasing Review, Draft Report for Stakeholder Distribution, Coastal Engineering UK Ltd, August 2019

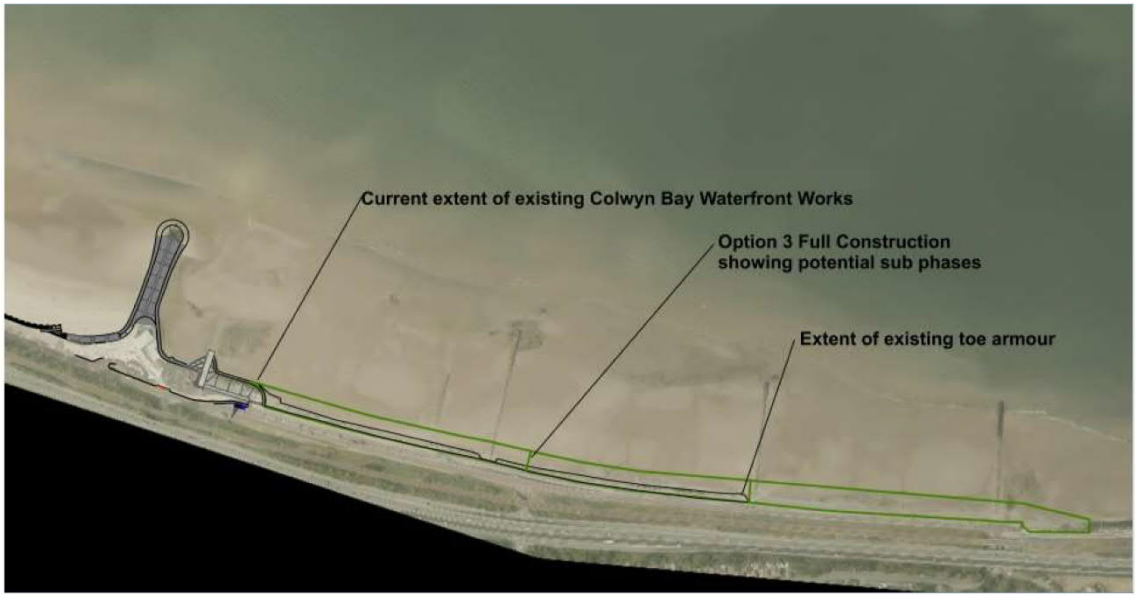
Option 3. Implementation of the Old Colwyn Coastal Defence Works in the Form Identified in the Modelling Completed18 (ES Volume 2, Technical Appendix 10.4) – Construction of Full Revetment

Option 3 meets all the overall objectives for the frontage in that it provides:

- Improved coastal defence to existing hinterland infrastructure assets including active travel infrastructure;
- Reduced coastal defence and highway maintenance expenditure;
- Opportunities for improved amenity;
- Improved highway usage; and
- Opportunities for re-generation of the public realm.

[18] Detailed Modelling Studies for Colwyn Bay Coastal Defence Scheme, Royal Haskoning, July 2010

Figure 2.4: Option 3



Source: Colwyn Bay Waterfront project Phase 3 – Phasing Review, Draft Report for Stakeholder Distribution, Coastal Engineering UK Ltd, August 2019

2.6 Option Comparison Summary

Considering Scheme Objectives

2.6.1 The four potential Options are compared against the Scheme Objectives identified in Section 2.3 in Table 2.3.

Table 2.3: Options Comparison Summary Table

Objective	Do Nothing	Do Something Option 1: Maintain Current Management Regime	Do Something Option 2: Extension of Existing Toe Armour	Do Something Option 3: Construction of Full Revetment
To limit overtopping of the existing defences to appropriate levels commensurate with the primary hinterland receptors	X	X	Lower overtopping rates would be anticipated.	✓
To mitigate the risk of failure of the coastal defences and the erosion of the shoreline that would take place without on-going shoreline management	X	Until such time that the approach is unsustainable in economic or operational terms	✓	✓
To safeguard the active travel routes, utilities, rail and transport infrastructure at risk from damage	X	X	Until such time that maintaining the defences in that form would become unsustainable	✓

Objective	Do Nothing	Do Something Option 1: Maintain Current Management Regime	Do Something Option 2: Extension of Existing Toe Armour	Do Something Option 3: Construction of Full Revetment
resulting from overtopping and/or erosion.			given climate change predictions	
To regenerate the Promenade area and provide environmental enhancements along with improved amenity commensurate with the overarching Waterfront Regeneration Plan	X	X	X	✓

Source: Adapted from: Colwyn Bay Waterfront project Phase 3 – Phasing Review, Draft Report for Stakeholder Distribution, Coastal Engineering UK Ltd, August 2019

2.6.2 Therefore, the Do Nothing (Walkaway) Scenario cannot be considered as a viable option, meeting none of the Scheme objectives.

2.6.3 Given the precarious nature and poor condition of the existing defences, Do Something Option 1 can only be considered as a temporary measure in the immediate term, until such time that improved arrangements can be put in place.

2.6.4 Overall, Do Something Option 2 would delay the onset of damage but with predicted climate change in the future, the risk of damage would increase until such time that maintaining the defences in that form would become unsustainable.

2.6.5 Do Something Option 3 is the only Option which meets all the Scheme objectives including providing the opportunity for investment into the Promenade with associated regeneration and amenity improvements.

Considering Environmental Effects

2.6.6 This section considers the likely environmental effects of each of the options at a high level. The descriptors for each significance of effect is summarised within Table 2.4 and anticipated effects are detailed in Table 2.5.

Table 2.4: Significance of Effect Descriptors

Significance of Effect	Summary	Adverse	Beneficial
Very Large	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.		N/A

Significance of Effect	Summary	Adverse	Beneficial
Large	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.		
Moderate	These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.		
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.		
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.		

Source: Adapted from DMRB LA104 Environmental Assessment and Monitoring Revision 1, July 2019

2.6.7 For the purposes of this high level assessment, short terms effects are considered to be over the next 5-10 years, and long term effects around 10 years onward.

Table 2.5: Options Comparison Summary Table – Anticipated Environmental Effects

Option	Impacts on Natural Environment	Impacts on Built Environment	Combined Impacts with Environmental Improvements and Regeneration
Do Nothing	• Major pollution event/s resulting from loss of sewerage services buried beneath the Promenade, including damage to Welsh Water sewerage infrastructure and direct discharge to the Old Colwyn intertidal area; • Change to intertidal character and loss and change of associated habitats (in the long-term the intertidal sands present on site would gradually be lost due to the action of longshore drift, this would reduce the suitability of the Site for species currently known to be present); • The terrestrial habitats would be anticipated to remain largely the same, with some additional scrub cover along the NWC Railway Line embankment where these are not subject to regular management; and • Eventual creation of equilibrium sedimentary shore habitat as collapsed hard structures fall into the sea and recession of shoreline and erosion of coastline landscapes.	• Closure of the Promenade highway to traffic in the first instance followed by total closure of Promenade access to pedestrians, cycles and vehicles; • Failure of defences arising from storm damage, with damage spreading rapidly longshore; • Loss of services buried beneath the Promenade; • Loss of boundary wall and erosion of the embankment and bridges supporting the NWC Railway Line leading to destabilisation, closure and eventual collapse of the railway; • Loss of access/egress to the A55 Expressway from the Promenade; and • Loss of the A55 Expressway. The area where there is the greatest risk to this would be at the eastern end where the bridge supports are immediately landward of the NWC Railway Line bridge.	• Regeneration proposals for the Old Colwyn waterfront area would not be possible – planning permission would be refused for any proposed improvements due to increasing flood risk and unsafe Promenade (which would be lost); • Closure of coast road and eventually NWC Railway Line and A55 Expressway would have a significant economic impact on both the local community as well as the wider regional economy of North Wales; • Loss of major transport links would have significant impacts on towns and communities to west of Colwyn Bay; • Population migration out of area due to loss of economic and social bases; • Eventual abandonment and loss of Old Colwyn seafront; and • Requirement for large economic investment to protect eastern edge of completed Waterfront Project area.
Overall Short Term Effect Significance	*Moderate Adverse (in relation to potential for pollution events)*	*Large Adverse*	*Large Adverse*

Option	Impacts on Natural Environment	Impacts on Built Environment	Combined Impacts with Environmental Improvements and Regeneration
Overall Long Term Effect Significance	*Neutral (as equilibrium environment created)*	*Very Large Adverse*	*Very Large Adverse*
Do Something Option 1: Maintain Current Management Regime	• Impacts on ecological habitats and associated species due to maintenance of defence structures; • Initially localised impacts which would become more significant as maintenance operations became more frequent; • Impacts as for Do Nothing Option over a longer timescale.	• Continual deterioration in condition and quality of Promenade environment; • Reduced use of the Old Colwyn waterfront area for active travel; • Continual increase in materials required for reactive maintenance; and • Impacts as for Do Nothing Option over a longer timescale.	• Increasingly high defence maintenance costs would eventually become economically unsustainable; and • Impacts as for Do Nothing Option over a longer timescale.
Overall Short Term Effect Significance	*Slight Adverse (in relation to increasing emergency maintenance requirements)*	*Moderate Adverse (in relation to continual deterioration)*	*Moderate Adverse (in relation to lack of investment possible along Promenade)*
Overall Long Term Effect Significance	*Moderate Adverse (in relation to potential for pollution events and increased maintenance requirements), effects would become Neutral in the very long term*	*Large Adverse (becoming Very Large Adverse following eventual abandonment)*	*Large Adverse (becoming Very Large Adverse following eventual abandonment)*
Do Something Option 2: Extension of Existing Toe Armour	• A rock toe would initially cover existing habitat although could create new habitat in longer term if designed appropriately; • Modifications to defence walls may impact on seascape panorama; • Eventual coastal recession as existing defences deteriorate over long term.	• Sustained partial protection to existing infrastructure in short to medium term though additional passive resistance which would reduce the risk of failure/collapse; • Reduced frequency of road and active travel route closures required for typical events (although effects of extreme events unlikely to be changed from current);	• Full regeneration of Old Colwyn Promenade unlikely to be permitted due to existing level of flood risk although in short and medium terms sustained defences would facilitate some regeneration and hence begin to provide limited economic growth; • Long term disruptions to Promenade access and eventual beach erosion would prevent investment in tourism and result in longer term economic decline;

Option	Impacts on Natural Environment	Impacts on Built Environment	Combined Impacts with Environmental Improvements and Regeneration
	• Impacts on ecological habitats and associated species due to maintenance of defence structures; and • Eventual deterioration and failure of defences over very long term would ultimately result in the same impacts as for Do Something Option 1 followed by Do Nothing.	• Deterioration of existing defences would result in long term (i.e. beyond 2060) threat to transport infrastructure and restrictions to Promenade access; and • Eventual deterioration and failure of defences over very long term would ultimately result in the same impacts as for Do Something Option 1 followed by Do Nothing.	• Eventual deterioration and failure of defences over very long term would ultimately result in the same impacts as for Do Something Option 1 followed by Do Nothing.
Overall Short Term Effect Significance	*Slight Adverse (in relation to short term effects associated with construction)*	*Slight Adverse (due to ongoing maintenance associated with extreme events)*	*Neutral (some limited investment in Promenade area balanced with continued disruption associated with extreme events)*
Overall Long Term Effect Significance	*Moderate Adverse (in relation to potential for pollution events and increased maintenance requirements), effects would eventually become Neutral*	*Large Adverse following initial defence failure (would eventually become Major Adverse)*	*Large Adverse following initial defence failure (would eventually become Major Adverse)*
Do Something Option 3: Construction of Full Revetment	• Movement of intertidal habitat seaward due to installation of linear rock defences; • Loss of strip of intertidal habitat adjacent to sea wall due to rock armour revetment construction in immediate term. Countered by creation of new marine habitat; • Creation of new terrestrial habitat; and • Reduced impacts on wintering birds from regular reactive maintenance.	• Improved level of protection and long term security for defended assets; • Defended Promenade would allow investment in active travel route improvements; and • Improved access from Promenade to Old Colwyn beach including Equality Act compliant access.	• Improved defences would facilitate regeneration of the Promenade with the potential for amenity and ecological enhancements; • Increased outdoor recreation opportunities; • Improved Promenade would attract tourism into area and thus improve identity and reputation of Colwyn Bay, encouraging business relocation into area; and • Economic benefits discussed further 2.6.8 to 2.6.13.

Option	Impacts on Natural Environment	Impacts on Built Environment	Combined Impacts with Environmental Improvements and Regeneration
Overall Short Term Effect Significance	*Slight Adverse Impact (in relation to short term effects associated with construction)*	*Moderate Beneficial*	*Moderate Beneficial*
Overall Long Term Effect Significance	*Slight Beneficial (in relation to habitat creation)*	*Large Beneficial*	*Large Beneficial*

Considering Economic Justification

2.6.8 The economic basis / business case for investing in the Colwyn Bay Waterfront project was originally provided in the 2010 PAR[13]. This quantified the direct economic damages associated with the following:

1. The cost associated with local diversion of traffic that uses the Promenade, in terms of additional distance and journey time for users;
2. The direct (like for like) replacement cost of services underneath Promenade/highway;
3. The cost of delay to rail users associated with loss of the rail line at Old Colwyn and the cost of providing a rail replacement bus service between Abergele & Pensarn and Llandudno Junction stations;
4. The cost associated with diversion of traffic in the event of loss of the A55 Expressway, in terms of additional distance and journey time for users; and
5. The value of commercial and residential properties that would be lost in the event of erosion, across the Phase 1 and 2 lengths.

2.6.9 These figures were updated in the Phase 2 PAR Review[19]. This identified that overall, based on a 100 year appraisal period, the total discounted economic damages prevented by incorporation of all three phases of the Colwyn Bay Waterfront Project was estimated to be between £330milion and £450million. The range representing the uncertainty associated with the timing of failure of the current defences.

2.6.10 Looking at the Old Colwyn Scheme frontage in isolation it can be seen that the majority of the direct damages are associated with this length of frontage, with estimated discounted damages of between £295million and £415million, associated with items 1-4 above[4].

2.6.11 For this exercise, the direct damages calculated associated with the diversion costs for rail and road users, assume that the diversions/replacement services remain in place from the time they commence until the end of the appraisal period.

2.6.12 There would also be wider impacts that damage to or loss of the A55 Expressway and/or the NWC Railway Line would have on the wider North Wales and National economy particularly in respect of impacts on tourism, on which the local economy relies, and on the movement of people and freight across the area.

2.6.13 It should also be noted that if Do Something Option 2 works were carried out, the direct damages would reduce to an estimated £150million, assuming the rock toe works bought an extra 20 to 30 years before the defences failed.

2.7 Design Basis

2.7.1 A Basis of Design Report for the Scheme was produced in April 2020[20] (ES Volume 2, Technical Appendix 2.4). Key information from this document is summarised below.

[19] Colwyn Bay Waterfront Scheme Project Appraisal review and Update, CCBC, May 2018

[20] Old Colwyn Promenade Coastal Defence and Active Travel Improvement, Basis of Design report, 415437-MMD-00-XX-RP-C-3100, Mott MacDonald Ltd, April 2020

Baseline Design Information

Beach Level Changes

2.7.2 Beach level monitoring indicates that the beach is generally stable and that levels do not vary significantly with time (see Table 2.6). Locations 1-5b are located from west to east with 1-3b in Area 1 and 4a-5b in Area 2. The maximum monitored variation in beach level was 0.7m from July 2005-January 2019. In light of the below results a beach drawdown value of 0.5m from the current survey data has been adopted for the design of the beach steps with possibility for the steps to be extended in the future should localised erosion occur in the future. Local beach recharge or recycling may also be implemented if required over time.

Table 2.6: Historic Beach Levels

Location	July 2005 (mOD)	October 2010 (mOD)	October 2015 (mOD)	January 2019 (mOD)	Max Difference in Levels (m)
1	0.5	0.4	0.5	0.6	0.2
2	0.9	0.6	0.6	0.4	0.5
3a	1.1	1	1.2	1.3	0.4
3b	0.9	0.9	0.9	1	0.1
4a	0.5	0.2	0.4	0.9	0.7
4b	0.4	0.4	0.2	0.7	0.4
5a	-0.5	-0.6	-0.6	-0.5	0.1
5b	-0.4	-0.4	-0.6	-0.7	0.3

Source: Old Colwyn Promenade Coastal Defence and Active Travel Improvement, Basis of Design report, 415437-MMD-00-XX-RP-C-3100, Mott MacDonald Ltd, April 2020

Sea Wall Levels

2.7.3 The level of the sea wall varies in the range +5.47-6.13mOD as summarised in Table 2.7.

Table 2.7: Existing Sea Wall Levels

Profile	Top of Sea Wall (mOD)	Exposed Toe Level of Sea Wall (mOD)	Wall Free Height (m)	Beach Slope
Western Area 1	6.13	3.00	3.13	1 in 100
Area1/Area 2 boundary	5.50	3.30	2.20	1 in 40
Central Area 2	5.47	0.00	5.47	1 in 50
Eastern Area 2	5.75	0.84	4.91	1 in 45

Source: Old Colwyn Promenade Coastal Defence and Active Travel Improvement, Basis of Design report, 415437-MMD-00-XX-RP-C-3100, Mott MacDonald Ltd, April 2020

Tide Levels

2.7.4 The Mean High Water Spring Tide (MHWS) Level is +3.70mOD and the predicted Highest Astronomical Tide (HAT) level is +4.68mOD (see Table 2.8 for Old Colwyn tide levels). Accordingly, at HAT there is only between 0.5m and 1.5m of freeboard between the tide level and the top of the existing sea wall without considering the action of waves.

Table 2.8: Old Colwyn Tide Levels

Tide	Ordnance	Chart Datum (m CD)	Ordnance Datum (mOD)
Highest Astronomical Tide	HAT	+8.78	+4.68
Mean High Water Spring	MHWS	+7.80	+3.70
Mean High Water Neap	MHWN	+6.10	+2.00
Mean Sea Level	MSL	+4.21	+0.11
Ordnance Datum		+4.10	0.00
Mean Low Water Neap	MLWN	+2.29	-1.81
Mean Low Water Spring	MLWS	+0.66	-3.44
Lowest Astronomical Tide	LAT	-0.24	-4.34

Source: Old Colwyn Promenade Coastal Defence and Active Travel Improvement, Basis of Design report, 415437-MMD-00-XX-RP-C-3100, Mott MacDonald Ltd, April 2020

2.7.5 Estimates of extreme water levels for Colwyn Bay (Environment Agency, Coastal flood boundary conditions 2018), including meteorological influences (storm surge), provide the following:

2.7.6 Base year 2017, Point location: 53° 18' 48.2423" N, 3° 42' 22.3465" W:

- Water level with an estimated 10% probability of occurrence in any year = 5.04mOD;
- Water level with an estimated 2% probability of occurrence in any year = 5.23mOD; and
- Water level with an estimated 0.5% probability of occurrence in any year = 5.39mOD.

Wave Conditions

2.7.7 In addition to the above, wave conditions defined as part of the joint probability of design waves and water levels, identified waves approaching the shoreline would be approximately 2m in height for the 1 in 1 year event and 3m in height for the 1 in 50 year event.

2.7.8 Those waves come from offshore (west to north-west) and get refracted around the shoreline to reach the beach in a parallel way.

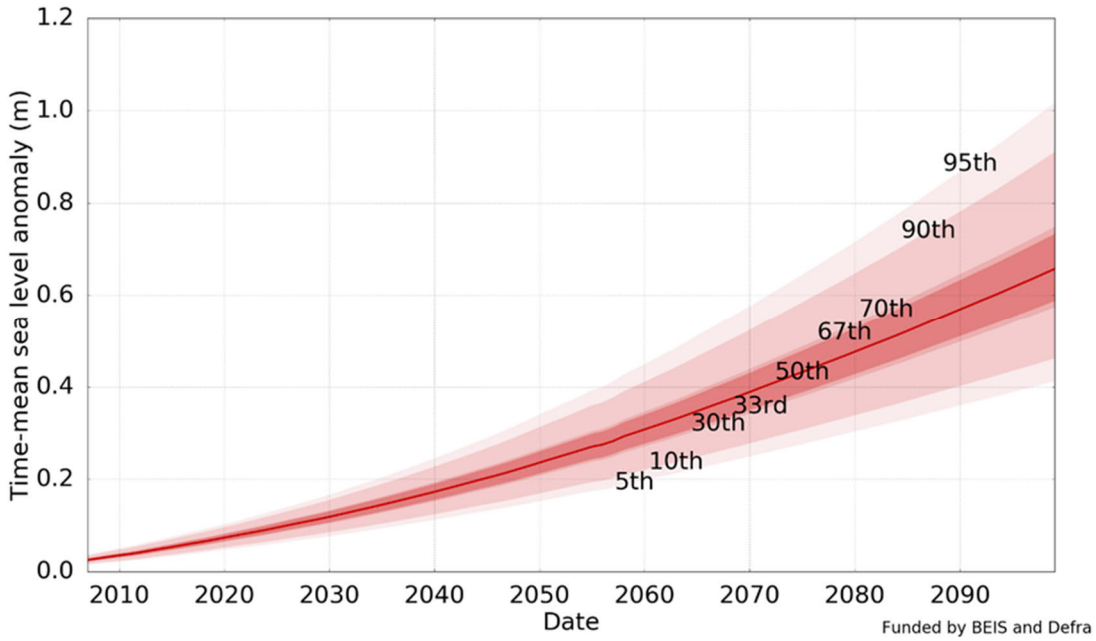
2.7.9 The largest waves break when reaching the beach as water depth decreases.

Sea Level Rise

2.7.10 The assessment of the sea level rise allowance for coastal structures is based on UK Climate Projections 2018 (UKCP18) from the Met Office[21]. The value used in the design has been extracted from the graph shown in Figure 2.5, this allows an adjustment from the tidal data above as well as setting 2020 as the baseline year for the beginning of the future 50 year sea level rise allowance. The 95th percentile of the RCP8.5 scenario (RCP8.5 is one of a suite of scenarios that describe several different potential future pathways in terms of the amount of carbon in the atmosphere that delivers global warming at an average rate of 8.5 watts per m^2 across the planet) has been considered as a conservative approach at this stage. An increase of 0.59m to water levels has been included for the mean sea level adjustment to present day and the future 50-year sea level rise allowance.

[21] 5. Met Office Hadley Centre Climate Programme funded by BEIS and Defra, UK Climate Projections (UKCP 18), 2nd Edition, March 2019

Figure 2.5: UKCP18 Projections at Colwyn Bay – RCP8, 95th Percentile



Source: Old Colwyn Promenade Coastal Defence and Active Travel Improvement, Basis of Design report, 415437-MMD-00-XX-RP-C-3100, Mott MacDonald Ltd, April 2020

Design Life

2.7.11 The design life of all structures has been set at 120 years[20]. This is defined as *"The assumed period for which a structure or part of it is to be used for its intended purpose with anticipated maintenance but without major repair being necessary*". The following exceptions have been identified:

Rock Revetment

2.7.12 The proposed design life of the rock revetment is 50 years. This is due to the flexible nature of the structure and the potential need for repairs as the structure may exhibit movement and create local voids during storms. Additionally, the current design incorporates 50 years sea level rise allowance and would require to be adapted if sea levels rise above the design allowance. Note that the majority of the individual rock material would be durable to survive the 120 years where it remains undamaged.

Fishing Platforms

2.7.13 Fishing Platforms: The proposed design life of the fishing platform structures, is 50 years for the steel sub-structures and 25 years for the timber elements. As a lightweight steel structure in the marine environment, it is at high risk of corrosion. Galvanisation would be specified as a minimum but additional coatings or finishes would be considered in the design as these can minimise maintenance and potentially extend the life. However, as the piles are located within the rock revetment there is potential that the rock could damage any applied finish and would commence the corrosion process. The design life of the timber utilised in the fishing platform is anticipated to be 25 years. Hardwood timber is suitable for the marine environment but owing to the organic nature of timber (overall durability and variability) elements would require replacement as they degrade over time. Timber elements have been designed to be easily replaceable.

Ancillary Design Items

2.7.14 Other ancillary design items such as guardrails, handrails and outfall grills are also likely to have limited design lives in accordance with manufacturers' designs. Where these items are to be specified the design would consider suitable durability for the marine environment in line with current best practice. Where practicable these items would be designed to be easily replaceable.

Climate Adaptability

2.7.15 The new Promenade and rock revetment are proposed be adaptable for future sea level rise, beyond the current 50 year allowance. These elements may require further works to maintain the proposed structural performance against overtopping or significant beach loss as a result of climate change. However, the underlying structural design remains compliant with the required design life.

2.7.16 Providing a phased adaptable approach to climate change is more acceptable to stakeholders and cost effective for Clients. An adaptable design is more justifiable as uncertainty around the environmental responses increase non-linearly the further the prediction is into the future.

2.7.17 Rock revetments are able to be adapted to accommodate further sea level rise or scour in the future through the modification of the cross section by adding additional layers of rock or reconstructing the design profile. This adaptability does require additional footprint to accommodate further layers of rock.

2.7.18 Additional raising of the road and the Promenade after 50 years is more challenging, and this area may be less adaptable. Future options may include the provision of additional setback walls to protect the road infrastructure and utilise the Promenade as a stilling area for overtopped water. Further impacts on views and accesses or more restrictive management during storms may also need to be accepted.

Overtopping

2.7.19 Overtopping hazards are assessed by determining the volume of water that passes over the crest of the defence. The outputs of overtopping analysis undertaken utilising the EurOtop Manual 2018[22] are:

- Mean overtopping discharge (q), defined as the average overtopping volume from all waves, it is estimated in litres per second per metre length of sea wall; and
- Individual maximum overtopping volume (Vmax), is defined as the maximum discharge from a single wave in litres per metre length of sea wall.

2.7.20 These parameters (q and Vmax) are checked against defined criteria to establish the performance of differing geometric structure configurations.

2.7.21 The frequency of the overtopping events, assessed by the return periods set in the joint probability analysis relate to the expectations of the users of the structures, highway and Promenade and the requirements of the asset owners/ managers.

2.7.22 Inputs to the calculations comprise the water levels, wave heights and wave periods for each profile that resulted from the joint probability analysis, both at present day and in 50 years, the structure geometry and the beach profile for each of the profiles investigated (including beach drawdown).

[22] 3. EurOtop Second Edition 2018. Manual on wave overtopping of sea defences and related structures:

2.7.23 In principle, the overtopping limits are taken from the latest industry standard guidance, EurOtop Manual 2018[22]. However, for areas of Promenade and carriageway landward of the crest no limits are given in the current version of the guidance and the limits from the previous version of the guidance have been adopted, as shown in Table 2.9. Those values are defined to ensure that the paved Promenade is not damaged during extreme events behind the crest of the revetment/sea wall.

Table 2.9: Recommended Discharge Limits for Assets

Surface	q [l/m/s]	Return Period (years)
Paved	200	100
Grass	50	100

Source: Old Colwyn Promenade Coastal Defence and Active Travel Improvement, Basis of Design report, 415437-MMD-00-XX-RP-C-3100, Mott MacDonald Ltd, April 2020

2.7.24 For pedestrian and vehicle access near the crest of the structure because the area does not provide essential access, but only amenity access, the overtopping limits have been assessed for the 1 in 1-year and 1 in 10-year wave and water level conditions. The risk for pedestrians and vehicles would be assessed as part of a risk assessment and mitigation measures such as Promenade or road closures would be assessed. Table 2.10 presents the recommended discharge limits for pedestrians and vehicles.

Table 2.10: Recommended Discharge Limits for Users

User	Vmax [l/m]	Return Period (years)
Pedestrian	600	1 - 10
Vehicle	2,000	1 - 10

Source: Old Colwyn Promenade Coastal Defence and Active Travel Improvement, Basis of Design report, 415437-MMD-00-XX-RP-C-3100, Mott MacDonald Ltd, April 2020

Existing Defence Overtopping

2.7.25 The overtopping results for the existing structures and geometries are presented in an Overtopping Assessment issued in June 2020[23] (included as ES Volume 2, Technical Appendix 10.3).

2.7.26 The results consider both present day and 50-year scenarios at four locations for the existing sea wall. For the 1 in 10-year return period, at present day, the maximum mean overtopping discharge q estimated is 690 l/m/s with a maximum overtopping volume Vmax of 57,500 l/m and flooding occurring in 50 years when considering the sea level rise along the frontage.

2.7.27 These values are significantly higher than the limits proposed by guidelines and impose risk to public health and safety, as well as risk to the protected assets beyond the sea wall. Existing structures are at high risk of flooding and damage during extreme events as overtopping values significantly exceed the overtopping criteria.

Design Overtopping

2.7.28 Following the Overtopping Assessment, a workable solution was chosen and approved by the Applicant, considering the levels of the existing structures at both ends of the Scheme, the need to maintaining sea view and the impact on construction costs.

[23] Old Colwyn Promenade Defence & Active Travel Improvements, Wave Overtopping Assessment, Mott MacDonald, June 2020

2.7.29 The results of this initial analysis led to a rock revetment crest design height at +7.50mOD and a Promenade raised to a design height of +7.00mOD. The overtopping assessment identified that for the preferred option the mean overtopping discharge q remaining under the limit for structures of 200 l/m/s for all cases and the maximum overtopping volume reduced under the limit of 600 l/m (pedestrians) for 1 in 1 year events.

2.8 Design Development

2.8.1 The development of the original design concept as outlined in the BCA Landscape Design Concept Document[24] (included as ES Volume 2, Technical Appendix 2.5) through to tender design and subsequently detailed design, has been informed by the following along with all the environmental discipline specific surveys and assessment:

- Design for Resource Efficiency Workshop held on 4th March 2020 (the tracking spreadsheet created during this session and maintained as a live document is included as ES Volume 2, Technical Appendix 9.2);
- Ecological Enhancement Workshop held on 25th March (held remotely due to Covid-19 restrictions) with team members, a marine ecologist and ornithologist to determine the achievable enhancements and optimal locations;
- CEEQUAL (The Civil Engineering Environmental Quality Assessment & Award Scheme): Numerous meetings throughout the design process involving design team and environmental team members (the Scheme is aiming for a Strategy and Design CEEQUAL Assessment Award of Excellent or higher);
- Design team meetings (including environment and landscape representatives); and
- Statutory and non-statutory consultation (see Section 5.4 for details of where Scoping responses have been addressed within this ES).

2.8.2 Following inputs from the above and continual collaboration between the environment, design and landscape teams, the iteration and development of the conceptual design proposals has been undertaken, included refinements to the design of the:

- Height of the Promenade;
- Rock armour, including crest width, revetment toe and foundations (refer to revetment optimisation doc;
- Access-buildout area;
- Sea wall design;
- Stepped access design; and
- Supplementary features.

2.8.3 There have also been a number of enhancements integrated into the design at an early stage, particularly in relation to ecology and landscape.

2.8.4 A description of the final Scheme is provided in Chapter 3.

2.9 Drawings

2.9.1 All drawings for this chapter are included within the ES Volume 2: Technical Appendices documents as listed in Section 2.10.

[24] Colwyn Bay Promenade Design Concept, BCA Landscape, December 2019

2.10 List of Documents Included in ES Volume 2: Technical Appendix 2

- Appendix 2.1: Colwyn Bay Waterfront Project Phase 3 Phasing Review;
- Appendix 2.2: Colwyn Bay Waterfront Phase 1 Engineering Works Environmental Statement, Volume 1;
- Appendix 2.3: Colwyn Bay Waterfront Project – Project Appraisal Report Update;
- Appendix 2.4: Basis of Design report; and
- Appendix 2.5: Design Concept Drawings.

3 Scheme Description

3.1 Environmental Sensitivity

3.1.1 The Scheme itself is not located within a European Site of Conservation Importance, however the Liverpool Bay Special Protection Area (SPA) is located approximately 150m northwards from the sea wall at its closest point (to the north-east of Splashpoint). The majority of the Scheme footprint including the construction works buffer area would be located within 50m to 60m of the sea wall, with the exception of any rock deliveries by barge (if this method of delivery is selected), temporary storage and movement of the rock revetment across the intertidal area following delivery and minor ecological habitat enhancement works to the existing rock groynes.

3.1.2 The Scheme construction footprint extends into the North Wales Important Bird Area, the boundary of which is located approximately 40m northwards of the sea wall at its closest point.

3.1.3 There are not considered to be any sensitive properties within the Scheme area given its waterfront location, segregated from residential areas by the NWC Railway Line and A55 Expressway. The closest residential properties are located on Min-y-Don Avenue approximately 70m to the south of the Promenade in Area 2.

3.1.4 The area is not considered to have any specific features of cultural heritage significance – the site of the former Cadw Grade II listed Victoria Pier (location of a proposed new truncated pier) is around 600m to the west of the western Scheme extent (at its closest point). The Old Colwyn conservation area is segregated from the Scheme by the A55 Expressway and the NWC Railway Line. National Cycle Route 5 runs along the Promenade within the Scheme area.

3.1.5 Detailed environmental baselines for each discipline are included in their respective Chapters, however a series of overarching Environmental Constraints Plans (Drawings 415437-MMD-00-XX-DR-N-1703 to 1706) showing the location of the Scheme in relation to key environmentally sensitive receptors within 2km of the red line boundary can be found in Section 3.5. The environmentally sensitive receptors are also summarised in Table 3.1.

Table 3.1: Environmental Receptor Sensitivity

Environmentally Sensitive Receptor	Details	Distance from Red Line Boundary
Special Protection Areas (SPA)	Liverpool Bay SPA – designated for red-throated diver (*Gavia stellata*) and common scoter (*Melanitta nigra*) as well as other overwintering bird species.	Bounding to the north
Important Bird Area	North Wales	Within
Sites of Special Scientific Interest (SSSI)	Mynydd Marian – of special interest for its range of limestone (calcareous) grassland communities as well as its population of the dwarf race of silver studded blue butterflies (*Plebejus argus ssp. Caernensis*). Nationally scarce plant species spring cinquefoil (*Potentilla neumanniana)* (*P. tabernaemontani*) is also present within stands of calcicolous grassland.	~2km south-east
Local Nature Reserve (LNR)	Fairy Glen - Ancient broadleaved woodland along the banks of the river Colwyn, supporting species such as grey wagtail (*Motacilla cinerea*).	0.5km south-east

Environmentally Sensitive Receptor	Details	Distance from Red Line Boundary
	Upper Dingle Woods - Broadleaved woodland supporting species such as lesser celandine (*Ficaria verna*) and bluebell (*Hyacinthoides non-scripta*).	0.6km south
	Pwllycrochan Woods - Ancient broadleaved woodland supporting species such as great spotted woodpecker (*Dendrocopos major*), treecreeper (*Certhia familliaris*) and tawny owl (*Strix aluco*).	0.8km south-west
Local Wildlife Sites	Coed Rhos Fossil Woodland - Candidate fossilised woodland, no survey information is currently available.	2km north-west
	Upper Dingle Woods – See above, LNR description.	0.6km south
	Pwllycrochan Woods – See above, LNR description.	0.8km south-west
Marine Habitats	Blue mussel (*Mytils edulis*) – Dense and sparse mussel beds – One mussel bed recorded in the east of the Site, which broadly meets the description for a priority habitat under Section 7 of the Environment (Wales) Act, 'Blue mussel beds on sediment', but was noted to be small and in poor condition (fragments and empty shells present on Site) so a poor example of this habitat.	Within
	Honeycomb worm (*Sabellaria alveolata*) – Isolated small patches – Small isolated patches of reef formed by polychaete worms were noted along the northern half of three groynes and within a single shingle and gravel area in the centre of the Scheme, which could meet the description of the priority habitat *Sabellaria alveolata* Reefs. However, due to their patchy distribution, these are not considered to be a high-quality example of this priority habitat.	Within
Species	Wintering birds - Wintering bird surveys recorded a number of wintering bird species in the area including common scoter and red-throated diver, both key interest features of the Liverpool Bay SPA.	Within
	Reptiles – Surveys not completed but NWC Railway Line embankment considered suitable for common reptile species, which are known to be present in the local area.	Within
	Marine mammals – The marine habitats off-site to the north could be used occasionally by marine mammals, such as common porpoise, common bottlenose dolphin and grey seal.	Within
	Fish – The marine intertidal habitats on Site and the habitats off-site to the north are likely to support a range of common and widespread fish species of various life stages. The wider area is known to be a high intensity spawning and nursery ground for various fish species.	Within
	Benthic species (infauna and epifauna) – The intertidal section of the Site supports and / or has potential to support various common benthic species.	Within
Marine Character Area	Colwyn Bay and Rhyl Flats	Within

Environmentally Sensitive Receptor	Details	Distance from Red Line Boundary
National Landscape Character Area	North Wales Coast	Within
Listed buildings	The majority are separated from the Scheme by the A55 Expressway and/or NWC Railway Line with the exception of the location of former Victoria Pier and Pavilion.	~450m west of Porth Eirias road entrance at closest point
WFD Water body	GB641011650000 North Wales Coastal Water body (Heavily Modified Water body), Overall Status: Moderate, Ecological Status: Moderate, Chemical Status: Fail.	Within
WFD Higher Sensitivity Habitat	• Blue Mussel bed (note: As above, the habitats on site are considered to be poor examples of this priority habitat type and are not considered to be of any elevated ecological value in a local context); and • Honeycomb Worm, could qualify as priority habitat under Section 7 of the Environment (Wales) Act (note: As above, the patches encountered were noted to be relatively small and isolated in extent (not reef forming) and so not a high quality example of this priority habitat).	Within
WFD Lower Sensitivity Habitat	• Subtidal soft sediment; • Intertidal soft sediment; • Rocky shore; and • Gravel and cobbles.	Within
Shellfish Waters	Rhos-on Sea	~2km to the west
	Llanddulas	~2.6km to the east
Bathing Waters	Colwyn Bay. Bathing water quality monitoring point at Porth Eirias.	Within. Bathing Water monitoring point ~500m west of red line boundary.
Surface water courses	• Nant-y-Groes (Main River) – culverted and discharges to beach; • The Llwd (Main River) – culverted and discharges to beach; and • The Nant-y-Fynnon (Ordinary Watercourse) – culverted and discharges to beach.	Immediate west, within and within respectively.
Flood risk	Areas of Flood Zone 3 are present along the length of the northern pedestrian Promenade and pedestrian Promenade along the alignment of the Nant-y-Groes and Nant-y-Fynnon. High surface water flood risk is present along the same alignment of the Nant-y-Groes and where Rotary Way joins the Promenade highway. Frequent overtopping occurs along the pedestrian Promenade and Promenade highway when high tides are associated with onshore winds.	Within
Residential properties	The closest residential properties are along Min-y-Don Avenue, to the south of the NWC Railway Line and A55 Expressway.	~70m south

Environmentally Sensitive Receptor	Details	Distance from Red Line Boundary
Other sensitive land uses	All separated from the Scheme by the NWC Railway Line and A55 Expressway.	Closest (primary school) ~140m south-east
Local businesses	Porth Eirias	Immediately adjacent to west
Local infrastructure	Promenade highway and pedestrian Promenade	Within
	NWC Railway Line	Partially within
	A55 Expressway	~30m south
Recreation and amenity	North Wales Coast Path	Within
	National Cycle Route 5	Within
	Public rights of way	Within
	Old Colwyn beach	Within
	Pedestrian Promenade	Within

Source: Chapters 7-14

3.2 Scheme Description

3.2.1 The proposed scope of work for the Scheme comprises a combination of coastal defence, Promenade and active travel improvements. For the overarching Scheme design please see the Coastal Defence General Arrangement (Drawings 415437-MMD-00-XX-DR-C-3001 and 3002) and BCA Landscape General Arrangement (Drawing 1.537-100-GA01) all located in Section 3.5. Supplementary drawings are referenced within the text below and can be found in the ES Volume 2, Technical Appendix 3.1.

Coastal Works

3.2.2 The coastal works design in summary includes the following key features:

Rock Revetment Construction

3.2.3 The revetment would be approximately 32m in cross sectional width and 1.15km in length with an approximately 5m wide crest and a slope of 1:3 down to beach level. The revetment is required to protect the active travel routes along the Promenade, underground services, NWC Railway Line and A55 Expressway. The revetment would tie-in to the existing rock revetment east of Porth Eirias to the west and Splashpoint to the east – the toes and crests would merge as cross-sections are very similar.

3.2.4 A plan of the coastal works within the Splashpoint area is shown on Drawing 415437-MMD-00-XX-DR-C-3052, typical revetment cross-sections can be seen on Drawing 415437-MMD-00-XX-DR-C-3100, with the tie-ins at the western and eastern ends represented on Drawing 415437-MMD-00-XX-DR-C-3102, all located in the ES Volume 2, Technical Appendix 3.1.

Outfall Extensions and Groynes

3.2.5 Modifications to five existing outfalls would be required along the length of the revetment including extensions and protective slabs where necessary. The revetment toe would need to be widened locally to 7.2m (from typically 3.6m) at two locations. Stainless steel grills would be fixed to the end of each of the three culverts which are to be extended.

Outfall and culvert cross-sections can be found on Drawings 415437-MMD-00-XX-DR-C-3750, 3752 and 3753, with outfall and culvert typical sections on Drawing 415437-MMD-00-XX-DR-C-3751 in the ES Volume 2, Technical Appendix 3.1.

3.2.6 A number of disused outfalls are also believed to be present – this would be confirmed during future surveys.

Access Build Out

3.2.7 A new access build out area would be constructed in the western half of Area 1, located between Porth Eirias and the first set of beach groynes, to the north-east of the picnic area. This build out would have numerous functions including:

- Providing a greater area for non-vehicular activity;
- Equality Act compliant access comprising a 2m wide access ramp along the southern boundary of the build out, comprising 10m long ramp sections split by 2m wide landings and having a brushed finish;
- Stepped access to the beach comprising 4m wide concrete steps along the northern section of the build out; and
- Landscape areas with pre-cast concrete seating steps set at varying levels with landscaping boulders fixed to the concrete slab.

3.2.8 The shape of the build out has been designed to complement on plan the design of the Promenade to the west of Porth Eirias with the use of landscape boulders to provide a transition area through the rock revetment.

3.2.9 A plan of the access build out can be found on Drawing 415437-MMD-00-XX-DR-C-3001 and 3200 with a piling plan and 3D view (including details of types and depths of piling required) represented on Drawing 415437-MMD-00-XX-DR-C-3201, and access build-out cross sections on Drawings 415437-MMD-00-XX-DR-C-3250 to 3252, all located in ES Volume 2, Technical Appendix 3.1.

Beach Access Steps

3.2.10 New pedestrian accesses through the proposed revetment to comprise three sets of beach access steps perpendicular to the linear rock revetment, would be constructed at the location of each of the three longest groynes within the Scheme area to the west of Rotary Way, mid-way between Rotary Way and Splashpoint and at Splashpoint.

3.2.11 Cross-sections for the perpendicular steps can be found on Drawings 415437-MMD-00-XX-DR-C-3301, 3321 and 3351, with plan views (including piling details) provided on Drawings 415437-MMD-00-XX-DR-C-3300, 3320 and 3350, all located in ES Volume 2, Technical Appendix 3.1.

Existing Groynes and Slipway

3.2.12 The existing groynes present would be retained, maintained and enhanced ecologically (see Section 3.3. Concrete access steps would be provided across the southernmost section of each groyne adjacent to the revetment.

3.2.13 The existing slipway at Splashpoint would be retained in its current location.

Fishing Platform

3.2.14 A fishing platform would be constructed in the Splashpoint area to ensure anglers do not block active travel routes (as is currently the case). The platform would be accessed from a

pedestrian only area and extend out over the revetment with supporting steelworks to be pocketed into the raised sea wall structure at this location. Access to the fishing platform walkway would have a galvanised steel chain with signage prohibiting access during dangerous weather conditions. The platform would be provided with edge protection incorporating vertical bars to reduce the risk of children climbing the railings. Railing details are found on Drawing 19.537 – 123 in ES Volume 2, Technical Appendix 3.1.

3.2.15 A cross-section of the proposed fishing platform can be found on Drawing 415437-MMD-00-XX-DR-C-3452, with a plan view provided on 415437-MMD-00-XX-DR-C-3450 and 3451, both located in ES Volume 2, Technical Appendix 3.1.

Promenade Raising

3.2.16 The raising of the Promenade is required to permissible overtopping levels with consideration for climate change.

3.2.17 The new Promenade finished level is to be +7.0mOD directly behind the seawall, with the Promenade slabs typically falling approximately 1:40 towards the seawall to allow over the edge drainage for surface water run-off.

3.2.18 In Area 1 the Promenade is to be raised above the levels of the Promenade highway and associated parking with a side retaining structure located along the rear of the Promenade slabs (the Promenade highway would be maintained at approximately current levels).

3.2.19 In Area 2, the Promenade and highway would both be raised, and the available Promenade would be widened where it narrows between Rotary Way and Splashpoint.

3.2.20 Typical highway sections are shown on Drawing 415437-MMD-00-ZZ-DR-D-0110 in ES Volume 2, Technical Appendix 3.1.

Promenade and Active Travel Improvements

3.2.21 In addition to the coastal works aspects of the Scheme, the current design in summary also includes the following active travel, Promenade and Promenade highway improvements:

Pedestrian and Cycle Path Improvements

3.2.22 Improvements to the alignment and width of pedestrian and cycle paths along the active travel route would form part of the Scheme.

3.2.23 In Area 1 a 6m wide clear shared zone (for pedestrians and cyclists) would be provided for active travel along the northern half of the Promenade adjacent to the revetment. In Area 2 due to Promenade width constraints, the shared zone would be a minimum of 3.2m wide.

3.2.24 From the Porth Eirias boundary in the west to just east of Splash Point (where the parallel parking ends) health markers would be included at approximately 50m intervals from Porth Eirias site boundary. The health markers would follow the same design as previous phases, comprising 3m long granite blocks at with etched artwork as an inset to the in-situ Promenade surface.

3.2.25 To the east of Porth Eirias, the existing cycle parking and cycle shelter would be retained.

3.2.26 At Splashpoint, the Promenade highway level lowers to tie in with existing levels beneath the NWC Railway Line and A55 Expressway bridges with the Promenade level remaining higher. In this area the footpath along the northern kerb of the highway (and in front of the retaining wall at the rear of the Promenade) would be minimum 3m wide to provide a continuous route for

cyclists transitioning between the shared use Promenade and the existing 2m wide National Cycle Route 5 to the east. In this transition zone a potential dismount point would potentially be required, which would be determined through a road safety audit.

3.2.27 In the Splashpoint area, there would be a pedestrian only zone in the vicinity of the fishing platform access and steps/ramp access up to the Promenade.

3.2.28 Proposed kerbs, footways and paved areas are shown on Drawings 415437-MMD-00-ZZ-DR-D-1101 to 1105 in ES Volume 2, Technical Appendix 3.1.

Pedestrian Crossings, Footpaths and Access to Promenade

3.2.29 Four pedestrian crossings of the Promenade highway would be constructed:

- Adjacent to the step & ramp access to Porth Eirias and near access to the picnic and outdoor education area;
- To the west of Rotary Way (at the bottom of the highway western ramp) and near the step / ramp access to the raised Promenade;
- To the east of Rotary Way near the proposed start of highway ground remodelling; and
- At Splashpoint (exact location to depend on visibility and safety around road curve and bridge columns).

3.2.30 Between the final two crossings listed above, the current footpath along the base of the Network Rail Embankment would be removed as it would no longer be required given the provision of a wider high quality Promenade suitable for active travel and grass would be reinstated.

3.2.31 Three main access points would be maintained/installed in Area 1 to provide access from the lower Promenade highway level to the Promenade, located just east of Porth Eirias, adjacent to the access build out and to the east of the access buildout.

3.2.32 To the north of the Rotary Way junction where the Promenade separates from the Promenade highway, the existing pedestrian steps down the retaining wall would be removed given the potential crossing safety issue at this location. Associated changes to layout of footways to either side of Rotary Way would be completed.

Picnic and Outdoor Education Area

3.2.33 The existing low quality picnic area to the south of the Promenade highway to the south-east of Porth Eirias would be improved in terms of utility, landscape and biodiversity (for biodiversity enhancements see Section 3.3). A formal picnic area would be created in a garden setting along with an outdoor classroom feature to the east to enable improved education opportunities. Both would be safely accessible from the Promenade active travel route via a pedestrian crossing.

3.2.34 The outdoor classroom would comprise a circular gravelled area with internal curved benches and outer ring of boulders to double up as informal seating. Soft landscaping throughout the picnic and outdoor education area would include a mixture of bulb, ornamental, tree, hedge, shrub and wildflower planting.

3.2.35 Drawings showing the formal picnic area garden setting (BCA Landscape Drawing 19.537-110) and outdoor classroom area (BCA Landscape Drawing 19.537-111) can be found in ES Volume 2, Technical Appendix 3.1.

Promenade Landscape Improvements

3.2.36 Along its length, the southern half of the Promenade would be classed as an activity zone and flexible open space, with seating and other landscape features including boulders (to act as an informal deterrent to cycling) and intermittent artwork to encourage varied activities.

3.2.37 The use of boulders in landscaping (for decoration, seating, seating edges for example) would be used to link the landscape of the Promenade with the adjacent revetment. The BCA Landscape Drawing 19.537-101-GA02 in ES Volume 2, Technical Appendix 3.1 shows the general arrangement of boulders and indicative details.

3.2.38 The access build out area would include various seating and other landscape features along with interpretation panels fixed to parapet walls (covering historical maritime and coastal defence interventions).

3.2.39 A new allocated activity zone and flexible open space would be provided beyond the retaining wall to the north of Rotary Way.

3.2.40 West of Splashpoint, an existing inset into the NWC Railway Line embankment would be used as a landscape feature inaccessible to public, potentially comprising reclaimed maritime objects set into low robust shrubs.

3.2.41 The artwork strategy for the Promenade is shown on BCA Landscape Drawing 19.537-103-GA04 in ES Volume 2, Technical Appendix 3.1 and would include surface artwork treatment to selected areas, boulder artwork (including selected boulders to be carved for a bas-relief finish depicting mythical sea and land creatures and boulder surface artwork treatment). There would also be wall art on the retaining wall at Rotary Way.

Landscape Planting

3.2.42 Planting would include a groundcover mix, small shrubs, medium shrubs, tree planting, outdoor planting indicative mix and tree planting.

3.2.43 The proposed soft landscaping general arrangement is shown on BCA Landscape Drawing 19.537-104-GA05, with detailed planting plans on Drawings 19.537-210-213, which can all be found in ES Volume 2, Technical Appendix 3.1.

Parking Improvements

3.2.44 Parking spaces would be improved and redistributed with the number of car parking spaces in Area 1 to decrease marginally (to accommodate the disabled parking allowance and electric vehicle charging bays) and a minor increase in Area 2 relating to the widened Promenade:

- In Area 1, four electric charging bays (in close proximity to Porth Eirias and two near the steps/ramp access to the Promenade to the east of the access build-out), 53 echelon standard spaced parking bays and 6 disabled bays would be provided (compared to approximately 73 spaces in total currently); and
- In Area 2, 63 parallel standard spaced parking bays and five disabled parking bays would be provided (compared to approximately 49 bays in total currently).

3.2.45 The short stay parking for access to the public convenience near Porth Eirias would be maintained.

3.2.46 Parking meters would be located at a maximum of 60m intervals.

3.2.47 At Splashpoint, the small parking and turning area currently present is to be retained with four standard spaced parking bays provided).

Highways

3.2.48 Improved highway alignment and width (and associated safety) would be provided for road users between Rotary Way and Splashpoint (within Area 2).

3.2.49 Boundary regrading would be required to reconcile the differences with existing highway levels to the west and east of Area 2 where the raised Promenade would have to tie into existing road levels.

3.2.50 Typical highway sections for both Area 1 and Area 2 are shown on Drawing 415437-MMD-00-ZZ-DR-D-0110. Drainage and service ducts are displayed on Drawings 415437-MMD-00-ZZ-DR-D-0501 to 0505 while road pavement details are shown on Drawing 415437-MMD-00-XX-DR-D-0701 and traffic signs, road markings, lighting column locations and pedestrian guardrails are displayed on Drawing 415437-MMD-00-ZZ-DR-D-1201 to 1205. All drawings can be found in ES Volume 2, Technical Appendix 3.1.

Furniture and Lighting

3.2.51 Furniture would be used as per the supplier for previous phases of the Waterfront Project for consistency. The BCA Landscape Drawing 19.537-102-GA03 shows the details of the furniture and lighting strategy in ES Volume 2, Technical Appendix 3.1.

3.2.52 Seating would include: Reconstituted granite blocks, seating (powder coasted steel frames) and picnic tables, timber benches, outdoor classroom curved and linear seating, litter bins and parking meters.

3.2.53 Railings and handrails would be white Ferrocast (by Marshalls or similar) – with different railing types used in different areas with the main Promenade edge railings being white harbour style (1.5m 3 rail system) and other specific railings for highway area railings, beach access step railings and ramp railings. See BCA Landscape Drawing 19.537-105-GA06 for details in ES Volume 2, Technical Appendix 3.1.

3.2.54 Lighting columns would be 10m high tapered steel columns (LED lit) at 30m spacings. Highway lighting would be mounted at 10m, with pathway lighting mounted at 6m. Other lighting as per the furniture and lighting strategy.

3.2.55 Litter bins would be provided at regular intervals.

Concessions Building

3.2.56 Space for a concession building would be provided in the Promenade active area to the south of the access build out. The exact nature of the building is not yet confirmed but it would be likely to take the form of a kiosk. It would be located adjacent to buildout in an area with seating blocks and vertical features.

3.3 Ecological and Educational Enhancement

Marine Enhancement

3.3.1 The Scheme has been identified as having significant potential for ecological enhancement which has been integrated into Scheme design from the earliest opportunity. The specification

for the marine ecological enhancements has been included in the ES Volume 2, Technical Appendix 3.2.

3.3.2 Two key areas of ecological enhancement have been chosen through discussions between marine biologists and ornithologists as being of optimum value given the locations of bird species and the potential for ecological connectivity. The first is located between Porth Eirias and the access build out and the second to the immediate west of Splashpoint (this area also has the advantage of providing links with improved fish habitat for local anglers). Each of the two areas would include:

- Placement of three clusters of three tidal pools;
- Localised enhancement of approximately 80m of enhanced rock revetment (25-30% enhanced rock) in the lower intertidal revetment area (around 3.6m width). The rock enhancement would comprise adding areas of rock with more complex surfacing to encourage colonisation.

3.3.3 In addition, the following would be completed:

- Enhancement of the three longer groyne structures with the placement of two ecological armouring unit habitats per groyne close to the low tide mark;
- The installation of 'Vertipool' features to retain water on vertical surfaces at lower tidal states at the south walls of the stepped access points and the north face of the ramp at the access build-out; and
- The enhancement of outer wall finishes along the intertidal sections of the perpendicular access steps and outer walls of the access buildout to provide greater complexity and improved potential for colonisation.

3.3.4 Following a plastic survey completed along the beach and the discovery of a range of plastics present, the potential for the education of the public about the dangers of marine plastics pose has been identified. The beach area would be classed (via signage and the appropriate placement of bins) as a single use plastic free zone.

Terrestrial Enhancement

3.3.5 There are two main areas of proposed terrestrial enhancement:

- The picnic and outdoor education area; and
- The Network Rail Embankment.

3.3.6 In the picnic and outdoor education area (within Area 1) the proposed ecological interventions are shown on BCA Landscape Drawing 19.537–200 included in the ES Volume 2, Technical Appendix 3.1. and include bulb planting, ornamental planting, holm oak planting, scots pine planting, planting mixes (native hedge, wildflower, understorey tree/shrub, canopy tree mix, edge shrub and native tree). Loose angular cobbles and a bug hotel would also to be included in this area.

3.3.7 In the Network Rail embankment area (along the length of Area 2) a series of scrapes and sowing of wildflower mixes are proposed at 50m intervals as represented in BCA Landscape Drawing 19.537-201, included in the ES Volume 2, Technical Appendix 3.1. The specification for the terrestrial ecological enhancements has been included in the ES Volume 2, Technical Appendix 3.3.

Educational Enhancement

3.3.8 The ecological enhancement measures would have distinct ecological benefits, however when considered in conjunction with the active travel improvements, Promenade improvements and coastal protection there are also many educational benefits of the Scheme:

- Improved active travel access along the Promenade for local schools – meaning the potential for field trips undertaken on foot without the requirement for vehicular transport (lower costs, lower emissions and health benefits);
- Provision of the outdoor classroom area located at a safe point where the coastal defences can be viewed and set within an area of terrestrial ecological enhancement;
- Potential for school field trips and public access to observe the enhanced features with improved intertidal access via safe perpendicular steps and Equality Act compliant access to the beach, with accessible Vertipool features and visible tide pools, enhanced revetment rock, ecologically enhanced armouring units (e.g. bioblocks) and enhanced walls;
- Potential links with universities to monitor the enhanced features;
- Information from interpretation panels (maritime history, coastal defence information) to educate school groups and the general public;
- Access build out and fishing platform viewpoints for school visits/public observation; and
- Potential for education for school groups and the general public about marine plastics through the creation of the single use plastic-free zone on the Old Colwyn beach area. Potential to use Old Colwyn as a focal point for beach cleans and discussions with anglers in relation to fishing related plastic waste.

3.4 Management and Maintenance

3.4.1 The Scheme also includes future management and maintenance actions.

3.4.2 Consultation with CCBC regarding the ongoing inspection regime within the Colwyn Bay area provided the following response:

3.4.3 "*We carry out two types of inspection NRW T98 and an Annual Maintenance Inspection. The coast is split up into areas and each area is split into lengths...The T98 takes into account a couple of factors and generates a condition grade and a recommended Inspection Interval (so the Inspection Interval will vary for each length and can be adjusted after each inspection). The Annual Maintenance Inspection is a defects inspection (photos and short description).*"

3.4.4 This information is passed onto the relevant team within CCBC to capture maintenance requirements. A copy of the T98 inspection supporting information sheet is provided as ES Volume 2, Technical Appendix 3.4.

3.4.5 Following further consultation with CCBC on the current maintenance of the Porth Eirias build-out, control structure, revetment and slipway, the anticipated future maintenance actions within the Old Colwyn Scheme area are considered to comprise the following:

- Reactive maintenance and repair of revetment, structures, groynes access-build out, steps and fishing platform as identified following routine inspections (this is anticipated to be minimal in the short-medium term);
- Routine maintenance and repair of Promenade including pavement, drainage system, vegetation management of soft landscaped areas including the picnic area and outdoor classroom;

- Cleaning and maintenance of slipways and flood gates (hinges and seals) with a suitable inspection regime;
- Maintenance of landscape features such as benches, guards and handrails; and
- Monitoring of beach levels at the toe of the revetment and along the beach: The revetment design has allowed for a 0.5m fall in beach levels (beach levels have been relatively stable for the past 15 years, see Table 2.6 in Chapter 2 Need for Scheme, Assessment of Alternatives and Basis of Design). Should beach levels be noted to fall more than 0.5m following inspections, localised recycling of beach material would be required. Conversely should accretion be noted of more than 1m, this could be detrimental to accesses or ecological enhancements and some limited beach management may be required.

3.4.6 During the occurrence of particular events (in general spring/highest tides coinciding with onshore winds or storm events) CCBC would monitor conditions as they do currently and potentially close the Promenade when overtopping levels may exceed safe limits for pedestrians/vehicles (the number of these occasions are anticipated to fall significantly following Scheme completion). The process for closing the Promenade follows the methodology provided in current CCBC management arrangements as outlined in Paragraph 2.2.13 in Chapter 2 Need for Scheme, Assessment of Alternatives and Basis of Design.

3.5 Drawings

3.5.1 The following key Drawings are included below:

- Drawing 415437-MMD-00-XX-DR-N-1703 – Designated Sites (Environmental Constraints);
- Drawing 415437-MMD-00-XX-DR-N-1704 – Landscape and Heritage (Environmental Constraints);
- Drawing 415437-MMD-00-XX-DR-N-1705 – Water and Flooding (Environmental Constraints);
- Drawing 415437-MMD-00-XX-DR-N-1706 – Sensitive Receptors (Environmental Constraints);
- Drawings 415437-MMD-00-XX-DR-C-3001 and 3002 - Coastal Defence General Arrangement; and
- Drawing 19.537–100-GA01 - BCA Landscape General Arrangement.

ROYAL FISHING WEIR LWS

COED RHOS FOSSIL WOODLAND LWS

BRYN EURYN SSSI, LNR AND LWS

Liverpool Bay / Bae Lerpwl (Wales) SPA

PWLLYCROCHAN WOODS SSSI, LNR AND LWS

UPPER DINGLE WOODS SSSI, LNR AND LWS

FAIRY GLEN LNR

MYNYDD MARIAN LNR AND LWS

lo-yn-Rhôs Rhôs-on-Sea

Colwyn Bay

Old Colwyn

Tan-y-Lan

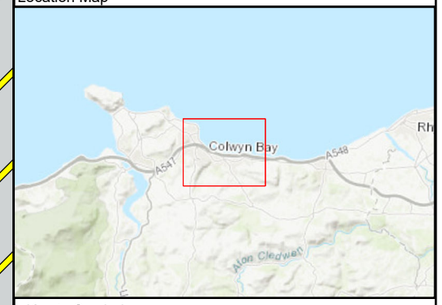
Penmaen Rhôs

Mynydd Maria

Llysfaen

Llanelian-yn-Rhôs

Location Map



Key to Symbols

- Scheme extent
- 500m buffer of scheme extent
- 1km buffer of scheme extent
- 2km buffer of scheme extent
- London to Holyhead Railway
- A55
- Important Bird Area (IBA)
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)
- Ancient Woodland
- Local Wildlife Sites (LWS)

Notes

1. For information only, not for construction.
2. Contains Ordnance Survey data © Crown copyright and database rights 2019 Ordnance Survey. All rights reserved.
3. Contains Natural Resources Wales information © Natural Resources Wales and Database Right. All rights Reserved. Contains Ordnance Survey Data. Ordnance Survey Licence number 100019741. Crown Copyright and Database Right.
4. Data reproduced with the permission of RSPB. © Crown Copyright. Ordnance Survey licence number 100021787 ([Year]).
5. Contains OS data © Crown Copyright and database right 2020 Contains data from OS Zoomstack, Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	23/07/20	MH	For information	NS	CW

MOTT MACDONALD

Mott MacDonald House
5 Woodland Road West
Colwyn Bay
LL29 7DH
T +44 (0)2920 467800
W www.mottmac.com

Client

CONWY CYNGOR BWRDEISTREF SIROL COUNTY BOROUGH COUNCIL

Conwy County Borough Council

Title Old Colwyn Coastal Defence and Active Travel Scheme
Designated Sites Constraints

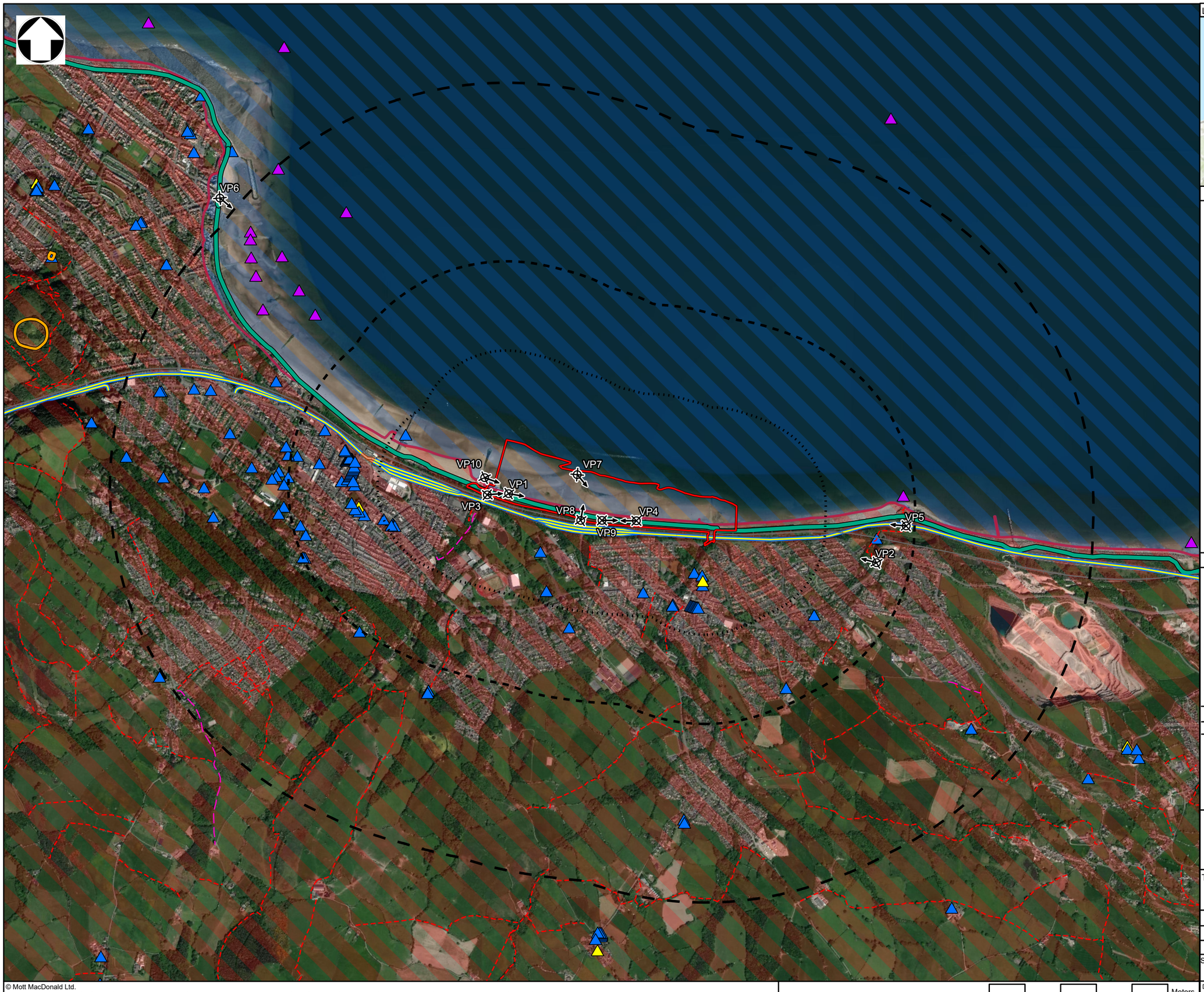
Designed	N Spofforth	NS	Eng. Check	N Spofforth	NS
Drawn	M Hayward	MH	Coordination	N Spofforth	NS
GIS Check	G O'Donovan	GO	Approved	C Williams	CW

Scale at A3	Status	Rev	Security
1:20,000	INF	P1	STD

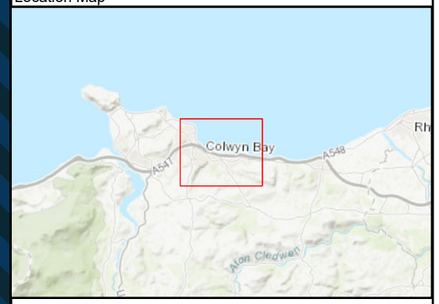
Drawing Number 415437-MMD-00-XX-DR-N-1703

0 200 400 600 800 1000 Meters

C:\Users\ANS90589\Mott MacDonald\410895 - Colwyn Bay Waterfront Phase 2b - GIS\MXD\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620.aprx



Location Map



Key to Symbols

- Red line boundary
- 500m buffer of red line boundary
- 1km buffer of red line boundary
- 2km buffer of red line boundary
- Representative viewpoint location
- North Wales Coast Railway Line
- A55 Expressway
- Public footpath
- Bridleway
- National Cycle Route 5
- Grade II listed building
- Grade II* listed building
- National Monuments for Wales - Marine Heritage Assets
- Scheduled Ancient Monuments
- Marine Character Area
- Landscape Character Area

Notes

1. For information only, not for construction.
2. Contains Ordnance Survey data © Crown copyright and database rights 2019 Ordnance Survey. All rights reserved.
3. Contains PRoW data reproduced by permission of Conwy Council, 5th June 20204. Contains CADW data, Intellectual Property Office © Crown copyright 2019
5. Contains public sector information licensed under the Open Government Licence v3.0
6. Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	23/07/20	MH	For information	NS	CW

Mott MacDonald House
5 Woodland Road West
Colwyn Bay
LL29 7DH
T +44 (0)2920 467800
W www.mottmac.com

Client: Conwy County Borough Council

Title: Old Colwyn Coastal Defence and Active Travel Scheme
Heritage and Landscape Constraints

Designed	N Spofforth	NS	Eng. Check	N Spofforth	NS
Drawn	M Hayward	MH	Coordination	N Spofforth	NS
GIS Check	G O'Donovan	GO	Approved	C Williams	CW

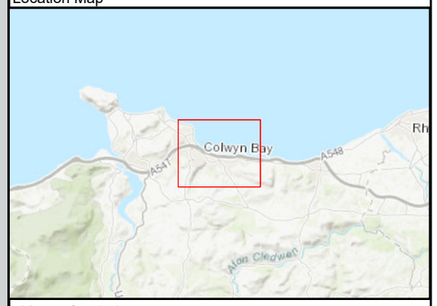
Scale at A3	Status	Rev	Security
1:20,000	INF	P1	STD

Drawing Number: 415437-MMD-00-XX-DR-N-1704

0 200 400 600 800 1000 Meters

C:\Users\ANS90589\Mott MacDonald\410895 - Colwyn Bay Waterfront Phase 2b - GIS\MXD\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620.aprx

Location Map



Key to Symbols

- Red line boundary
- 500m buffer of red line boundary
- 1km buffer of red line boundary
- 2km buffer of red line boundary
- London to Holyhead Railway
- A55
- Existing outfalls
- Bathing Water monitoring point
- Main rivers
- Minor watercourses
- Mean low water mark
- Mean high water mark
- Sensitive areas - Bathing Waters
- Flood zone 3
- Flood zone 2
- Shellfish waters

Notes

1. For information only, not for construction.
2. Contains Ordnance Survey data © Crown copyright and database rights 2019 Ordnance Survey. All rights reserved.
3. Contains Natural Resources Wales information © Natural Resources Wales and Database Right. All rights Reserved. Contains Ordnance Survey Data. Ordnance Survey Licence number 100019741. Crown Copyright and Database Right. Some features of this information are based on digital spatial data licensed from the Centre for Ecology & Hydrology © NERC (CEH). Defra, Met Office and DARD Rivers Agency © Crown copyright. © Cranfield University. © James Hutton Institute. Contains OS data © Crown copyright and database right 2015. Land & Property Services © Crown copyright and database right.
4. Contains OS data © Crown Copyright and database right 2020 Contains data from OS Zoomstack, Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	23/07/20	MH	For information	NS	CW

MOTT MACDONALD

Mott MacDonald House
5 Woodland Road West
Colwyn Bay
LL29 7DH
T +44 (0)2920 467800
W www.mottmac.com

Client

CONWY CYNGOR BWRDEISTREF SIROL COUNTY BOROUGH COUNCIL

Conwy County Borough Council

Title

Old Colwyn Coastal Defence and Active Travel Scheme
Hydrological, Coastal and WFD Constraints

Designed	N Spofforth	NS	Eng. Check	N Spofforth	NS
Drawn	M Hayward	MH	Coordination	N Spofforth	NS
GIS Check	G O'Donovan	GO	Approved	C Williams	CW

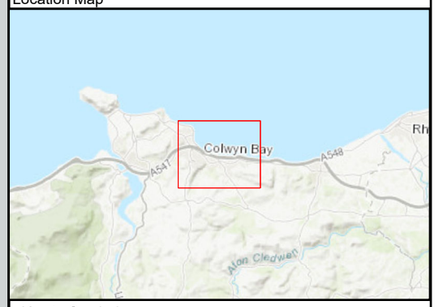
Scale at A3	Status	Rev	Security
1:20,000	INF	P1	STD

Drawing Number
415437-MMD-00-XX-DR-N-1705

0 200 400 600 800 1000 Meters

C:\Users\ANS90589\Mott MacDonald\410895 - Colwyn Bay Waterfront Phase 2b - GIS\MXD\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620.aprx

Location Map



Key to Symbols

- Red line boundary
- 500m buffer of red line boundary
- 1km buffer of red line boundary
- 2km buffer of scheme extent
- A55
- London to Holyhead Railway
- Public toilets
- Pre-school care
- Higher or university education
- Secondary education
- Primary education
- Special needs education
- Medical care accommodation
- Hospital

Environmental noise (road)

Noise Class (dB)

- 55.0-59.9
- 60.0-64.9
- 65.0-69.9
- 70.0-74.9
- >=75.0

Notes

1. For information only, not for construction.
2. Contains Ordnance Survey data © Crown copyright and database rights 2019 Ordnance Survey. All rights reserved.
3. Contains data from © OpenStreetMap contributors
4. Contains Natural Resources Wales information © Natural Resources Wales and Database Right. All rights reserved.
5. Contains OS data © Crown Copyright and database right 2020 Contains data from OS Zoomstack, Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	23/07/20	MH	For information	NS	CW

MOTT MACDONALD

Mott MacDonald House
5 Woodland Road West
Colwyn Bay
LL29 7DH
T +44 (0)2920 467800
W www.mottmac.com

Client

Conwy County Borough Council

Title Old Colwyn Coastal Defence and Active Travel Scheme
Sensitive Receptors

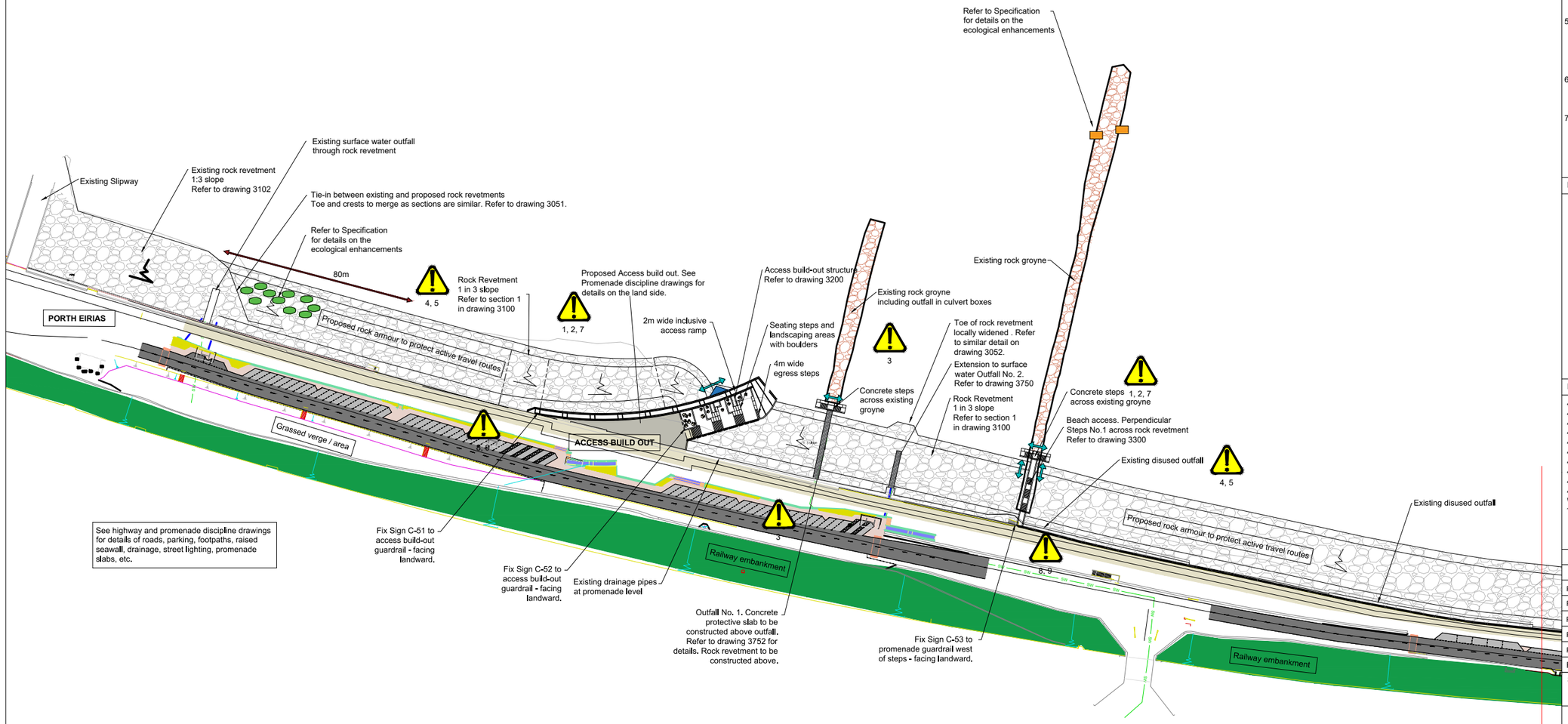
Designed	N Spofforth	NS	Eng. Check	N Spofforth	NS
Drawn	M Hayward	MH	Coordination	N Spofforth	NS
GIS Check	G O'Donovan	GO	Approved	C Williams	CW

Scale at A3	Status	Rev	Security
1:20,000	INF	P1	STD

Drawing Number
415437-MMD-00-XX-DR-N-1706

0 200 400 600 800 1000 Meters

C:\Users\ANS90589\Mott MacDonald\410895 - Colwyn Bay Waterfront Phase 2b - GIS\MXD\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620.aprx



Location Plan - Area 1
1:1000

Safety, Health & Environmental Information

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement.

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following risks and information:

CONSTRUCTION

1 Depth and full extent of existing seawall foundations are unknown. Existing seawall becomes destabilised (DHER Ref. 19 & 23).
2 Unforeseen ground conditions/obstructions prevent sheet piles being driven (DHER Ref. 20).
3 The status (i.e. disused or live) and precise positions of some outfalls are unknown (DHER Ref. 21).
4 Falling from height. Falling objects from promenade (DHER Ref. 22).
5 Working in tidal zone (DHER Ref. 27).
6 Presence of Unexploded ordnances (UXOs). Site area categorised as low risk. (DHER Ref. 30).

OPERATION AND MAINTENANCE

7 Beach levels to be reinstated to existing levels or higher after completion of works. Beach levels shall be monitored at regular intervals including before and after storms and at least once a year in spring (DHER Ref. 4).
8 Marine growth to be removed periodically from pedestrian access surfaces (DHER Ref. 5).

Notes

1. This drawing is to be read in conjunction with all discipline drawings, specifications and standards.
2. Unless otherwise noted (UNO), all dimensions are in millimetres, all levels are in meters above ordnance datum (AOD), and all setting-out points in millimeters to the British National Grid (OSGB36). Do not scale from drawing, if in doubt ask.
3. All relevant setting-out points, dimensions & levels are to be checked by Contractor on-site prior to commencement of the works.
4. The onshore topographical survey was supplied by Survey Operations Ltd in April 2008. The offshore topographical (beach) survey was supplied by Environmental & Engineering Services in 2019. The CCTV survey was supplied by Invek Surveys Ltd in May 2020.
5. Drawings show approximate position of known services. See Site Information for further information. Further unknown services maybe present. Contractor to undertake survey to determine full extent of services present within working area. Results to be forwarded to the Structural Design Engineer 2 week prior to commencement of works, or ordering of materials, whichever occurs first.
6. See 415437-MMD-00-XX-DR-C-2000 series drawings for the proposed promenade works. See 415437-MMD-00-XX-DR-D-0000 to 1399 series drawings for the proposed highway & drainage works.
7. Refer to Appendix 12/1 of the Works Specification for all the sign details.

Key to symbols

- Existing railway enbankment
- Proposed extent of highway
- Group of 5 Vertipools fixed to wall
- Textured outer walls
- Enhancement of rocks
- Rock structures
- Fishing platform
- Outfall extension/ protection
- Tidal pools
- Ecological Armouring unit

Reference drawings

415437-MMD-00-XX-DR-C-3051 - Plan at Porth Eirias End
415437-MMD-00-XX-DR-C-3052 - Plan at Splash Point End
415437-MMD-00-XX-DR-C-3100 - Revetment Cross Sections - Sheet 1 of 3
415437-MMD-00-XX-DR-C-3102 - Revetment Cross Sections - Sheet 3 of 3
415437-MMD-00-XX-DR-C-3200 - Access Build-Out Plan
415437-MMD-00-XX-DR-C-3300 - Perpendicular Steps No.1 Plan
415437-MMD-00-XX-DR-C-3750 - Outfall Extensions and Culvert Cross Sections
415437-MMD-00-XX-DR-C-3752 - Outfall No. 1 Protection Details
415437-MMD-00-XX-DR-C-2000 series - Promenade Works
415437-MMD-00-XX-DR-D-0000 to 1399 series drawings - Highway and Drainage Works
19.537 - 100 Old Colwyn GA Landscape Drawing

Rev	Date	Drawn	Description	Ch'k'd	App'd
P05	17/07/20	AA	Construction Issue for Client Approval	AD	ZH
P04	26/06/20	AA	Construction Issue for Client Approval	AD	ZH
P03	27/04/20	ZD	Tender Issue for Client Comments	AD	ZH
P02	25/03/20	ZD	Second Issue for Internal Comments	AD	ZH
P01	12/03/20	ZD	First Issue for Comments	AD	ZH

Status Stamp

MOTT MACDONALD
Mott MacDonald House
5 Woodland Road West
Colwyn Bay
LL29 7DH
United Kingdom
T +44 (0)1492 534601
F +44 (0)1492 533063
W www.mottmac.com

Client
CONWY
CYNGOR BWRDEISTREF SIROL
COUNTY BOROUGH COUNCIL

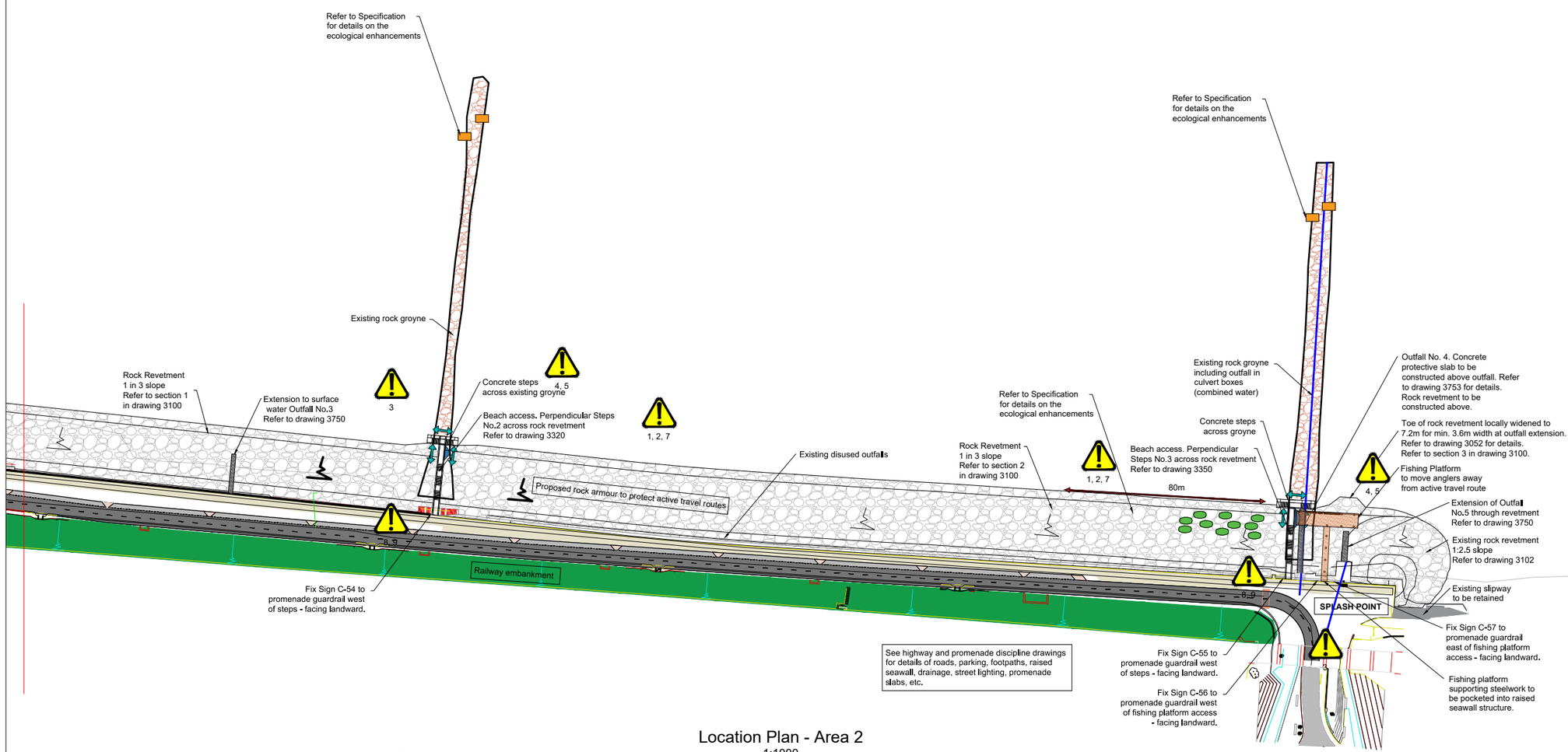
Title
Old Colwyn Promenade Coastal Defence & Active Travel Improvements

General Arrangement Plan - Area 1 Sheet 01 of 02

Designed	P. Kacperek	PK	Eng check	A Douglas	AD
Drawn	A. Al-Abdullah	AA	Coordination	F. Loy	FL
Dwg check	D. Sciuto	DS	Approved	Z. Hutchison	ZH

MMD Project Number	Scale at A1	Security
415437	1:1000	STD
Suitability Description: Issue for Construction Approval		Suit. Code: S4
Drawing Number: 415437-MMD-00-XX-DR-C-3001		Revision: P05

1:1000 0 50m 100m



Location Plan - Area 2
1:1000

0 50m 100m
1:1000

Safety, Health & Environmental Information

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement.

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following risks and information:

CONSTRUCTION

1 Depth and full extent of existing seawall foundations are unknown. Existing seawall becomes destabilised (DHER Ref. 19 & 23).
2 Unforeseen ground conditions/obstructions prevent sheet piles being driven (DHER Ref. 20).
3 The status (i.e. disused or live) and precise positions of some outfalls are unknown (DHER Ref. 21).
4 Falling from height. Falling objects from promenade (DHER Ref. 22).
5 Working in tidal zone (DHER Ref. 27).
6 Presence of Unexploded ordnances (UXOs). Site area categorised as low risk. (DHER Ref. 30).

OPERATION AND MAINTENANCE

7 Beach levels to be reinstated to existing levels or higher after completion of works. Beach levels shall be monitored at regular intervals including before and after storms and at least once a year in spring (DHER Ref. 4).
8 Marine growth to be removed periodically from pedestrian access surfaces (DHER Ref. 5).

C:\Users\loy70749\Mott MacDonald\415437 - Old Colwyn Prom Coastal Defence - Do\Drawings\Coastal\3000 - General Arrangement\415437-MMD-00-XX-DR-C-3001 & 3002 - General Arrangement - P04.2.dwg Jun 26, 2020 - 6:21PM LOY70749

Notes

1. This drawing is to be read in conjunction with all discipline drawings, specifications and standards.
2. Unless otherwise noted (UNO), all dimensions are in millimetres, all levels are in meters above ordnance datum (AOD), and all setting-out points in millimeters to the British National Grid (OSGB36). Do not scale from drawing, if in doubt ask.
3. All relevant setting-out points, dimensions & levels are to be checked by Contractor on-site prior to commencement of the works.
4. The onshore topographical survey was supplied by Survey Operations Ltd in April 2008. The offshore topographical (beach) survey was supplied by Environmental & Engineering Services in 2019. The CCTV survey was supplied by Invek Surveys Ltd in May 2020.
5. Drawings show approximate position of known services. See Site Information for further information. Further unknown services maybe present. Contractor to undertake survey to determine full extent of services present within working area. Results to be forwarded to the Structural Design Engineer 2 week prior to commencement of works, or ordering of materials, whichever occurs first.
6. See 415437-MMD-00-XX-DR-C-2000 series drawings for the proposed promenade works. See 415437-MMD-00-XX-DR-D-0000 to 1399 series drawings for the proposed highway & drainage works.
7. Refer to Appendix 12/1 of the Works Specification for all the sign details.

Key to symbols

- Existing railway enbankment
- Proposed extent of highway
- Group of 5 Vertipools fixed to wall
- Textured outer walls
- Enhancement of rocks
- Rock structures
- Fishing platform
- Outfall extension/ protection
- Tidal pools
- Ecological Armouring unit

Reference drawings

415437-MMD-00-XX-DR-C-3052 - Plan at Splash Point End
415437-MMD-00-XX-DR-C-3100 - Revetment Cross Sections - Sheet 1 of 3
415437-MMD-00-XX-DR-C-3102 - Revetment Cross Sections - Sheet 3 of 3
415437-MMD-00-XX-DR-C-3320 - Perpendicular Steps No. 2 Plan
415437-MMD-00-XX-DR-C-3350 - Perpendicular Steps No. 3 Plan
415437-MMD-00-XX-DR-C-3450 - Fishing Platform Plan
415437-MMD-00-XX-DR-C-3750 - Outfall and Culvert Cross Sections
415437-MMD-00-XX-DR-C-3753 - Outfall No.4 Protection Details
415437-MMD-00-XX-DR-C-2000 series - Promenade Works
415437-MMD-00-XX-DR-D-0000 to 1399 series drawings - Highway and Drainage Works
19.537 - 100 Old Colwyn GA Landscape Drawing

Rev	Date	Drawn	Description	Ch'k'd	App'd
P05	17/07/20	AA	Construction Issue for Client Approval	AD	ZH
P04	26/06/20	AA	Construction Issue for Client Approval	AD	ZH
P03	28/04/20	ZD	Tender Issue for Client Comments	AD	ZH
P02	13/04/20	ZD	Second Issue for Internal Comments	AD	ZH
P01	12/03/20	ZD	First Issue for Comments	AD	ZH

Status Stamp

MOTT MACDONALD
Mott MacDonald House
5 Woodland Road West
Colwyn Bay
LL29 7DH
United Kingdom
T +44 (0)1492 534601
F +44 (0)1492 533063
W www.mottmac.com

Client: CONWY CYNGOR BWRDEISTREF SIROL COUNTY BOROUGH COUNCIL

Title
Old Colwyn Promenade Coastal Defence & Active Travel Improvements General Arrangement Plan - Area 2

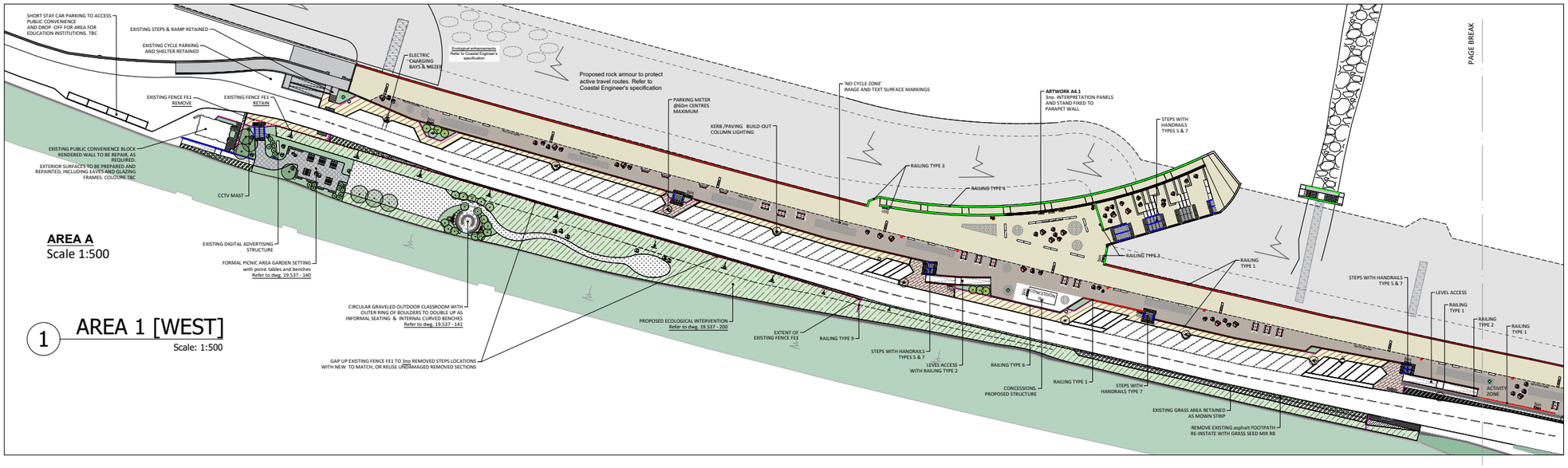
Sheet 02 of 02

Designed	P. Kacperek	PK	Eng check	A. Douglas	AD
Drawn	A. Al-Abdullah	AA	Coordination	F. Loy	FL
Dwg check	D. Sciuto	DS	Approved	Z. Hutchison	ZH

MMD Project Number	Scale at A1	Security
415437	1:1000	STD

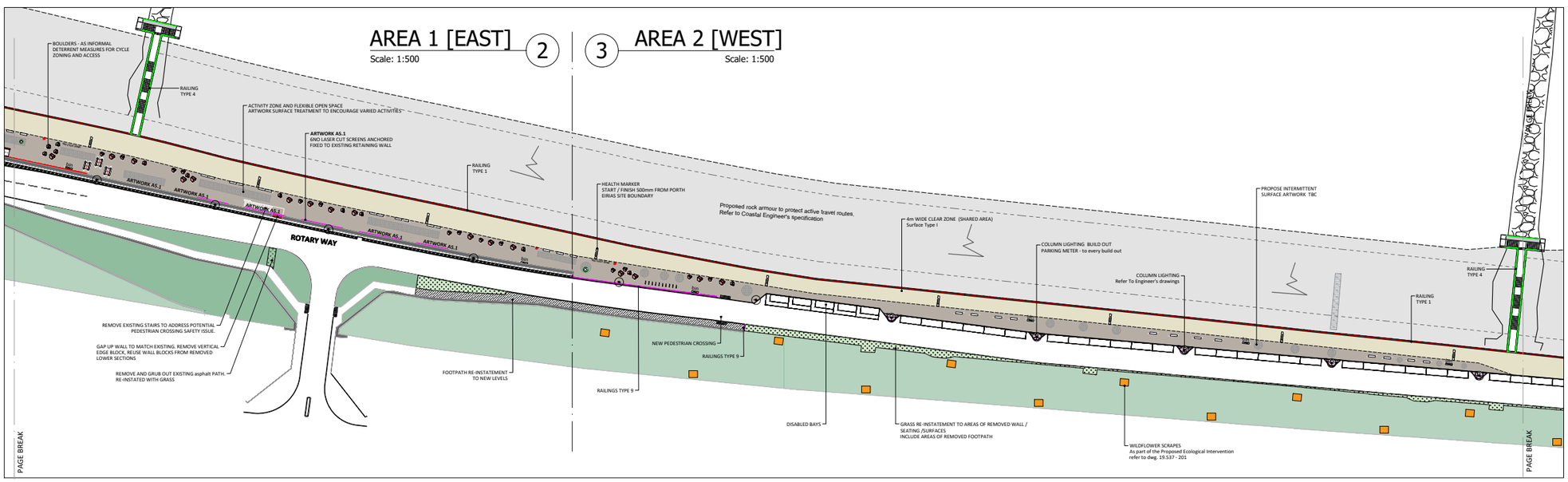
Suitability Description	Suit. Code
Issue for Construction Approval	S4

Drawing Number	Revision
415437-MMD-00-XX-DR-C-3002	P05



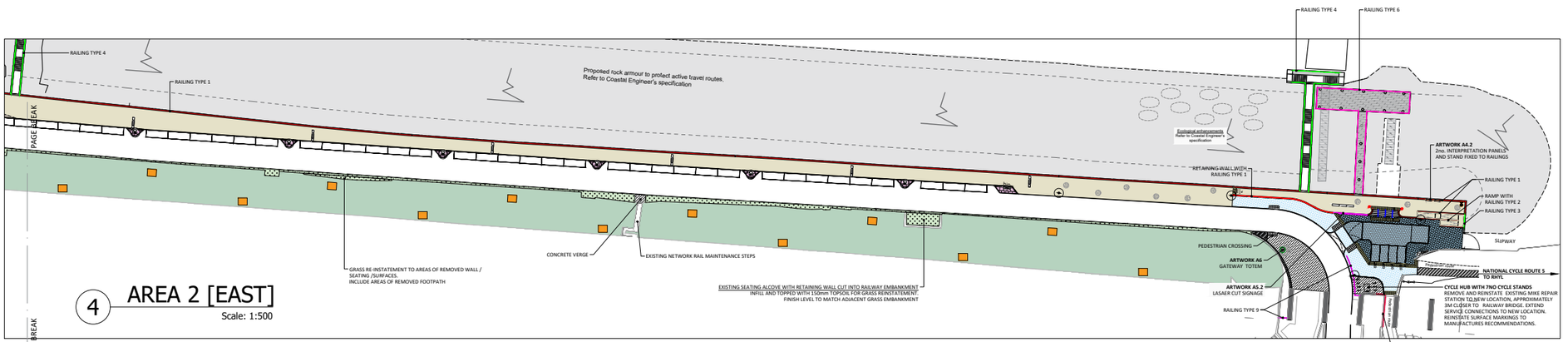
AREA A
Scale 1:500

1 AREA 1 [WEST]
Scale: 1:500



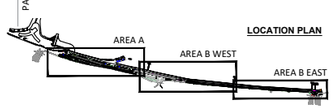
2 AREA 1 [EAST]
Scale: 1:500

3 AREA 2 [WEST]
Scale: 1:500



4 AREA 2 [EAST]
Scale: 1:500

LOCATION PLAN



N

0 10 20 30 40 50 75 100
metre

EDGINGS
ALL HIGHWAY KERBS AND EDGINGS TO MOTT'S SPECIFICATIONS AND DESIGN

PCC granite aggregate edgings

- Type EF1: 145 x 255 Conservation Kerb 100mm upstand
- Type EF2 : 145 x 145 Conservation Centre Stone Flush edging
  Product: Conservation Kerb Edging. Supplier: Marshalls or similar approve
- Type EF5: 50 x 150 pcc flat top pin kerb, flush

Picnic Area Metal Edging:

- Type EF3 Picnic Area only. Product: Pro Edge DP7 150mm high x 2500mm long x 2.5mm thick. Finish: galvanised, slate
- Type EF4 Outdoor Classroom only. Product: Pro Edge BP7 100mm high x 2500mm long x 2.5mm thick. Finish: galvanised, slate

SURFACES
REFER TO MOTT'S SERIES 1100 DRAWINGS FOR FOR BUILD-UP SPECIFICATIONS

UNIT PAVING.
All unit paving to be 'Kellen', to match previous phases. Supplier: Hardscape Ltd

AREA 1

TYPE A 653m²
Flexible construction.
60mm thick
Location: footpath adjacent to parking zone
Sizes flinshes:
General paving : 300 x (300/600): Finish: Wit
Wall trim and banding : 100 x 300; Finish: Rood

TYPE B 153m²
Flexible construction.
Location: pavement build outs at promenade access points
80mm thick, Kellen
Size: 200 x 600
Finishes: Rood, Rood/Zwart, Oranje, Grijs/Rood, Grijs

AREA 2

TYPE C 65m²
Rigid construction.
Location: pavement build outs
Size: 200 x 600
Finish: Wit

SPLASH POINT

TYPE D1 143m²
Rigid construction.
Pedestrian Area: laid as stretched bond;
Size: 200 x 600
Finishes: Grijs/rood: Grijs/

TYPE D2 212m²
Rigid construction.
Cycle track: laid as stretched bond;
Size: 200 x 600
Finish: Grijs

TYPE D3 167m²
Rigid construction.
Vehicle zone: laid as herringbone;
Size: 200 x 600
Finishes: As per Pedestrian Zone

PICNIC AREA

TYPE E 176m²
Flexible construction.
Size: 150 x 150 x 80mm thick
Finish: grijs/rood, grijs & wit.

OUTDOOR CLASSROOM

TYPE F 41m²
LOOSE AGGREGATE
500 x 500mm interlocking format Suregreen RP50 plastic cell blocks on 35mm 10-20 free draining, sharp angular 10-20mm Welsh Brown gravel on 100mm Type 3 sub base.
Edging Type EF3

ASPHALT

TYPE G 401m²
FOOTPATH RE-INSTATEMENT
Dense asphalt concrete surface course on 50mm AC20 dense asphalt concrete binder course on 200mm Type 1 sub-base.

TYPE H 38m²
ASPHALT SURFACE COURSE RE-INSTATEMENT
Remove existing surface course, re-instate with dense asphalt concrete surface course as part of adjacent new bitmac surface works to avoid patchwork surface finishes

NOTE:
Carriageway asphalt surfaces and road markings to be as per Highway Engineer's Series 700 drawings and specification

PROMENADE IN-SITU CONCRETE. TO MOTT'S SPECIFICATIONS AND DESIGN

TYPE I
Proposed in-situ concrete slab. Citrus finish
PROMENADE 1 - Clear Zone 3468m²
ACCESS BUILD OUT BEACH ACCESS 549m²

TYPE J 3807m²
PROMENADE 2
Proposed in-situ concrete slab. Smoke grey finish.

CONCRETE VERGES

TYPE K 66m²
Concrete verge
100mm thick fibre reinforced air entrained PAV2 concrete to BS 8500 on 150mm Type 1 sub-base. Saw cut contraction joints at 4.4m spacing. Depth of contraction joints to be approx. 35mm and sealed with Nitoseal 12 or similar approved. Brushed finish to match Phase 2 finish.

TYPE L 135m²
Concrete verge
Hard verge with deterrent paving to match existing. 25mm sand bedding on 220mm Type 1 sub-base. 2-5mm flexible sand joints.

HAZARD PAVING

TYPE M PEDESTRIAN CROSSING
50mm thick, 450 x 450 thick buff colour 'Blister' paving, Where the back edge is not parallel to the kerb, and as a result the depth of the tactile surface varies, it should be no less than 800mm at any point

TYPE N TOP AND BOTTOM OF STEPS; END OF SHARED SURFACE AREA
50mm thick, 400 x 400 'corduroy' paving
Colours - ensure contrast with adjacent surface:
- 'charcoal' finish to Splash Point
- 'buff' finish to all other locations

TOP AND BOTTOM OF ACCESS BUILD OUT STEP RUNS
800mm wide 'corduroy' markings to Maritime Engineer's detail

EDGE RESTRAINTS AND HANDRAILS

REFER TO DRAWINGS:
19.537 - 106 FOR TYPES AND LOCATIONS; 19.537 - 123 INDICATIVE DETAILS

PROPOSED FERROCAST HARBOUR STYLE POST AND RAIL SYSTEMS BY MARSHALLS OEA
50mm Ø horizontal rails, surface fixed as standard. Post & rail system to resist class 3 loading to BS 7818. Base plate & holding down bolt arrangement to withstand loading requirements for class 3 post & rail pedestrian restraint system as detailed in table 2 of BS 7818-1995. Supplier /fabricator to provide final construction detail drawings package and components schedule including post and rail variations to suit different applications.

- **TYPE 1** To Promenade Edge — 3-rail system. Top rail @1.15m high
- **TYPE 2** Ramps (excluding beach access ramps) — 3-rail system. Top rail @ 1.15m high above ramp pitch. Post with 'swivel' sockets for diagonal rail fixing. 50mm Ø DDA handrail bracket fixed to post 750mm above surface pitch. Hockey stick end to handrails. Post fixed atop 100mm upstand.
- **TYPE 3** To 500mm high parapet walls. — 2-rail system. Top rail @ 605mm high above parapet wall. Post and rail arrangement varies depending on transition with other edge restraint elements
- **TYPE 4** To 500mm high parapet wall ramp and steps — 2-rail system. Top rail @ 605mm high above parapet wall. Swivel post to sloped wall and rail arrangement varies depending on location e.g. beach access ramps and steps
- **TYPE 5** Free Standing Handrails to Wide Steps — 2- rail system. Top rail @ 1000mm and second rail @ 600mm above step pitch. End handrails to return connecting post fixing holes
- **TYPE 6** Wall mounted handrails — 50mm Ø handrail 1000mm above steps pitch. Saddle bracket fixed to wall. Hockey stick end handrails
- **TYPE 7** To Concessions Area & Fishing Platform — 2- rail system with vertical rail panel infill. Top rail @ 1.15m high above surface level. 50mm Ø horizontal rails to have flat section for welding vertical bars to. Panel infill consist of 954mm high 20mm Ø vertical rails @ 115mm centres. Overall post height for Fishing Platform dependent on fixing details to platform structure. Engineer to confirm with fabricator

PICNIC AREA

- **TYPE 8** Stainless steel post and rail — 1000mm overall height, 50mm Ø post, handrail and intermediate handrail Steps : Root fixed (soft areas) and base plate surface fixed (hardstanding). Ramp: Surface fixed to ramp upstand (100mm)

EXISTING FENCE

- FE1 Frame and mesh fence to bottom of picnic area grass bank. RETAIN. Remove section along new step access to picnic area Gap up at removed steps locations

NEW FENCE

- **TYPE 9** Protective barrier adjacent to selected pedestrian crossings and pedestrian access restriction at Splash Point. Product: V4 Optirail. Supplier: Alpharail OEA; Height: 1050 Support Posts: 50 x 50 x 3 mm SHS and 50 x 10 RSF @ 2m centres 2m long panel. Concrete root fixed posts Finish: Polyester powder coated; RAL colour TBC
- FE2 Protective barrier to Splash Point storm drain (RETAIN)

LIGHTING
Refer to Highway Engineers drawings and specification

- **Light columns** Twin 'Kinium' LED luminaire
- **Light Beacon** 4m high cylindrical luminaire

STREET FURNITURE
Refer to dwg. 19.537 - 102 Furniture

- **SEATING - GENERAL**
- **PICNIC SETS**
- **TOURIST TELESCOPE** Product: HDC DFNT4 Dual Head, Wheelchair Accessible Non-coin Operated Telescope X20 Magnification Supplier: HDC International OEA
- **LITTER BINS** ML/B446 Large capacity Quad Recycling Bin Size: 872 (h) x 1952 (l) x 472 (w) Supplier: Wybone
- **SHEFFIELD FERROCAST CYCLE STANDS** Supplier : Marshalls OEA Dimensions: 50mm diameter x 950mm long x 770mm high Root Fixed
- **WOLVERHAMPTON FERROCAST BOLLARD** Supplier : Marshalls OEA Dimensions: 1000mm high; Domed top Root Fixed
- **FLOOD GATE TO REPLACE EXISTING** Location: Splash Point slipway To Engineer's detail
- **BIKE REPAIR STATION WITH INTEGRATED PUMP** Supplier: Turvec Solutions Ltd Dimensions: 440mm (w) x 300mm (d) x x1440mm (h) Finish: Powder Coated ; RAL colour TBC Fixing: Surface mounted on baseplate

ACTIVE TRAVEL NORTH WALES BOULDERS
Refer to dwg. 19.537 - 101 GA 02

For fixing details:
19.537 - 126 for landscape boulder detail
2000 series for Promenade boulder detail
3000 series for Access Build Out boulder detail

ARTWORK
Refer to dwg. 19.537 - 104 Artwork Strategy

A1 ACTIVE TRAVEL HEALTH MARKER
as per previous phases
3m long granite blocks @ 50m intervals, with etched / inset artwork, and as inset to in-situ promenade surface. Each marker is made up of 3no. 1m long x 500mm wide x 100mm deep blocks.

A2 ACTIVE TRAVEL SURFACE ARTWORK
Surface artwork treatment to selected areas.
Product : Decomark - preformed thermoplastic sheets; applied to promenade concrete surfaces
Artwork design to be confirmed following further consultations
Assume artwork area as 477m²

A3 ACTIVE TRAVEL NORTH WALES BOULDERS
Artwork to selected boulders only @ 20% of overall boulder quantity
A3.1 Artwork consist of geological classification; geographical identification; composition; process; timeline; origin etc. Artwork letters to be of either carved, insets, different finish.
A3.2 Carved boulders as a sunken and bas relief. E.g. mythical creatures

A4 INTERPRETATION PANELS AND STAND
1.6m length x 0.9m high
Quantity: 5no
1. 3no fixed to parapet Access Build Out parapet wall
2. 2no fixed to Harbour Style railings by Splash Point
Supplier: Photocast Ltd. OEA

A5 LASER CUT PANEL
Powder coated steel. Resin anchored to new/existing walls. LED strip back lighting
1. Active Area existing retaining wall
   4no 12m long x 1.5m high
   2no 9m long x 1.5m high
2. Splash Point rear retaining wall including bespoke edge restraint details
   1no 10m long (approx.) x 1.150m high

A6 GATEWAY TOTEM
PROVISIONAL SUM
To be designed

SOFT LANDSCAPE

Refer to dwg. 19.537 -
104 Soft Landscape Strategy
121 Planting Bed Details
122 Tree Planting Details

GROUNDCOVER PLANTING
Area 1 75m²
Picnic Area 193m²
Outdoor Classroom 57m²

Plant specification:
General planting: 2 -3 Lt pots @ 5no/m² average density
Specimen plants : 5-7lt pots @ 2no/m² average density;
landscape membrane topped with 75mm deep loose gravel (50mm depth bark mulch for picnic area only).
400mm depth topsoil for shrub planting.
Plant species to be predominantly low maintenance small shrubs, with selected areas of grass and herbaceous mixes.

TREE /SHRUB PLANTING

Picnic Area & Outdoor Classroom Trees
Mix deciduous and evergreen species; various sizes

Promenade edge small tree/shrub planting

ECOLOGICALLY RICH HABITAT CREATION

AREA 1 INTERVENTION
Refer to dwg. 19.537 - 200 for full planting mix and specification
ECOLOGICAL PLANT MIXES
Picnic Area & Grass verge

AREA 2 INTERVENTION
Refer to dwg. 19.537 - 201 for full planting mix and specification
WILDFLOWER SEED MIX
Rotary Way to Splash Point Railway Embankment
24no- 2x 2.6m scrapes
Locations to be determined on site

BULB PLANTING 55m²
To selected locations of existing and and re-instated grass areas
Planting density: 30no/m² average between species

GRASS RE-INSTATEMENT 688m²
To gap-up removed wall sections, footpath, and to re-graded areas. Re-instate with removed grass from immediate site. Removed grass to including 50mm soil depth

MOWN GRASS
Existing lawn area to be retained

REMOVAL OF EXISTING TURF FOR RE-USE
Works to be in accordance with BS 3969

NOTE:
This drawing is to be read in conjunction with all relevant discipline drawings, specifications and standards.

Client	MottMacDonald	**Scale** 1:500 @ A0	**Created by** HR	**Last edited by** RAZAK.H	**Date** 24 July 2020
Job title	Old Colwyn Promenade Coastal Defence And Active Travel Improvements	**Project number** 19.537	**Drawing number** 100	**Issue** C 01	**Checked** TH
Drawing title	General Arrangement				

CONSTRUCTION

BCA Landscape

33 OLD HALL STREET
LIVERPOOL
L3 9JQ
TELEPHONE +44 (0)151 242 0 241
FACSIMILE +44 (0)151 236 4467
e-MAIL mail@bcalandscape.co.uk
WEB SITE www.bcalandscape.co.uk

Revision	Description	By	On
C 1	Construction Issue	HR	16/07/2020

3.6 List of Documents Included in ES Volume 2: Technical Appendix 3

- Appendix 3.1: Drawings:
  - Drawing 415437-MMD-00-XX-DR-C-3100 – Typical Revetment Cross-Sections;
  - Drawing 415437-MMD-00-XX-DR-C-3102 – Rock Revetment at Scheme Ends;
  - Drawing 415437-MMD-00-XX-DR-C-3052 – Coastal Works within the Splashpoint Area;
  - Drawings 415437-MMD-00-XX-DR-C-3750 to 3753 – Outfall and Culvert Cross-sections;
  - Drawing 415437-MMD-00-XX-DR-C-3751 – Outfall and Culvert Typical Sections;
  - Drawing 415437-MMD-00-XX-DR-C-3001 and 3200 – Access Build-out Plans;
  - Drawing 415437-MMD-00-XX-DR-C-3201 – Access Build out Piling Plan and 3D View;
  - Drawings 415437-MMD-00-XX-DR-C-3250 to 3252 – Access Build out Cross-Sections;
  - Drawing 415437-MMD-00-XX-DR-C-3301, 3321 and 3351 – Perpendicular Steps Cross-Sections;
  - Drawing 415437-MMD-00-XX-DR-C-3300,3320 and 335 and 3350 – Perpendicular Steps Plan View (including piling details);
  - Drawing 415437-MMD-00-XX-DR-C-3452 – Proposed Fishing Platform Cross-Section;
  - Drawing 415437-MMD-00-XX-DR-C-3450 and 3451 – Proposed Fishing Platform Plan View;
  - Drawing 415437-MMD-00-ZZ-DR-D-0110 – Typical Highway Sections;
  - Drawings 415437-MMD-00-ZZ-DR-D-1101 to 1105 – Kerbs, Footways and Paved Areas;
  - Drawing 19.537-110 – BCA Landscape Detailed Area 1 – Picnic Area;
  - Drawing 19.537- 11 – BCA Landscape Detailed Area 2 – Outdoor Classroom;
  - Drawing 19.537-101-GA02 – BCA Landscape General Arrangement of Boulders and Indicative Details;
  - Drawing 19.537-103-GA04 – BCA Landscape Artwork General Arrangement;
  - Drawing 19.537-104-GA05 – BCA Landscape Soft Landscape General Arrangement;
  - Drawings 19.537-210-212 – BCA Landscape Detailed Planting Plans;
  - Drawing 19.537-105-GA06 – BCA Landscape Edge Restraints and Handrails General Arrangement;
  - Drawing 19.537-102-GA03 – BCA Landscape Furniture General Arrangement;
  - Drawings 415437-MMD-00-ZZ-DR-D-0501 to 0505 – Drainage and Service Ducts;
  - Drawing 415437-MMD-00-XX-DR-D-0701 – Road Pavement Details;
  - 415437-MMD-00-ZZ-DR-D-1201 to 1205 – Traffic Signs, Road Markings, Lighting Columns and Pedestrian Guardrails;
  - Drawing 19.537-200 – BCA Landscape Area A Proposed Ecological Interventions; and
  - Drawing 19.537-201 – BCA Landscape Area B Proposed Ecological Interventions.
- Appendix 3.2: Marine Ecological Enhancement Specification;
- Appendix 3.3: Terrestrial Ecological Enhancement Specification; and
- Appendix 3.4: NRW T98 Coastal Inspection Information Sheet.

4 Scheme Construction

4.1 Assumptions

4.1.1 The information in this chapter has been collated through discussions with the Applicant, examining information from previous Phases of the Colwyn Bay Waterfront Project and some limited Early Contractor Engagement. The below is a preliminary outline methodology and is subject to amendment, consent and construction stage contractor methodology and risk assessments.

Programme

4.1.2 CCBC are currently seeking funding for these critical works. There are a number of stakeholders and the amount of funding required is considerable, therefore it is not possible at this time to predict when the works may go ahead. However, the following programme assumptions have been made for ES purposes:

- Detailed design of the Project would be complete in Summer 2020;
- Finance is available to enable a Spring 2021 start;
- Planning is granted prior to tender action; and
- The Project is delivered as one Scheme.

Phasing

4.1.3 Dependant on funding and the procurement strategy for materials the Scheme may be delivered as one contract or in phases – previous sections of Promenade improvements were delivered in phases over several years.

4.1.4 The overall timings in this Chapter reflect what is considered to be the most likely phasing split between the east and west of the Scheme centred on Rotary Way.

4.1.5 The current proposal is for rock armour to be imported and the rock revetment constructed from Splashpoint in the east to Porth Eirias in the west, starting with the most vulnerable section. The rock armour would need to be imported and placed prior to any work being undertaken on the Promenade.

Miscellaneous

4.1.6 Other assumptions comprise:

- All design would be complete prior to construction commencement;
- All land would be acquired/leases negotiated and available for permanent works and compound areas; and
- Major utilities would be diverted/relocated where required.

4.2 Construction Overview

4.2.1 The main construction activities to be completed are summarised as follows:

- The construction of a rock revetment along the entire length of the Scheme;

- Temporary traffic management on the Promenade in order to safely construct the works including temporary restrictions such as road closures, reduced lane widths and speed limits, along with traffic signal controls and public rights of way (PROW) diversions;
- The elevation of the pedestrian Promenade for the entire length of the Scheme. The highway between Rotary Way and Splash Point would also be raised to match the new Promenade. Earthworks would be required to construct the embankment required for the designed highway alignment, as well as drainage, structures and landscaping works;
- Drainage systems would be constructed to accommodate highway drainage and run off from adjacent land. This drainage would, where practicable, be used to manage temporary flows during construction;
- A number of new structures would be constructed, including outfall extensions, ramps, steps, fishing platforms and retaining walls These works would require a combination of local earthworks and drainage, foundation construction, including piling and structural concrete and steelwork; and
- As revetment, earthworks, drainage and structures elements are completed, construction of the new and improved sections of highway would be carried out. This would include the carriageway construction, traffic signs, road markings and street lighting.

4.3 Key Dates and Phasing

Key Dates

4.3.1 Table 4.1 shows the summary of anticipated key dates on the outline construction programme (subject to the assumptions in Sections 4.1.2 to 4.1.6).

Table 4.1: Milestones

Milestone	Key Date
Stage 1: Pre-Qualification	November 2020 (date subject to award of funding)
Stage 2: Restricted Tender	January 2020 (or two months from Stage 1)
Award and Access Date	April 2021 (or three months form Stage 2)
Construction Completion	December 2022 (or 20 months from award and access date)

Source: As agreed with CCBC.

Phasing

4.3.1 The Project has been divided into the two general sections for the purposes of planning and sequencing the works as follows:

- Construction Section 1: Splash Point to Rotary Way (Area 2); and
- Construction Section 2: Rotary Way to Porth Eirias (Area 1 and the westernmost section of Area 2).

4.3.2 It has been assumed that the start date for the main works package would be April 2021, commencing with a short period of mobilisation and development of the health and safety plan and other relevant documents.

Construction Section 1

4.3.3 A ten month construction period is anticipated, commencing April 2021 and extending to January 2021.

Construction Section 2

4.3.4 A ten month construction period is anticipated commencing February 2022 and extending to December 2022.

4.3.5 Note: If Section 1 and 2 are to be completed under separate contracts, additional time would be required for a second mobilisation for Section 2.

General Phasing of Activities

4.3.6 In both Sections, the initial activity would comprise the delivery and placement of the rock revetment and general site clearance of the Promenade. Construction of the coastal defence elements would be completed before the Promenade construction works commence.

Marine Works

4.3.7 The marine works consist of a rock revetment, drainage outfalls, fishing platform and access steps of various configurations (the crest wall would form part of the highway works and support the end of the fishing platform). Key buildability information is summarised below:

- Existing revetment rock present against the sea wall would be examined and if suitable, it would be removed and stockpiled on the beach. Piling activities would take place first (tubular steel piles driven into the underlying clay for the fishing platform and sheet piles for the access steps and access build-out structure) followed by the construction of the revetment;
- Core material would most likely be delivered by road. Rock armour would be delivered either by sea or by road, and stockpiled on the beach for use.;
- Core material would be placed against the wall to form the required profile. At outfalls, the pipes or culverts would be placed within the core. Pipes and culverts would be delivered by road and placed from the Promenade by crane. The toe of the revetment would be excavated into the beach.
- The geotextile separation layer would then be placed over the core (delivered by road and transferred to the beach by crane from the Promenade). Although large scale movements of the geotextile along the beach would be by front loader it would be necessary for operatives to work on the core to correctly position the material;
- The layers of rock armour would be placed by front loader and coordination with the crest wall construction would be required. The underlayer would need to be to be complete before the crest wall is constructed. In order to protect the underlayer the front face of the primary armour would be constructed as soon as possible. The primary armour would not be placed on the crest of the revetment until the crest wall has been constructed;
- The construction of the outfall culverts through the armour layers would be coordinated with the rock armour placing. It is possible to place the culverts using the front loader used for the rock armour placing as they weigh less than the primary armour;
- The site is readily accessible from the A55 Expressway. The top of the wall is accessible along the Promenade for road transportable equipment. There is a weight limit on the Promenade and the existing wall would need to be assessed for construction loads; and
- There are slipways at both ends of the site giving access to the beach for equipment. Both slipways would be managed to maintain emergency use throughout the works. The beach is generally a medium density sand that can be traversed by tracked vehicles. There is potential for soft areas that would have to be assessed during the works. Use of ‘bog mats’ may be required to provide access. Due to environmental constraints the access for the works along the beach would be minimised.

Promenade Works

4.3.8 To provide improved costal protection the Promenade crest height would be raised. The existing sea walls would be raised by constructing new reinforced concrete (RC) sea walls on top of the existing, therefore reusing the existing structures as much as possible and reducing associated structural disturbance.

4.3.9 The new RC structures along the Promenade seaward edge would not be constructed nor the Promenade raised until the new rock revetment is constructed to the existing Promenade level. To provide restraint to the existing sea wall, the lower section of existing sea wall would be embedded by fill material and the rock armour would be constructed to rest against the sea wall (as discussed in Paragraph 4.3.7). In the western section, the existing recurved sea wall upstand would remain in place and a mass gravity reinforced concrete stepped wall would be constructed on top. Along the majority of the remaining seaward edge the existing sea wall coping would be locally removed, and a new reinforced concrete balanced cantilevered wall would be built on top.

4.3.10 Possible localised existing voids in the highway and Promenade would be remediated (by excavating voids and backfilling with compacted granular fill). Along the lower western highway section and Splashpoint, new drainage pipes, kerbing, services ducts, street lighting / sign foundations and back of Promenade retaining wall foundations which are lower than the new finished floor level would be installed.

4.3.11 Elsewhere where the Promenade / Promenade highway would be raised, and the existing surfacing would be perforated for drainage by core drilling on a local grid (so the existing highway can typically remain in-situ). Suitable compacted granular fill in accordance with the specification of highway works (ideally from recycled suitable materials) would be installed in layers. During this process new drainage pipes, services ducts, kerbing, street lighting and sign foundations would be constructed. After the Promenade and highway is raised the new Promenade slabs, highway sub-base and asphalt pavement and footway paving would be installed.

4.3.12 Once the heavy civil engineering works are complete, the street furniture, signs, artwork features, lighting, landscaping, road markings etc would be installed.

4.4 Minimisation of Disruption Due to Construction

Construction Strategy to Minimise Disruption

4.4.1 Construction of the Scheme would cause a degree of disruption to the local environment, local people and to users of the local highway network. Such disruption is unavoidable, although measures would be implemented to minimise the adverse effects. The most significant effects are likely to be temporary traffic diversions and increased noise and vibration associated with the works on site. In addition, there would be disruption to non-motorised users where there would be a need for restrictions.

4.4.2 Mitigation measures would be recorded in the CEMP. Task specific mitigation measures would also be included in RAMS to be developed before related works commence.

4.4.3 The Contractor would be required to register for the Considerate Constructors Scheme on this Project. Once registered, the contractor would follow the Site Code of Considerate Practice.

Waste Minimisation and Management

4.4.4 The CEMP would outline the way in which waste would be minimised and managed throughout the construction of the works. This would include waste generated through works activities and also waste generated by the associated office and welfare facilities.

4.4.5 A Site Waste Management Plan (SWMP) forms part of the CEMP and would be developed by the Contractor for the Scheme to ensure that all waste is handled efficiently and managed appropriately.

Noise and Vibration from Construction Activities

4.4.6 Where appropriate and practical, noise and vibration from construction activities have been assessed in the ES.

4.4.7 The Environmental Health Officer (EHO) of CCBC would be consulted on the noise and vibration limits to be included within the CEMP. Where necessary, noise and vibration monitoring at key receptors would be agreed with the EHO to ensure compliance with the limits set.

4.4.8 Where activities are anticipated that may generate a significant impact, construction methodologies would be developed to minimise this nuisance. Where specific activities remain where there are no reasonable alternatives methods, detailed proposals would be discussed with the relevant EHO and public liaison would be carried out.

4.4.9 BS 5228 (part 1 and 2) provides guidance on best practice to minimise noise and vibration impacts during construction. It also advises on proactive measures that can be taken in terms of liaising with residents. The following mitigation measures would be employed on site to ensure that noise and vibration levels are attenuated as far as possible and would be considered in preparing the CEMP:

- The use of ‘best practicable means’ during all construction activities, as contained in BS 5228;
- Switching off plant and equipment when it is not in use for longer periods of time;
- Establishing agreement with the local authority on appropriate controls for undertaking significantly noisy works or vibration-causing operations close to receptors;
- Programming works so that the requirement for working outside normal working hours is minimised;
- Use of low noise emission plant where possible;
- Appropriate selection of piling methodologies;
- The use of temporary noise screens around particularly noisy activities; and
- Regular plant maintenance.

4.5 Construction Traffic

General Routing – Materials and Plant Deliveries

4.5.1 Delivery of materials and plant would be via road delivery, exiting the A55 Expressway at the immediately adjacent Junction 22. This route does not pass any properties or other sensitive receptors and avoids the requirement for construction traffic through the streets of Colwyn Bay and Old Colwyn.

Rock Revetment Deliveries

Delivery by Road

4.5.2 The rock armour for the revetment would consist of quarried boulders, in part by reusing the existing toe revetment materials where suitable (with the exception of Splashpoint) with the remained sourced from local quarries if possible. Delivery of materials would then be via road delivery as above, exiting the A55 Expressway at Junction 22. Storage of the revetment would then be either on the upper beach directly seaward of where it is needed (this would provide additional protection to the sea wall during the construction works) or on the Promenade (should tides not permit beach access on delivery) awaiting transfer to the beach.

Delivery by Barge

4.5.3 Depending on funding and timing constraints, if rock (particularly the 3t to 6t size) cannot be sourced from local quarries in sufficient quantities, bringing in some (or all) quarried rock from elsewhere (considered likely to be Norway) by barge for direct delivery to the beach would be necessary. Rock armour deliveries would be stockpiled on the beach, immediately seaward from where they are to be placed within the revetment.

4.5.4 For this method of delivery, the delivery barge would be guided to shore by a tug at a designated (and rising) tidal state when access to the upper shore area is possible. The rock armour would be unloaded directly to shallow water on the beach. The window for this operation would be relatively small (considered likely to be limited to 2 hours either side of high tide only). Land based plant would then move the unloaded revetment boulders to the designated stockpile locations along the beach.

Transhipment

4.5.5 If barge delivery is deemed to be necessary and the rocks are to be transported on larger delivery vessels and then transferred onto smaller barges (guided into place by a tug) with lower drafts in order to access the intertidal area, a Transhipment Plan would be produced by the contractor in agreement with CCBC, NRW, ecologists and other local stakeholder (e.g. local fishermen, water sports clubs etc). This would depend on the draft of the vessels being proposed by the contractor.

4.5.6 The Transhipment Plan would need to include how the rocks are going to be safely transferred from one vessel to the other, tolerances for each vessel in terms of movement, how the rocks would be stopped from falling into the sea and how they would log a fallen overboard rock. The transfer of rocks from the vessels to the beach would need to be monitored appropriately in terms of noise and vibration and a Section 61 agreed.

4.5.7 Rock deliveries by barge would also be likely to need 24/7 working patterns to allow the contractor to use the tides – if not this could be a higher cost to the Scheme relating to the very high costs associated with barge standing time. Stakeholder engagement with the local residents and businesses would be required to ensure they were aware of when the rock unloading is going to be taking place for example newsletters, website information and a stakeholder phoneline.

4.5.8 Barge works are very weather dependant and safe mooring locations inshore would be required in case of bad weather. These would be agreed before construction commenced.

4.5.9 Given the high costs of delays and standing time for barge deliveries combined with health and safety issues, delivery of materials by barge if transhipment is needed is not considered to be suitable for the winter months when the risk of storms is much higher.

Construction Workers

4.5.10 Construction workers travelling from outside the area would be encouraged to access the Scheme from the A55 Expressway Junction 22. It is anticipated that there are likely to be between 20-30 site staff present within the Scheme area on a daily basis during construction.

Construction Delivery Traffic Movements

4.5.11 The site benefits from having convenient and direct access from the A55 Expressway. Construction vehicles and deliveries would use the A55 Expressway Junction 22 for all trips to and from the site and compound areas, avoiding the need to use the local highway network.

4.5.12 According to the Transport Statement (ES Volume 2, Technical Appendix 15.1), it is anticipated that worst case (import of rock armour by road) the total number of HGV trips to and from the site is expected to be no more than 8 per hour, equating to 1 arrival and 1 departure departures every 15 minutes within the standard site working hours discussed in this chapter.

4.5.13 The A55 Expressway carries in the region of 55,000 to 60,000 vehicles (AADT) and the increase in traffic as a result of construction activities would be negligible.

4.6 Traffic Management, Closures and Diversions

4.6.1 Traffic management would be designed in consultation with the CCBC Highways Department to ensure it would:

- Minimise disruption to road users during the works;
- Minimise disruption to local communities and businesses and emergency services during the works, providing access throughout;
- Provide a safe working area for the construction workforce;
- Provide safe and clearly signed traffic routes through the works; and
- Ensure non-motorised users are provided with suitable facilities.

4.6.2 Traffic management and restrictions would be needed to provide safe access and working areas for the construction workforce and their vehicles, plant and equipment and to permit safe passage of vehicles and non-motorised users, such as pedestrians and cyclists, through and adjacent to the works.

4.6.3 These traffic restrictions would be carefully planned and managed and would include a variety of measures, from separating works areas from public access areas to full closures of certain roads and speed restrictions.

4.6.4 Traffic management would comply with the requirements of Chapter 8 of the Traffic Signs Manual with project specific additions and relaxations as agreed with CCBC.

4.6.5 Road closures and diversions would be anticipated to be as summarised within Table 4.2 and visually displayed in Figure 4.1, subject to consultation and agreement with CCBC.

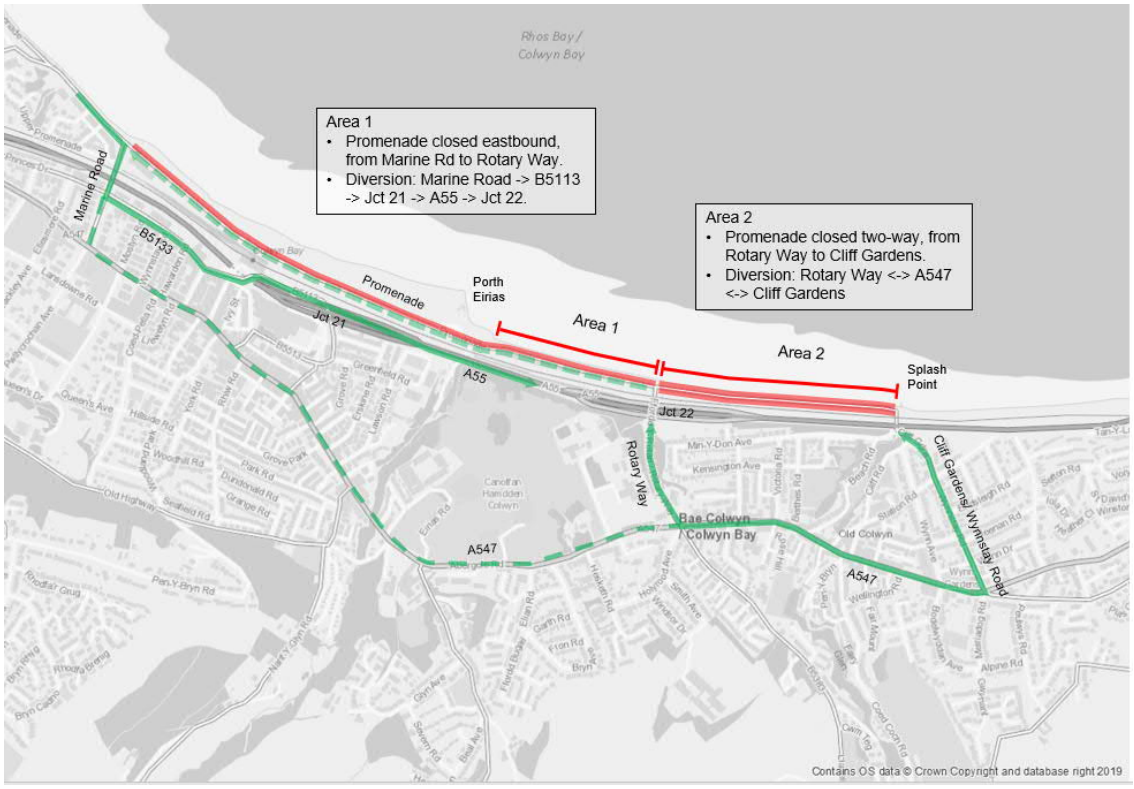
Table 4.2: Traffic Management – Road Closures and Diversions

Location	Closures	Period of Disruption	Anticipated Diversions (subject to consultation and approval with CCBC)
Construction Section 1 Splashpoint to Rotary Way	Vehicles would be prohibited from entering, using established CCBC system for closing Promenade.	10 months from start date	Via the A457 Abergele Road and Rotary Way. Note this diversion is currently in place due to the Splashpoint Project works which commenced in January 2020.

Construction Section 2 Rotary Way to Porth Eirias	Vehicles would be prohibited from entering site eastwards of Porth Eirias entrance. Westbound traffic lane would remain open with short periods of closure to facilitate any subsequent resurfacing work. During this time, the closure would use established CCBC system for closing Promenade for special events such as Prom Xtra.	Duration of the section (anticipated to be 10 months)	Eastbound traffic for the A55 Expressway: Diversion south at Marine Road and onto the B5113 Princes Drive turning east for access to Junction 21. Eastbound Traffic for Old Colwyn: Diversion south at Marine Road and onto the A547 Conway Road/Abergele Road. For limited periods of combined eastbound and westbound closure, diversions as above with the additional diversion via A547 Abergele Road and Wynnstay Road for vehicular access to Construction Section 1 (Splashpoint to Rotary Way Promenade area).

Source: CCBC

Figure 4.1: Road Closures and Diversions



Source: Old Colwyn Coastal Defence and Active Travel Scheme, Transport Statement, Mott MacDonald Ltd, July 2020

4.6.6 The traffic management strategy is set out in the Transport Statement (TS) (ES Volume 2, Technical Appendix 15.1).

4.7 Public Rights of Way, Public Access Areas and National Cycle Route 5 Closures and Diversions

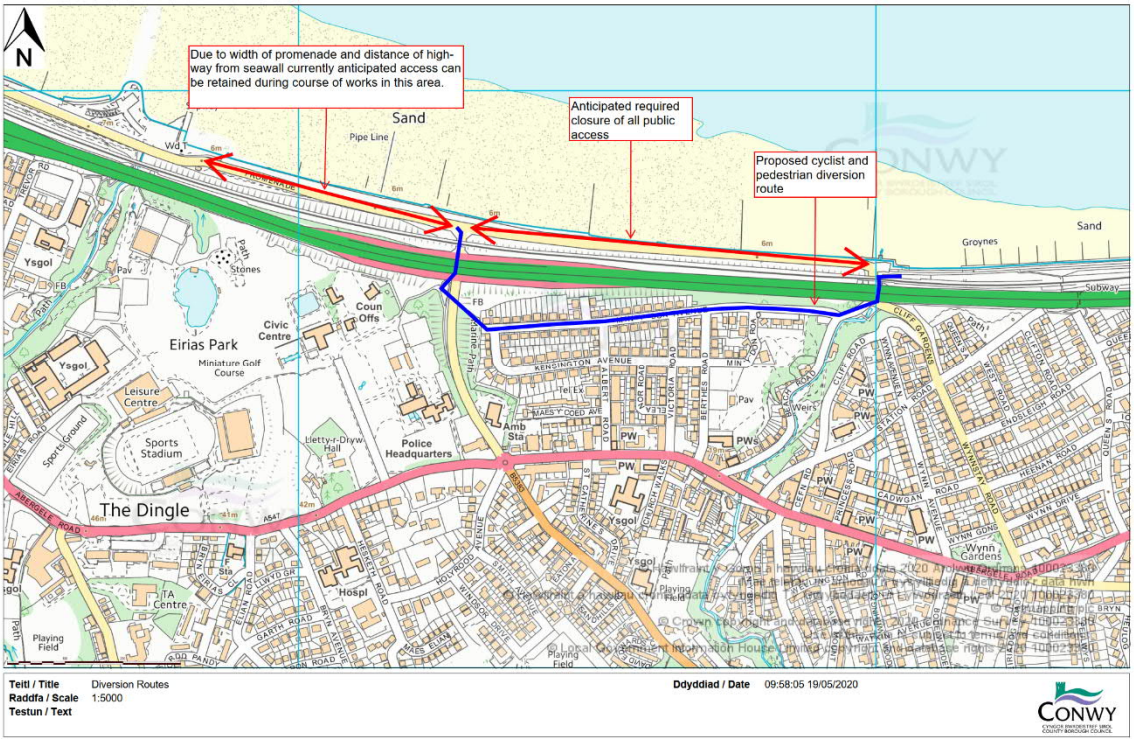
4.7.1 Road closures and diversions would be anticipated to be as summarised within Table 4.3 and visually displayed in Figure 4.2.

Table 4.3: Public Rights of Way and Access Areas – Closures and Diversions

Location	Restrictions	Period of Disruption	Anticipated Diversions (subject to consultation and approval by CCBC)
Construction Section 1 Splashpoint to Rotary Way	Pedestrian Promenade closed. Pedestrian movements restricted to footpath adjacent to immediate north of Network Rail embankment. Cyclists would need to dismount or use National Cycle Route 5 diversion. Pedestrian beach access prohibited throughout Section 1 area.	3 months from start date.	National Cycle Route 5 diversion through the residential streets of Old Colwyn (Min y Don Avenue followed by off-road route to Rotary Way). Note this diversion is currently in place due to the Splashpoint works which commenced in January 2020.
Construction Section 1 Splash point to Rotary Way	All pedestrians and cyclists prohibited. Pedestrian beach access prohibited throughout Section 1 area.	7 months closure 3 months in from start date.	National Cycle Route 5 and pedestrian diversion through Old Colwyn as above.
Construction Section 2 Rotary Way to Porth Eirias	Pedestrian Promenade closed. While westbound carriageway open: Pedestrian movements restricted to footpath adjacent to immediate north of Network Rail embankment. Cyclists would need to dismount. When closed to traffic in both directions: Pedestrians and cyclists may need to use diversion depending on works locations. Pedestrian beach access prohibited throughout Section 2 area and potentially part of Section 1 area depending on safe access and egress points	Duration of the section (anticipated to be 10 months)	Short term National Cycle Route 5 and pedestrian diversion to be confirmed if necessary. Considered likely to be via Eirias Park if required.

Source: CCBC, 2020

Figure 4.2: Public Rights of Way Closures and Diversions



Source: CCBC, 2020

4.8 Construction Working Hours

4.8.1 The normal working hours within the Site would be Monday to Friday between 07:00 and 20:00 hours and Saturday between 08:00 and 12:00. There may be exceptions to these hours for oversize deliveries and tie-ins or for traffic management or tidal reasons.

4.8.2 The normal working hours within the Site for piling activities would be Monday to Friday between 08:00 and 18:00 hours and Saturday between 10:00 and 16:00 hours.

4.8.3 The Contractor would not carry out works on Sundays or Public Holidays nor during the week immediately following Christmas, Easter and Whitsun Bank Holiday, nor would deliveries of materials or plant be permitted after 12:00 hours on Saturdays.

4.8.4 Due to tidal cycles, traffic management restrictions, safety and operational constraints, some limited operations would need to be carried out at night. CCBC would be liaised with where notable operations are to be carried out at night, such as depositing rock armour on the beach in readiness for placement (if delivery by barge is deemed necessary by the Contractor). Liaison would also be carried out with the local community, businesses and other key stakeholders.

4.8.5 Where construction works could have a significant impact on neighbouring properties, businesses and residents, the affected parties would be advised of these works prior to their occurrence. The EHO from the Local Authority would be consulted with regard the nature and extent of any such works. In addition, the Applicant would liaise closely with members of the public, businesses and the EHO to minimise the disruption and impacts resulting from the construction works.

4.9 Piling

Piling is required as part of the Scheme access build-out area, for each set of perpendicular steps and the fishing platform. See Drawings 415437-MMD-00-XX-DR-C-3201, 415437-MMD-00-XX-DR-C-3350 and 415437-MMD-00-XX-DR-C-3451 in the ES Volume 2, Technical Appendix 3.1 for details of depths and types of piles proposed. The anticipated piling timescales would be as follows:

- Access build-out: Approximately 285m of piling expected. Considering tidal working, addition of connectors and potential obstructions, an estimate of 12-14 weeks would be anticipated;
- Perpendicular steps (x3): Approximately 60m of piling expected for each set of steps. Considering tidal working, addition of connectors and potential obstructions an estimate of 3-4 weeks per set of steps would be anticipated; and
- Fishing platform: 14 piles required for the platform. Considering tidal working, addition of connectors and potential obstructions an estimate of 3-4 weeks would be anticipated. Piles would need to be driven before the revetment is built.

4.10 Construction Compounds

4.10.1 The location of the construction compounds for the Scheme have not yet been finalised given the funding and phasing constraints however all would be located within the existing red line boundary drawing on the hardstanding Promenade area to the south of the sea wall.

4.10.2 The Splashpoint works utilised the Splashpoint Promenade area as a compound and it is highly likely this area would be used as a compound for works in Construction Section 1. In Construction Section 2, the location of the compound would be dependent on the phasing of works however the pedestrian Promenade area in front of Rotary Way (segregated form the highway from a retaining wall) is considered likely to be utilised.

4.10.3 There is the potential that the eastern third of the Porth Eirias car park would be used for the storage of plant and access to the slipway. Hours of access to the car park would be restricted and agreed with CCBC and their tenants in order to avoid adverse impacts on Porth Eirias operation and businesses.

4.11 Pre-Construction and Mobilisation

4.11.1 Pre-construction and mobilisation activities would aim to:

- Engage effectively with local communities to explain the planned works;
- Mobilise the site efficiently and provide where practical early mitigation measures;
- Mobilise the site so that disruption is minimised, safe access is provided, and adequate security provided to keep the public safe; and
- Complete as much site clearance as is possible outside of restrictive seasonal windows.

Preconstruction and Mobilisation Activities

4.11.2 Pre-construction and mobilisation activities would be required to support the construction workforce, provide storage for materials and allow the works to be constructed in a safe and efficient manner, with reference to the local environments.

4.11.3 The preconstruction and mobilisation activities would be likely to include:

- Mobilisation of compounds, offices and welfare facilities;
- Provision of works accesses and delineation of the site boundaries;

- Works to identify, delineate and protect statutory utility apparatus, other hazards and environmental constraints (including the delineation of areas to be avoided for ecological protection reasons);
- Fencing to separate the public from the works sites (permanent fencing would be erected wherever practicable, where this is not possible, suitable temporary fencing would be installed); and
- Environmental site clearance (taking into account any applicable seasonal constraints). Where protected species or their habitats would likely be affected, the works would be carried out in accordance with the methods laid out in the CEMP and agreed with an ecologist. All necessary approvals or licences would be obtained from the appropriate regulatory body for the planned works.

Site Clearance and Demolition

4.11.4 Site Clearance drawings can be found in ES Volume 2, Technical Appendix 4.1. Drawings 415437-MMD-00-ZZ-DR-D-0201 to 0205. Site clearance activities would include the following:

- Removal and re-use of existing rock armour where it is in accordance with the specification;
- Removal of the steel frame section of existing ramp near Porth Eirias;
- Removal of lighting columns;
- Removal of fittings and furnishings for example wooden benches, hand-rails, poles, steps, seating structures, timber groynes;
- Coping units to be removed and set aside for re-use;
- Upper sections of walls to be removed and set aside for reuse (Construction Section 1 south of Promenade highway) lower section to be buried by highway raising works), seating and associated masonry wall to be removed and ground infilled/reprofiled;
- Electrical enclosure to be removed;
- Existing footway and edgings to be taken down and reused where appropriate;
- Highway kerb edging stone to be removed and taken off site; and
- Limited vegetation clearance where necessary.

4.11.5 Where items removed would have the potential for re-use elsewhere, they would be taken to CCBC's Llanelian nursery for storage.

4.11.6 Only three buildings/structures require demolition, two Promenade shelters and a kiosk. The demolition of these properties would be carried out early in the construction programme. All three structures have been subject to a bat survey and no evidence of usage by bats was found. There are considered to be no environmental constraints associated with the demolition of these structures.

4.12 Key Construction Plant

Plant and Equipment Inventory

4.12.1 Table 4.4 provides a summary of key plant and equipment that is anticipated to be used in the major areas of the project:

Table 4.4: Anticipated Plant and Equipment Inventory (subject to change following appointment of Contractor)

Activity	Anticipated Plant Summary
Creation of site compound, secure site office, materials storage compound & erection of fencing to site works area	360 Excavator
	Dumper
	Hi-Ab wagon
	Cabins and containers
	Heras Fencing
Generator + potable water bowser	Generator
	Potable water bowser
Fencing	8t excavator
	Auger attachment
Site Clearance - removal of existing lampposts, street furniture, shelters, key clamp railings, storm gates etc.	Insulated Hand digging tools to be used.
	Excavator
	Breaker/Pecker attachment
	Angle grinder
Perforating existing Promenade and highway.	Bolt remover and ratchet spanner.
	SDS Drill and bits
	PC360 Excavator
	PC480 Excavator
	Dumper
	Breaker
	Compressor
	JCB Excavator with pecker
Drainage	JCB Excavator
	8t Excavator
	20t Excavator
	16t Excavator
	8t Dumper
Earthworks	20t Excavator
	Dozer
	9t Dumper
	Roller on back of dozer
	Roller Bomag BW 219 D-4
	Road Wagons 8 wheeled 20t
Structures	Concrete Pumps
	Concrete Mixer Trucks
	Tracker/wheeled excavator
	Large (75t) Mobile Cranes
	Vibrating pokers
	Powered hand tools (SDS drills and drivers)
	Generators for poker vibrator
	Vibro hammer

Activity	Anticipated Plant Summary
Revetment	D6D Bulldozer
	PC360 Excavator
	PC480 Excavator
	8 wheel tippers
	30t dump truck
Materials Delivery (3t to 6t revetment if barge delivery selected)	Revetment: 6000t delivery vessel
	Revetment: Loading 1500t Transhipment Barge
	Revetment: Tug to manoeuvre barge
	On barge: PC360 Excavator/dozer
	Revetment: 1500t Barge (non-powered)
	OR…
Materials Delivery 3-6t revetment if road delivery selected)	Revetment: 32t delivery truck
Materials Delivery	44t delivery truck (other deliveries)
Pavement Foundation Construction	Roller Bomag BW 219 D-4
	Road planing equipment
	Road Wagons 8 wheeled 20t
Pavement	Roller Bomag 120
	Road planing equipment
	Roller Bomag BW 24
	Chipper for asphalt, machine to spread tack coats.
	Concrete cutting tools
	Telehandler
	JCB 2cx with hydraulic breaker
	Truck
	Paver
Signs & Lines	3t Excavator
	Hi-ab
	12t white lining truck
VRS and Lighting	3t Excavator
	Hi-ab
Piling Works	Ancillary piling equipment - Cleaning welds on piles
	Ancillary piling equipment - Shaping top of bored pile for fitting concrete cap
	Piling crane 50t
	Service crane 50t
	Piling hammer (movax vibratory installation steel piles)

Activity	Anticipated Plant Summary
Outfalls and culvert works	Ancillary piling equipment - Cleaning welds on piles
	Ancillary piling equipment - Shaping top of bored pile for fitting concrete cap
	Piling crane 50t
	Service crane 50t
	Piling hammer (movax vibratory installation steel piles)

Source: Mott MacDonald Ltd, 2020

Restrictions on Plant Movements and Stockpiling in the Intertidal Area

4.12.1 Plant and equipment movements on the beach are to be restricted to within 20m to 30m of the revetment toe for the vast majority of the construction works. No stockpiling would be permitted on the area of spare or dense Blue Mussel bed which would be demarcated by a marine ecologist and the Contractor 6-8 weeks prior to works commencing. No plant movements would be permitted across the area of dense Blue Mussel bed (see Chapter 8 Biodiversity for more information), although some limited movements would be permitted across the south-western corner of the sparse mussel bed if necessary given its very poor condition. In Chapter 8, the marine ecologists state that: *"It is unlikely that the entire mussel bed will be able to be avoided by tracking plant, however limiting the area for tracking to the sparse sections and avoiding dense areas will lead to minimal temporary impacts on the mussel bed only".*

4.12.2 Activity on the lower beach would be limited to revetment delivery by barge (if it is not to arrive by road) and ecological enhancement works to the three existing longer groynes, currently anticipated to involve the installation of two ecological rock armouring unit (or similar) per groyne.

4.12.3 For any plant movements and stockpiling of rock armour in the lower intertidal area (beyond 20-30m from the revetment toe), plant movements would be restricted given the presence of the Blue Mussel bed and intertidal patches of Honeycomb Worm with suitable buffer zones to be established by the marine biologist and Contractor at the walkover 6-8 weeks prior to works commencing.

4.12.4 As no Contractor is yet on board for the Scheme, stockpile areas and plant routes along the lower intertidal area are not yet known. It is anticipated that rock armour would be stockpiled immediately seaward of its proposed final location within the revetment. Drawing 415437-MMD-00-XX-DR-N-1711 in Section 4.16 shows the anticipated principal construction area along with the ecological constraints to plant movements and stockpiling within the intertidal area.

4.13 Construction Flood Risk Management

4.13.1 During site clearance, existing rock armour is to be removed and re-used where appropriate in accordance with specification.

4.13.2 The Contractor would produce a Construction Flood Risk Management Plan to set out the methodology to be followed during construction to ensure coastal protection of the site is maintained throughout the construction phase.

4.13.3 This plan would also set out the emergency access and egress procedures and specific site precautions necessary to protect both human life and the environment in the case of storm overtopping events occurring during the construction period.

4.13.4 The placement of stockpiled rock armour immediately seaward of where it is to be used within the revetment would help to dissipate wave energy and provide some limited additional protection during any storm events.

4.14 Materials

4.14.1 A full list of anticipated materials to be used and quantities has been produced, however this information is commercially sensitive and cannot be reproduced here. A discussion of the key materials required and the associated environmental effects of the use of these materials is provided within Chapter 12.

4.15 Construction Lighting

4.15.1 Street lighting columns are situated along the Promenade between Porth Eirias and Splashpoint. However, there would be a requirement for lighting on the beach between the access slipway and the working areas during the hours of darkness (during normal working hours in winter or over-night for specific activities such as barge deliveries). During the re-development of the Promenade, these lighting columns would be removed and replaced, therefore in addition, temporary lighting of the Promenade would be required during this period of construction.

4.15.2 Lighting towers would be used to provide directional lighting and so would be positioned to minimise light spill on the beach and to neighbouring areas.

4.16 Drawings

4.16.1 The following key Drawings are included below:

- Drawing 415437-MMD-00-XX-DR-N-1711 – Anticipated Principal Working Area and Constraints for Lower Beach Plant Access and Stockpiling.

4.16.2 Other drawings are included within the ES Volume 2: Technical Appendix 4 as listed in Section 4.17.

Porth Eirias

Splashpoint

Location Map

Key to Symbols

- Red line boundary
- Anticipated principal working area
- Area of permanent construction
- Ecological enhancements only
- Mussel bed - dense (approximate location)
- Mussel bed - sparse (approximate location)
- Honeycomb Worm Reef - sparse (approximate location)

Notes

1. For information only, not for construction.
2. Contains Ordnance Survey data © Crown copyright and database rights 2019 Ordnance Survey. All rights reserved.
3. Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	23/07/20	SA	For information	CW	CW

MOTT MACDONALD

Mott MacDonald House
5 Woodland Road West
Colwyn Bay
LL29 7DH
T +44 (0)2920 467800
W www.mottmac.com

Client

Conwy County Borough Council

Title Old Colwyn Coastal Defence and Active Travel Scheme Anticipated Principal Working Area and Constraints for Lower Beach Plant Access and Stockpiling

Designed	N Spofforth	NS	Eng. Check	C Williams	CW
Drawn	S Anstice	SA	Coordination	N Spofforth	NS
GIS Check	H Wheldon	HW	Approved	C Williams	CW

Scale at A3	Status	Rev	Security
1:5,000	INF	P1	STD

Drawing Number 415437-MMD-00-XX-DR-N-1711

0 100 200 300 400 500 Meters

C:\Users\ANS90589\Mott MacDonald\410895 - Colwyn Bay Waterfront Phase 2b - GIS\MXD\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620\GIS_410895_MMD_EnvironmentalConstraints230720.aprx

4.17 List of Documents Included in ES Volume 2: Technical Appendix 4

- Appendix 4.1: Site Clearance Drawings 415437-MMD-00-ZZ-DR-D-0201-0205.

5 Consultation

5.1 Consultation on the Colwyn Bay Waterfront Project

5.1.1 Extensive public consultation undertaken by CCBC played a key role in the development of the Waterfront Project Plan in 2006 and 2007. As part of the strategy development a range of options for maintaining or improving the coastal defences within Colwyn Bay were identified and examined, which formed the basis for initial public consultation. During this consultation the rock revetment option was favoured over beach recharge or a concrete step revetment for the Old Colwyn waterfront area.

5.1.2 Further to the initial public consultation exercise, further technical development of options, economic analysis and environmental appraisal was carried out. The Draft Strategy Option was presented for further public examination in November 2007.

5.1.3 As part of the EIA process for the Colwyn Bay Waterfront in 2010 (along with the EIA Addendum in 2013), consultation was undertaken with a wide range of both statutory (required by law), non-statutory bodies and the public, with the aim of collating all comments and concerns regarding the proposed Project (as reported within the 2010 ES[25] (ES Volume 2, Technical Appendix 2.2) and the subsequent 2013 Addendum[26]).

5.2 Phasing Review Consultation

5.2.1 In order to inform the 2019 Phasing Review[27] (ES Volume 2, Technical Appendix 2.1), contact was made with those bodies whose assets are affected or who have responsibility for emergency service provision, in order to identify what they would do in order to ensure on-going operation of the asset/public safety, both temporarily and in the longer term should the defences at Old Colwyn fail.

5.2.2 A number of stakeholders were contacted, and key responses were received from:

- CCBC Highways;
- CCBC Harbourmaster;
- CCBC Street Lighting;
- Welsh Water;
- Network Rail;
- Scottish Power; and
- Welsh Government Network Management Division (Transport).

5.2.3 The principal points from the responses received are summarised below:

CCBC Highways

5.2.4 *"Loss of highway access would mean that traffic travelling along the A547 (Abergele Rd) towards the Promenade is directed by current signage towards the seafront down Wynnstay Rd and onto the Promenade at Cliff Gardens. In the event that the Promenade highway was*

[25] Colwyn Bay Waterfront Project Phase 1 Engineering Works, ES Volume 1: Main Text, Mott MacDonald Ltd, December October 2010

[26] Colwyn Bay Waterfront Project ES Addendum for Phase 1b Promenade Enhancement and Phase 1c Coastal Defence, Mott MacDonald Ltd, December 2013

[27] Colwyn Bay Waterfront project Phase 3 – Phasing Review, Draft Report for Stakeholder Distribution, Coastal Engineering UK Ltd, August 2019

closed, which would also include closure of access from the A55 at Rotary Way, traffic would have to continue along the A547 into the centre of Colwyn Bay and thence onto the Promenade at Marine Drive, between Porth Eirias and Rhos-on-Sea. This would lead to significant congestion, particularly during the summer months; and there would be a loss of parking on the Promenade".

CCBC Harbourmaster

5.2.5 *"Loss of the Promenade would mean loss of the Promenade amenity and access to the beach at locations east of Porth Eirias. This would have a negative impact on public use of the beach at Old Colwyn and reduced numbers of visitors would impact negatively on the local economy;*

5.2.6 *In the event that the sea wall/Promenade were structurally weakened public access would be prohibited.*

5.2.7 *The cost of monitoring and managing the area – increased inspections, erecting and maintaining fencing is estimated to cost £30,000 per annum".*

CCBC Street Lighting

5.2.8 *"In 2015, the Street Lighting was located to the landward side of the highway between Rotary Way and Beach Road due to deterioration of the cable network. If the sea wall/Promenade collapsed this would cause damage to the underground cable network with the risk of possible fatal or severe injury to the public.*

5.2.9 *In general, if no Street Lighting was utilised in this area then there would be a possible increase in crime & anti-social behaviour which would have a negative effect on road & public safety & pedestrians.*

5.2.10 *With regeneration of the Promenade street lighting would be upgraded to LED lighting with a 65% saving in energy and carbon footprint. This would also boost tourism".*

Welsh Water

5.2.11 *"Welsh Water operate two lengths of sewer within the Phase 3 section of Promenade:*

- *A combined trunk sewer; and*
- *A parallel storage pipe.*

5.2.12 *These are located below the Promenade immediately behind the sea wall, so in the event of it being breached they could suffer structural damage, with a potential risk of loss of function and pollution.*

5.2.13 *Welsh Water are committed to working with CCBC in relation to arrangements along the Phase 3 frontage.*

5.2.14 *Welsh Water have contributed to emergency repairs carried out to the Promenade in the past 12 months and are prepared to work collaboratively with key agencies, to consider the most sustainable long-term options for the protection of the coastal assets in Old Colwyn.*

5.2.15 *Welsh Water have considered the risks associated with the failure of the existing coastal defences between Porth Eirias and Beach Road including dealing with local failures and an assessment of risk in the event of total loss of the affected 1.2km length of Promenade, compromising the associated trunk and storage sewers in their entirety.*

5.2.16 *In the event of localised repairs being required, it would require flows from Beach Road pumping station (and possibly Tan Lan sewage pumping station) to be tankered for the duration of the work. Repairs downstream of Rotary Way and the Civic Centre could require temporary slipway closure on and off the A55 to enable tankering of flows. Estimated repair costs (include tankering costs) could be in the region of £350,000 per annum average (..per occurrence)."*

5.2.17 In the event that failure of the defences required the re-routing of services, Welsh Water have considered three options:

- A rising main below the seabed;
- A rising main from Beach Road Pumping Station to Eirias Park and gravity sewer combination; and
- A tunnel option, between Eirias Park Access Road and rear of Beach Road Pumping Station Welsh Water have produced a high level estimate of the cost of these options of £4.3 million.

Network Rail

5.2.18 *"Network Rail responded that they had already been involved in discussions regarding this project and potential funding opportunities. They see CCBC, as the primary coastal protection authority, being responsible for providing coastal protection to third parties and that the risks should be addressed at a more strategic level by Welsh Government.*

5.2.19 *Network Rail confirmed that relocation or diversion of railway infrastructure would not be a viable option in the event of a failure of the current coastal defences. Under these circumstances the railway would be shut to protect public safety and not re-opened until the risk had been addressed. In the interim bus replacement services would be used".*

Scottish Power

5.2.20 *"Overall the scenario identified does not pose Scottish Power Energy networks significant network issues and they would be able to deal with the situation in an emergency, as it presents itself".*

Welsh Government Network Management Division (Transport)

5.2.21 *"The Welsh Government Network Management Division are not aware of any assets that would require re-locating or diverting; and*

5.2.22 *From a public safety perspective, they did not envisage any immediate arrangements that would be necessary to the A55 Dual Carriageway should the sea defences fail due to the fact that the rail track provided a buffer.*

5.2.23 *The Welsh Government Network Management Division (Transport) did not provide any values for their assets. Current costs for construction of a two lane dual carriageway are estimated to be of the order of £10-£12 million per kilometre (average 2005 costs updated to 2019 using Construction Tender Indices).*

5.2.24 *However, given that any replacement road would have to be constructed in an elevated position, either supported on piles or through a bridge arrangement, on the same alignment it is likely that actual costs would be much higher".*

5.3 Scheme Specific Early Consultation

5.3.1 The Applicant initiated early consultation on the Scheme to date (pre-Screening Opinion request) with the following:

- Internal CCBC Officers (including planning, highways, harbour master and open spaces representatives);
- Network Rail;
- Welsh Water;
- Sustrans; and
- Local anglers.

A consultation meeting with Colwyn Bay Town Council was held on 21st October 2019 and provided an update on the proposals for both the next two phases of the Colwyn Bay Waterfront Project - Phase 2b at Rhos-on-Sea and the Scheme.

Initial consultation has also been completed with NRW and CPAT with respect to the Marine Licence required for the intrusive ground investigations proposed for the Scheme.

5.4 Scoping Consultation

5.4.1 Following submission of the Scheme Scoping Report on 15th May 2020, (ES Volume 2, Technical Appendix 1.3) CCBC provided it to statutory and non-statutory consultees in order to compile a Scoping Response.

5.4.2 Consultation responses received are included in the ES Volume 2, Technical Appendix 1.4. Details of the key comments from these responses and where they have been addressed within this ES are detailed in Table 5.1. A meeting between the Applicant, coastal engineers from Mott MacDonald Ltd and NRW took place on 15th July 2020 to discuss some of the scoping response comments, details are included in Table 5.1 where relevant

Table 5.1: Scoping Report Comments and Locations in the ES Where they have been Addressed

Subject and Consultee	Comment	Where Addressed in ES
General - CCBC	CCBC detailed requirements for assessment of alternatives, baseline and do nothing scenarios, and non-technical summary. *To note, the requirement for all of these aspects were covered within the Scoping Report.*	Chapter 2 Need for Scheme, Assessment of Alternatives and Basis of Design and ES Volume 3 Non-Technical Summary.
Management and Maintenance baseline - NRW	NRW advise that further information will be required in the ES on future management and maintenance actions, particularly beach management.	Chapter 3 Scheme Description Section 3.4
Preliminary Methodology - NRW	The SR is based only on 'current best understanding' and a preliminary outline methodology; advice may change depending on any alterations to the detailed design.	Noted.
Timescales - NRW	NRW advise that further information will be required regarding timescales to be able to inform Water Framework Directive and Habitats Regulations Assessments.	Chapter 4 Scheme Construction.
Coastal Defence Works - NRW	In the event that delivery of rock could be via the sea, NRW advise that any potential significant impacts should be scoped into the EIA. Additionally, the ES	Chapter 3 Scheme Description. Chapter 4 Scheme Construction. 4.12.

Subject and Consultee	Comment	Where Addressed in ES
	and CEMP should include details of access routes across the foreshore and designated locations for stockpiling rock and sediment on the beach to ensure no significant effects occur.	Chapters 7 to 14 for the environmental disciplines. As no Contractor is yet on board for the Scheme, stockpile areas and plant routes along the lower intertidal area are not yet known. It is anticipated that rock armour would be stockpiled immediately seaward of its proposed final location within the revetment. Drawing 415437-MMD-00-XX-DR-N-1711 in Section 4.16 shows the anticipated principal construction area along with the ecological constraints to plant movements and stockpiling within the intertidal area.
Planning Policy -CCBC	The following LDP policies are also of relevance to the proposal: • DP/1 - Sustainable development principles; • DP/3 - Design quality and crime reduction; • DP/4 - Development criteria; • DP/5 - Infrastructure and new developments; • DP/6 - National planning policy and guidance; • NTE/1 - The natural environment; • NTE/3 - Biodiversity; • CTH/1 - Cultural Heritage; • CTH/2 - Development Affecting Heritage Assets; • STR/3 - Mitigating travel impact; and • MWS/1 - Minerals and waste.	Included in Chapter 6 Policy Context.
Cultural Heritage - Clwyd-Powys Archaeological Trust (CPAT)	There is no real assessment for the potential of the beach excavation works to impact buried deposits related to the former prehistoric land surface. CPAT advise that the beach between MHW and MLW has a moderate to high potential for prehistoric deposits related to the former land surface that has been submerged since the Palaeolithic and Mesolithic periods. Peat deposits and submerged forest remains are not uncommon to the east where they have been mapped around Rhyl and Prestatyn in association with coastal protection works. CPAT consider that the impact upon deposits sub-surface levels would be difficult to pick up in a walkover as it would need optimum conditions (no masking sand layer and a recent storm to scour the surface and reveal peat layers or trees) to see evidence. If any preliminary geotechnical works are proposed on the beach (e.g. excavated test pits or cores)	Archaeological watching brief to be present during GI. If sub-surface deposits of note are identified, further assessment to be completed as standalone reporting as advised by CPAT. Chapter 15 Other Environmental Disciplines.

Subject and Consultee	Comment	Where Addressed in ES
	CPAT consider it would be useful to have an archaeological contractor attached to the GI team conducting these works so that the beach deposits can be examined in profile and recorded.	
Biodiversity - NRW	NRW advise that impacts to the Blue Mussel beds should be avoided as far as possible. If rocks are imported to the site via the sea this will create a risk of introducing invasive non-native species (INNS). NRW advise that any risk of INNS will need to be suitably managed to minimise introduction and spread as far as possible and the applicant should ensure that this is adequately assessed.	Chapter 8 Biodiversity. Biosecurity Risk Assessment: ES Volume 2, Technical Appendix 8.6.
Biodiversity - NRW	In the event that any significant wader/waterfowl roosts are present near or within the application area, NRW advise that works avoid the two-hour period either side of high tide to prevent disturbance during the critical period for roosting birds.	Chapter 8 Biodiversity. No wader/waterfowl roosts identified.
Coastal processes - NRW	NRW advise that further information on the assessment methodology will be required in the ES. NRW recommend you refer NRW guidance note GN041 Marine Physical Processes Guidance to inform EIA (see enclosed document).	Chapter 10 Coastal Processes and Flood Risk.
Coastal processes - NRW	NRW advise that a map and justification of spatial extent should be provided in the ES.	Chapter 10 Coastal Processes and Flood Risk.
Coastal processes - NRW	NRW caution against using past modelling where the baseline has since changed. Further information can be learnt from the schemes that have been implemented since previous modelling was completed. The ES should be a standalone document and not merely reference previous reports where that information is relied upon; it should discuss the information relevant to the assessment of coastal processes for this proposal.	Chapter 10 Coastal Processes and Flood Risk. Following the Scoping response a meeting with NRW was held on 15th July 2020 which identified that no further modelling was required for the Scheme. A short review of the model and available information following the construction of the previous phases has been undertaken in Chapter 10. Meeting minutes are included in ES Volume 2, Technical Appendix 5.2.
Coastal processes/ Materials - NRW	NRW advise against any beach sediment being used as construction infill as this would deplete the local sediment budget and leave a negative legacy of sediment available for beach building in times of increased sea level rise. Locking the sediment within the proposal would create a deficit of marine sand to the environment and interrupt sediment downdrift to the east. NRW recommend that any marine sediment of the	See Chapter 9 Climate, Chapter 10 Coastal Processes and Flood Risk, and Chapter 12 Materials. Sediment to be retained within marine environment.

Subject and Consultee	Comment	Where Addressed in ES
	appropriate type, and which does not present contamination issues, should be retained within the marine environment for the sustainable management of natural resources. Quantification and further information should be provided in the ES regarding sediment infill requirements and options for sourcing from elsewhere.	
Water Framework Directive (WFD) compliance assessment - NRW	NRW advise that a WFD compliance assessment is required, which should include an assessment of the construction and operational phases of the project. The WFD compliance assessment should assess any potential effects of the project on WFD water body status and objectives. These can be direct effects e.g. the physical footprint of the scheme, or they can be indirect i.e. secondary impacts arising to processes or species through biotic or migratory routes. Please refer to the relevant guidance (OGN 72 and Clearing the Waters for All) for further information on how to carry out a WFD compliance assessment. Please note that OGN 72 is internal guidance for NRW staff and is currently under review but can be provided externally to facilitate the WFD compliance assessment process (see enclosed document). The information utilised in the WFD compliance assessment will largely draw upon that gathered for the wider EIA where there are relevant topic areas. The WFD compliance assessment can be submitted as a chapter of the ES and its preparation fall under the EIA umbrella, along with HRA, or it can be submitted as an Appendix to the EIA.	Chapter 10 Coastal Processes and Flood Risk. ES Volume 2, Technical Appendix 10.1.
Flood Risk Activity Permit (FRAP) - NRW	NRW advise that any works in, over, under or within 8m of either of the main rivers may be subject to a FRAP.	To be completed by future Contractor at construction stage. See Chapter 10 Coastal Processes and Flood Risk. Requirement for FRAP included in Outline Environmental Management Plan (OEMP).
Coastal processes - NRW	NRW strongly advise that coastal processes are scoped into the ES for the construction phase. The scheme is intended to be approximately 32m in width and 1.15km long; this is a large intertidal working area. The length of construction has not yet been determined but could be up to 24 months or longer in stages. Release and storage of sediments on the beach could impact	Scoped in. See Chapter 10 Coastal Processes and Flood Risk.

Subject and Consultee	Comment	Where Addressed in ES
	coastal processes, as could the stockpiling of rock.	
Flood Consequences Assessment (FCA) - NRW	NRW advise that a FCA is submitted in support of any planning application. The scoping assessment (Section 11.6) refers to a 'design life' of 50 years and that the effects of climate change would be considered over this period. NRW suggest any FCA commissioned also considers the effect of climate change over a longer period (75 and 100 years), to allow the future flood risk to be fully understood and allow for informed decision on the design of the project in relation to the maximum benefit which could be achieved in terms of flood risk.	Chapter 10 Coastal Processes and Flood Risk. ES Volume 2, Technical Appendix 10.2.
Transport Statement - CCBC	The Highways Authority has advised that the study area must include the following junctions. • Rhos Promenade; • Cliff Gardens; and • Beach Road.	Transport Statement – ES Volume 2, Technical Appendix 15.1.
Transport Statement - CCBC	The Highways Authority has advised that the Transport Statement (TS) must include: • Surveys (including queue lengths) of the Rhos Promenade, Cliff Gardens and Beach Road junctions on at least four separate days. Surveys must be carried out in a neutral month with the surveys undertaken in the following form: Tuesday one week, Wednesday on a second week and Thursday on a third week, Saturday on the fourth week. • A qualitative review of nearby bus stop usage and routes (to be shown in the TS). The Highways Authority has advised that the TS must review year of application (as base assessment, with and without development) along with future assessment year for the detailed junction capacity assessment of year of application +10 years. (For example - if the application is submitted this year the future assessment year will be 2030). The applicant must propose what growth rates are to be used which the HA must approve prior to use.	Transport Statement – ES Volume 2, Technical Appendix 15.1. Response to comments and request for confirmation of way forward (Covid-19 relating) provided to CCBC Highways Department, no response received back at time of writing. Highly conservative approach adopted.
Transport Statement - CCBC	The Highways Authority has advised that the TS must take account of any approved but as yet unbuilt committed developments within the traffic flow calculations within the TS work.	Transport Statement – ES Volume 2, Technical Appendix 15.1. Response to comments and request for confirmation of way forward (Covid-19 relating) provided to CCBC Highways Department, no response received back

Subject and Consultee	Comment	Where Addressed in ES
	The Highways Authority has advised that the Construction Management Assessment must explain the traffic management solutions to be undertaken by the Contractor regarding: • Closures; • Deliveries; • Diversion routes; • Phased workings and timescales; • Management of motorised and non-motorised routes; • How access for properties and businesses access will be maintained (including deliveries); • Site compound location details; • Detail the temporary access to the development from the public highway showing an access road made from bound material, free of any obstruction including gates. • On-site parking provisions for a minimum of 40 (this figure is subject to change to align with proposed development) vehicles which must adhere to CCBC SPG LDP2: Parking Standards and include provision for at least 10 oversized parking bays of 6m x 3m and 10 visitor parking bays as well as storage areas for plant . The approved layout must be available until all of the roadways have been constructed and at least 85% of the scheme completed in full. The parking area must also have a compliant turning head to allow vehicles to enter, turn around and exit in a forward gear; • Scheduling and timing of deliveries; • Loading and unloading proposals/method statements; • Travel Management Plan; • Details of on-site wheel washing facilities which must have a bound material or other approved equivalent temporary roadway between the wheel washing facilities and the public adopted highway for the duration of the works (this is to ensure that cleaned vehicles do not travel over/through mud/virgin ground/verge etc. afterwards, this in turn will secure that vehicles exiting the site do not deposit mud on the public highway which is a road safety issue and an offence); • Cleansing proposals of the Public Highways due to the development;	at time of writing. Highly conservative approach adopted.

Subject and Consultee	Comment	Where Addressed in ES
	• Storage of plant and material used in constructing the development; • Information on the management of junctions; • Temporary lighting proposals to ensure that Illumination gear from any lighting source is not visible to motorists using the public highways; • Proposed TTRO to protect the free flow of traffic on highways to the site; • Bilingual (Welsh above English) traffic management signs schedule and location plan (to The Traffic Signs Manual and The Traffic Signs Regulations & General Directions specifications).	

5.4.3 Responses were not received from:

- Network Rail:
- Welsh Water:
- Welsh Government Transport Division:
- CCBC Community and Development; and
- CCBC Conservation Officer.

5.4.4 A number of other consultees have previously been/are also in the process of being, consulted by the Applicant on the Scheme including:

- Sustrans;
- Local anglers' associations;
- Colwyn Bay Town Council; and
- Conwy Access Group.

5.5 Community Consultation

5.5.1 Given the restrictions relating to Covid-19 which were in place during writing and are ongoing, an online public information event is proposed to take place in August 2020 to be followed by a physical event in the future as and when restrictions are lifted.

5.6 Covid-19

5.6.1 Covid-19 resulted in non-normal conditions during the planned baseline traffic and noise assessment period meaning these surveys could not be completed. Therefore, alternative approaches were agreed with the CCBC Principal Environment Officer for the air quality assessment and with the CCBC Environmental Health Officer for the noise assessment. A response from CCBC Highways had not been received at the time of writing. Responses from CCBC are included as ES Volume 2, Technical Appendix 5.1.

5.7 Drawings

5.7.1 No key drawings accompany this Chapter.

5.8 List of Documents Included in ES Volume 2: Technical Appendix 5

- Appendix 5.1: CCBC consultation responses; and
- Appendix 5.2: NRW consultation meeting minutes.

6 Policy Context

6.1 National Policy

6.1.1 This Chapter provides a summary of the principal national and local policy relevant to the Scheme and the EIA.

6.1.2 Environmental discipline-specific summaries are provided within each discipline Chapter.

Planning Policy Wales (Edition 10, December 2018)

6.1.3 Planning Policy Wales (PPW) sets out current land use planning policy for Wales. It provides the policy framework for the effective preparation of local planning authorities' development plans.

Relevant to the Coastal Defence Scheme Aspects

6.1.4 (6.5 Coastal Areas) 6.5.20 "*In considering new coastal defence works, account should be taken of all potential environmental effects, both on and off-shore, including the impacts on habitat fragmentation and consequential 'coastal squeeze', as well as information contained in Shoreline Management Plans and other relevant documents such as Area Statements".*

6.1.5 (6.6 Water and Flood Risk) 6.6.28 *"New or improved flood defences in coastal and/or riverside locations should be carefully planned, ensuring all potential environmental effects, both on and off-shore, and relevant Shoreline Management Plan policies are taken into account. Flood defence works can provide opportunities to achieve wider social, economic and environmental benefits, which should be maximised where possible. Nature based solutions should be the first consideration given the opportunity to deliver other multiple benefits, including habitat creation, biodiversity enhancement and water quality improvements. Overall, green infrastructure opportunities can benefit ecosystem resilience and provide opportunities for leisure facilities or renewable energy generation".*

Relevant to the Active Travel Scheme Aspects

6.1.6 Being "*accessible by means of active travel and public transport"'* is listed as being one of the methods by which Facilitating Accessible and Health Environments can be achieved (National Sustainable Placemaking Outcomes).

6.1.7 In addition, the following are relevant:

6.1.8 **3 Strategic Spatial Choices: Movement**

6.1.9 3.12 *"Good design is about avoiding the creation of car-based developments. It contributes to minimising the need to travel and reliance on the car, whilst maximising opportunities for people to make sustainable and healthy travel choices for their daily journeys. Achieving these objectives requires the selection of sites which can be made easily accessible by sustainable modes as well as incorporating appropriate, safe and sustainable links (including active travel networks) within and between developments using legal agreements where appropriate".*

6.1.10 3.13 *"Existing infrastructure must be utilised and maximised, wherever possible. Where new infrastructure is necessary to mitigate transport impacts of a development and to maximise accessibility by sustainable non-car modes, it should be integrated within the development layout and beyond the boundary, as appropriate. This could include works to connect cycle*

routes within a site to a wider strategic cycling network or provision of bus priority measures on highway corridors serving a new development".

6.1.11 **3 Strategic Spatial Choices: Promoting Healthier Places**

6.1.12 3.20 "*Disadvantaged and deprived communities tend to be disproportionately affected by health problems. There are links between the built and natural environment and health throughout a person's lifetime and an understanding of the wider determinants of health should be a key component of development plan preparation. The planning system should identify proactive and preventative measures to reduce health inequalities. This will include enabling opportunities for outdoor activity and recreation, reducing exposure of populations to air and noise pollution, promoting active travel options and seeking environmental and physical improvements, particularly in the built environment".*

6.1.13 **4 Active and Social Places: Moving within and between places**

6.1.14 4.1 Transport – Active Travel

6.1.15 4.1.25 *"Walking and cycling are good for our health and well-being. They support valuable social and recreational opportunities and are integral to placemaking, creating life and activity in public places and providing the opportunity to meet people. Sustainable places invite people to walk and cycle as part of their everyday routine".*

6.1.16 4.1.26 *"The Active Travel (Wales) Act 2013 makes walking and cycling the preferred option for shorter journeys, particularly everyday journeys, such as to and from a workplace or education establishment, or in order to access health, leisure or other services or facilities. The Active Travel Act requires local authorities to produce Integrated Network Maps, identifying the walking and cycling routes required to create fully integrated networks for walking and cycling to access work, education, services and facilities".*

6.1.17 4.1.29 "*New development places additional demand on transport infrastructure and networks, with the location, layout and design of development affecting the distance and way in which people travel. Developing local active travel networks can help to mitigate the impact of new development, by providing an alternative mode of travel to the private car, particularly for shorter journeys. Provision for active travel must be an essential component of development schemes and planning authorities must ensure new developments are designed and integrated with existing settlements and networks, in a way which makes active travel a practical, safe and attractive choice".*

The Well Being of Future Generations Act 2015

6.1.18 *"The Well-being of Future Generations (Wales) Act 2015 – places a duty on the Welsh Ministers (and other public bodies) to produce well-being objectives and take reasonable steps to meet those objectives in the context of the principle of sustainable development".*

6.1.19 *"**A Resilient Wales** can be supported by protecting sufficient scales, extent and connectivity of, and between, landscapes and habitats to enable them to withstand the pressures of change and protect and enhance biodiversity, to tackle pollution, to protect and enhance water resources, to protect soils and to enable flood mitigation, the creation of carbon sinks, especially in urban areas, and to promote opportunities for social and economic activity based on valuing and enabling access to the natural, historic and built environment".*

6.1.20 *"**A Healthier Wales** can be achieved by enabling opportunities for connecting with the natural and historic environment, enabling access to tranquil areas, tackling airborne pollution and other*

environmental risks and the promotion of active travel and encouragement of healthier lifestyles with the benefit of improving physical and mental well-being".

Technical Advice Notes

6.1.21 PPW is supplemented by 21 topic-based Technical Advice Notes (TANs). Procedural guidance is given in Welsh Office / National Assembly for Wales / Welsh Government Circulars. Each TAN provides detailed planning advice on a different subject.

6.1.22 The TANs considered to be relevant to this Scheme are:

- TAN 5: Nature Conservation and Planning;
- TAN 11: Noise;
- TAN 12: Design;
- TAN 13: Tourism;
- TAN 14: Coastal Planning;
- TAN 15: Development and Flood Risk;
- TAN 16: Sport, Recreation and Open Space;
- TAN 18: Transport;
- TAN 20: Planning and the Welsh Language;
- TAN 21: Waste;
- TAN 23: Economic Development; and
- TAN 24: The Historic Environment.

6.1.23 TAN 15 is of particular relevance. This TAN provides technical guidance which supplements the policy set out in PPW in relation to development and flooding. It advises on development and flood risk and provides a framework within which risks arising from both river and coastal flooding, and from additional run-off from development in any location, can be assessed. TAN 15 recognises that sea level rise and increased storminess are some of the most likely effects of climate change to which Wales would need to adapt in the future

Welsh National Marine Plan (November 2019)

6.1.24 This Welsh National Marine Plan (WNMP) is the first marine plan for Wales and represents the start of the process of shaping Welsh inshore and offshore marine waters to support economic, social, cultural and environmental objectives. It sets out how proposals will be considered by decision makers for the sustainable development of the marine area. Marine planning will guide the sustainable development of the marine area by setting out how proposals will be considered by decision makers.

6.1.25 It has been prepared and adopted under the MCAA 2009. The WNMP and supporting material should be used by applicants to shape proposals and licence applications for the sustainable development of the Plan area.

6.1.26 The Plan vision will be delivered through the Plan's objectives supported by general, cross-cutting policies and sector-specific objectives and policies. Plan objectives describe the desired outcomes this Plan is seeking to achieve, thereby supporting the UK High Level Marine Objectives (HLMOs)[28] and the UK Marine Policy Statement (MPS) as summarised in Table 6.1.

[28] MPS Chapter 2, Box 1.

Table 6.1: Welsh National Marine Plan Objectives

HLMO Theme	Objective	
Overarching	1	Support the sustainable development of the Welsh marine area by contributing across Wales' well-being goals, supporting the Sustainable Management of Natural Resources (SMNR) through decision making and by taking account of the cumulative effects of all uses of the marine environment.
Achieving a sustainable marine economy	2	Contribute to a thriving Welsh economy by encouraging economically productive activities and profitable and sustainable businesses that create long term employment at all skill levels.
	3	Support the opportunity to sustainably develop marine renewable energy resources with the right development in the right place, helping to achieve the UK's energy security and carbon reduction objectives, whilst fully considering other's interests, and ecosystem resilience.
	4	Provide space to support existing and future economic activity through managing multiple uses, encouraging the coexistence of compatible activities, the mitigation of conflicts between users and, where possible, by reducing the displacement of existing activities.
	5	Recognise the significant value of coastal tourism and recreation to the Welsh economy and well-being and ensure such activity and potential for future growth are appropriately safeguarded.
Ensuring a strong, healthy and just society	6	Contribute to supporting the development of vibrant, more equitable, culturally and linguistically distinct, cohesive and resilient coastal communities.
	7	Support enjoyment and stewardship of our coasts and seas and their resources by encouraging equitable and safe access to a resilient marine environment, whilst protecting and promoting valuable landscapes, seascapes and historic assets.
	8	Improve understanding and enable action supporting climate change adaptation and mitigation.
Living within environmental limits	9	Support the achievement and maintenance of Good Environmental Status (GES) and Good Ecological Status (GeS).
	10	Protect, conserve, restore and enhance marine biodiversity to halt and reverse its decline including supporting the development and functioning of a well-managed and ecologically coherent network of Marine Protected Areas (MPAs) and resilient populations of representative, rare and vulnerable species.
	11	Maintain and enhance the resilience of marine ecosystems and the benefits they provide in order to meet the needs of present and future generations.
Promoting good governance	12	Support proportionate, consistent and integrated decision making through implementing forward-looking policies as part of a plan-led, precautionary, risk-based and adaptive approach to managing Welsh seas.
Using sound science responsibly	13	Develop a shared, accessible marine evidence base to support use of sound evidence and provide a mechanism for the unique characteristics and opportunities of the Welsh Marine Area to be better understood.

Shoreline Management Plan

6.1.27 The North West England and North Wales Shoreline Management Plan covers the North Wales Coast (SMP22, sub-cell 11a) August 2016, within which the policy for the frontage is to Hold the Line for the next 100 years: "*This policy includes those situations where work is carried out in*

front of the existing defences (such as beach recharge, rebuilding the toe of a structure, building offshore breakwaters and so on) to improve or maintain the standard of protection provided by the existing defence line. It also includes work behind existing defences (such as building secondary flood defences) where this work would form an essential part of maintaining the current coastal defence system". For more information see Section 2.2.

National Strategy for Flood and Coastal Erosion Risk Management in Wales

6.1.28 The first National Strategy for Flood and Coastal Erosion Risk Management in Wales was published in 2011. The strategy was compiled under the terms of the Flood and Water Management Act 2010 and sets out the key objectives for the management of flood and coastal erosion risk in Wales. This was reviewed in 2016 and considers both the Wellbeing of Future Generations Act 2015 and the Planning Wales Act 2015.

6.1.29 The key objectives of this strategy aim to *"reduce the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion; raising awareness of and engaging people in their response to flood and coastal erosion risk; providing an effective and sustained response to flood and coastal erosion events; and prioritising investment in the most at risk communities".*

6.2 Local Policy

The Conwy Local Development Plan 2007-2022, Adopted October 2013

6.2.1 According to mapping within the Local Development Plan (LDP), the Scheme is located within the Coastal Zone, a strategic regeneration area, and from Rotary Way to the west, within the Colwyn Bay Masterplan Area.

6.2.2 Key Issues identified as impacting on the LDP area include the following 'Priority Issues' relevant to the Scheme:

- Tackling Deprived Areas*: "Colwyn Bay has experienced a significant decline in the tourism industry. There is a need to promote the comprehensive regeneration and renaissance of Colwyn Bay to broaden economic activity, address social exclusion, reduce deprivation, and limiting and reducing Houses in Multiple Occupation (HMO) through the Strategic Regeneration Area Initiative and the Colwyn Bay Masterplan". (Sources: Wales Spatial Plan (Update 2010), Bay Life Initiative Strategy (2006), Government Strategic Regeneration Initiative Area Status, Colwyn Bay Masterplan Brief (2009), Colwyn Bay Masterplan Baseline Study, 'Turning the Tide Strategy', BP/37 'Growth Distribution Options Report').*
- Protecting Regional & Town Centres*: "The regional centre of Llandudno and other important Town Centres within the Plan Area experience pressure from non-retail uses. There is a need to maintain and, where appropriate, enhance Llandudno as the retail centre for the region, promote the regeneration of Colwyn Bay, as well as other retail centres and, where possible, enhance the overall vitality, attractiveness and viability of the centres through a more diverse shopping experience".*
- Encouraging Sustainable Transport*: "The dominant mode for journeys to work, including high outward commuting, is by car within the Plan Area. There is a need for improved sustainable transport use and transport infrastructure in Conwy through the development of an integrated transport system, sustainable accessibility in urban and rural areas, public transport provision, modal interchanges, increased cycling and walking facilities and the requirement of travel plans to reduce car dependency".*

6.2.3 The following LDP policies are also considered to be relevant to the Scheme and have bene considered in the preparation of this ES:

- DP/1 – Sustainable Development Principles;
- DP/3 – Design Quality and Crime Reduction;
- DP/4 – Development Criteria;
- DP/5 – Infrastructure and New Developments;
- DP/6 – National Planning Policy and Guidance;
- DP/8 – Colwyn Bay Urban Regeneration Masterplan;
- NTE/1 – The Natural Environment;
- NTE/3 – Biodiversity;
- NTE/5 – The Coastal Zone;
- STR/1 – Sustainable Transport, Development and Accessibility;
- STR/3 – Mitigating Travel Impact;
- MWS/1 – Minerals and Waste;
- MWS/3 – Safeguarding Hard Rock and Sand and Gravel Resources;
- CTH/1 – Cultural Heritage; and
- CTH/2 – Development Affecting Heritage Assets.

Conwy Local Flood Risk Management Strategy (February 2013)

6.2.4 This local strategy aims to complement and support the Welsh governments' 'The National Strategy for Flood and Coastal Erosion Risk Management (Wales)'. CCBC have been designated as a Lead Local Flood Authority (LLFA) and is required under the Flood and Water Management Act 2010 to develop, maintain and monitor a local flood risk management strategy in its area and forms a new chapter within the Flood and Coastal Erosion Risk Management for Conwy.

6.3 Drawings

6.3.1 No key drawings accompany this Chapter.

6.4 List of Documents Included in ES Volume 2: Technical Appendix 6

6.4.1 No technical appendices accompany this Chapter.

7 Air Quality

7.1 Introduction

7.1.1 The purpose of this chapter is to present the air quality assessment for the Scheme ES and discuss the key factors associated with the construction and operation of the Scheme, namely:

- Nuisance, loss of amenity and health impacts caused by construction dust. These have been considered in line with the Institute of Air Quality Management's (IAQM) 'Guidance on the assessment of dust from demolition and construction'[29]
- Air quality impacts caused by additional traffic generation during construction and operation of the Scheme.

The report considers concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10}[30] and $PM_{2.5}$[31]) only, as these are the key pollutants of concern associated with the Scheme.

7.2 Legislative and Policy Framework

7.2.1 The principal legislative and planning context in relation to the assessment of the environmental effects of the Scheme on air quality is discussed below.

European Legislation

7.2.2 The European Union Directive on ambient air quality and cleaner air for Europe (2008/50/EC)[32] sets legally binding limits for pollutant concentrations. This Directive defines Limit Values and times by which they are to be achieved for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants. The Limit Values within the Directive are intended to apply everywhere with the exception of:

- any locations situated within areas where members of the public do not have access and there is no fixed habitation
- in accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply
- on the carriageway of roads; and
- on the central reservations of roads except where there is normally pedestrian access to the central reservation.

7.2.3 This Directive was made law in Wales through The Air Quality Standards (Wales) Regulations 2010[33] (amended by The Air Quality Standards (Wales) (Amendment) (EU Exit) Regulations 2019[34]).

[29] Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction.

[30] Particulate matter with a diameter of less than 10 microns

[31] Particulate matter with a diameter of less than 2.5 microns

[32] The European Parliament and the Council of the European Union (2008) Directive 2008/50/EC of the European Parliament and of the Council

[33] Statutory Instrument (2010) The Air Quality Standards (Wales) Regulations

[34] Statutory Instrument (2019) The Air Quality Standards (Wales) (Amendment) (EU Exit) Regulations

National Legislation

7.2.4 Part IV of the Environment Act 1995[35] includes a statutory duty for local authorities to undergo a process of Local Air Quality Management (LAQM). This requires local authorities to regularly and systematically review and assess air quality within their boundaries against a series of objectives and appraise development and transport plans against these assessments. Any parts of a local authority's area where the objectives are not being achieved or are not likely to be achieved within the relevant period must be identified and declared as an Air Quality Management Area (AQMA). Once such a declaration has been made, authorities are under a duty to prepare an Action Plan which sets out measures to pursue the achievement of the air quality objectives within the AQMA.

7.2.5 The air quality objectives, specifically for use by local authorities in carrying out their air quality management duties, are set out in The Air Quality (Wales) Regulations 2000[36] and The Air Quality (Wales) (Amendment) Regulations 2002[37]. In most cases, the air quality objectives are numerically equal to limit values specified in the EU Directives although compliance definitions and dates differ.

Air Quality Strategy

7.2.6 Part IV of the Environment Act 1995 places a duty on the Secretary of State for the Environment to develop, implement and maintain an Air Quality Strategy with the aim of reducing atmospheric emissions and improving air quality. The Air Quality Strategy provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment and sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives.

7.2.7 The first UK Air Quality Strategy was published in 2007[38] and has now been superseded as of the 14th January 2019 with the Clean Air Strategy 2019 (CAS)[39]. The CAS has targets for reducing total UK emissions of nitrogen oxides (NOx) and fine particulate matter ($PM_{2.5}$) from sectors such as road transport, domestic sources and construction plant (non-road mobile machinery or NRMM). The Welsh Government are currently consulting upon a 'Clean Air Plan' for Wales, as an equivalent to the CAS produced for England in 2019 to provide a framework for air quality improvements.

Statutory Nuisance

7.2.8 Section 79(1)(d) of the Environmental Protection Act 1990[40] defines one type of 'statutory nuisance' as "*any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance*". Where a local authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. Failure to comply with an abatement notice is an offence. Best practicable means is a widely-used defence by operators, if used to prevent or to counteract the effects of the nuisance.

[35] Department for Environment Food and Rural Affairs (2003) Part IV of the Environment Act 1995 Local Air Quality Management.
[36] Statutory Instrument (2000) The Air Quality (Wales) Regulations, No. 1940 (W.138).
[37] Statutory Instrument (2002) The Air Quality (Amendment) (Wales) Regulations, No. 3182 (W.298).
[38] Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland
[39] Defra (2019) The Clean Air Strategy
[40] Parliament of the United Kingdom. (1990), 'Environmental Protection Act', Chapter 43. Queen's Printer of Acts of Parliament.

National Policy

7.2.9 The current air quality planning policies for the Welsh Government are set out in Planning Policy Wales Edition 10 (December 2018)[41] (PPW). Of relevance to air quality are:

- Chapter 3 'Strategic and Spatial Choices', which highlights the importance of promoting healthier places through the planning system. This includes enabling opportunities for outdoor activities, good design in planning to minimise exposure to poor air quality, reduction of health inequalities and making positive contributions to environmental protection and improvement, including air quality;
- Chapter 4 'Active and Social Places, which states that the Welsh Government is committed to supporting modal shift from private cars to walking, cycling and public transport and that local authorities must adopt an integrated approach to traffic management, also considering wider planning objectives such as improvement in air quality;
- Chapter 5 'Productive and Enterprising Places' details that planning authorities should take into account the need to minimise impacts on local communities and the natural environment and that any minerals proposals must set out criteria to prevent adverse impacts upon these receptors; and
- Chapter 6 'Distinctive and Natural Places' states that development plan strategies, policies and development proposals should look to the long-term protection and enhancement of the built and natural environment in order to achieve Wales' wellbeing goals. This includes considering effects of development proposals on air quality with the aim to reduce population exposure to air pollution in Wales.

7.2.10 PPW is supplemented by a series of topic-based Technical Advice Notes (TANs). TAN 18 Transport details the importance of good air quality, and states: *"well designed and implemented traffic management can help secure planning objectives*…[by]*… reducing…local air pollution…".*

7.2.11 In June 2017, the Welsh Government set out further provisions in Policy Guidance PG(W)(17)[42], which adopts five ways of working set out in the Well-being of Future Generations (Wales) Act 2015[43] with the intention to improve the economic, social, environmental and cultural well-being of Wales in accordance with the sustainable development principles. The five ways of working are:

- "*looking to the long term so we do not compromise the ability of future generations to meet their own needs;*
- *taking an integrated approach;*
- *involving a diversity of the population in the decisions affecting them;*
- *working with others in a collaborative way to find shared sustainable solutions; and*
- *acting to prevent problems from occurring or getting worse*".

7.2.12 Welsh Local Authorities are expected to follow these ways of working when carrying out their LAQM duties.

7.2.13 The Welsh Government published The Wales Transport Strategy[44] in 2008, which sets out the Government's main transport development aims and how these will be achieved. The strategy

[41] Welsh Government. (2018) Planning Policy Wales. Edition 10. [online] Available at: (Accessed May 2019)

[42] Welsh Government (2017) Local air quality management in Wales. Part of the Environment Act 1995. Policy guidance PG(W)(17)

[43] Welsh Government (2015) Well-being of Future Generations (Wales) Act 2015.

[44] Welsh Assembly Government (2008). One Wales: Connecting the Nation. The Wales Transport Strategy. [online] https://gov.wales/sites/default/files/publications/2017-09/wales-transport-strategy.pdf (Accessed June 2020)

contains long-term environmental outcomes for transport in Wales; *"Outcome 14: Air pollution and other emissions"* aims to *"reduce the contribution of transport to air pollution and other harmful emissions"* through refusal of transport developments which could increase pollution levels in AQMAs or lead to new AQMAs being created.

Air Quality Plan for Nitrogen Dioxide in UK

7.2.14 The latest plan for tackling roadside NO_2 concentrations was published by Defra in July 2017 and details the government's plan to reduce NO_2 concentrations within statutory limits within the shortest possible time[45]. Within this plan, several named local authorities with exceedances of the NO_2 limit values are required to undertake a local assessment to consider the best options to achieve compliance with this limit value. The Welsh Government published a supplemental plan[46] to the UK plan in November 2018 to provide additional information of which measures would ensure compliance with the limit values for NO_2 within Wales in the shortest possible time.

7.2.15 The Scheme is within the North Wales Zone (UK0042), which is covered by a zone-specific Air Quality Plan[47]. Colwyn Bay is not specifically named within the supplemental plan or Air Quality Plan as ambient concentrations of NO_2 are below legal limits.

Local Policy

Conwy Local Development Plan

7.2.16 The Conwy Local Development Plan 2007 – 2022[48] was adopted in 2013; this plan acts as a single framework for the control of development and use of land within its administrative boundary, sets out the key challenges facing Conwy and identifies the development strategy from 2007 to 2022. The main policy of relevance to air quality within the plan is:

"Strategic Policy NTE/1 – The Natural Environment:

> *"i. Preventing, reducing or remedying all forms of pollution including air, light, noise, soil and water, in line with Policy DP/6".*

"Policy DP/6 - National Planning Policy and Guidance:

> *"Development proposals must comply with national planning policy and guidance".*

7.2.17 Conwy are preparing a Replacement Local Development Plan (RLDP) for the period 2018 to 2033. The Preferred Strategy[49] for the RLDP, published in 2019, outlines the plan's vision, issues and objectives, preferred level of growth and preferred spatial strategy. The RLDP is anticipated to be adopted in 2021. Policies in the plan relevant to air quality include:

[45] Defra (2017) UK plan for tackling roadside nitrogen dioxide concentrations: Detailed Plan [online] Available at: https https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/633270/air-quality-plan-detail.pdf (Accessed June 2020).

[46] Welsh Government. 2018. Welsh Government supplemental plan to the UK plan for tackling roadside nitrogen dioxide concentrations 2017: Tackling roadside nitrogen dioxide concentrations in Wales. [online] Available at: https://gov.wales/sites/default/files/publications/2019-04/tackling-roadside-nitrogen-dioxide-concentrations-in-wales.pdf (Accessed June 2022)

[47] Defra (2017) Air Quality Plan for tackling roadside nitrogen dioxide concentrations in North Wales (UK0042). [online] https://uk-air.defra.gov.uk/assets/documents/no2ten/2017-zone-plans/AQplans_UK0042.pdf (Accessed June 2020)

[48] Conwy County Borough Council (2013) Conwy Local Development Plan 2007-2022. [online] http://conwy.opus3.co.uk/ldf/documents/Adopted%20LDP Accessed June 2020.

[49] Conwy County Borough Council (2019) Replacement Local Development Plan 2018-2033: Preferred Strategy. [online] https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Replacement-LDP/Stage-5-Preferred-Strategy/assets/documents/Preferred-Strategy-web.pdf Accessed: June 2020

"Strategic Policy 1 (SP/1): Sustainable Placemaking Principles

> *"…development proposals will only be permitted where consistent with the sustainable placemaking principles…*[and]*… Maximises Environmental Protection and Limits Environmental Impact…*[and]*…Promotes clean air and reduces pollution;"*

"Strategic Policy 6 (SP/6) Promoting Healthier Places in Conwy

> *"…development proposals are required to…Reduce exposure of populations to air and noise pollution in line with Strategic Policy 25: Water, Air, Soundscape and Light"*

"Strategic Policy 25 (SP/25): Water, Air, Soundscape and Light

> *"The RLDP will reduce exposure to air and noise pollution, balance the provision of development and lighting to enhance safety and security, and protect and enhance the water environment and water resources, including surface and groundwater quantity and quality".*

Other Policy and Guidance

Environmental Protection UK and Institute of Air Quality Management

7.2.18 The Land-Use Planning and Development Control: Planning for Air Quality' guidance produced by Environmental Protection UK (EPUK) and the IAQM [50] provides criteria for the determination of whether a development requires an air quality assessment. This is guidance is outlined further in Section 7.4.

Summary

7.2.19 This section has identified the legislation and policy framework relevant to this assessment. On the basis of the above, applicable air quality objectives and limit values for the Scheme are summarised in Table 7.1, hereafter referred to as air quality objectives.

7.2.20 It should be noted that the UK air quality objectives only apply at locations where members of the public might reasonably be exposed to pollutants for the respective averaging periods. Table 7.2 provides details of where the respective objectives should and should not apply and therefore the types of receptors that are relevant to the assessment.

Table 7.1: Relevant Air Quality Objectives and Limit Values

Pollutant	Averaging Period	Air Quality Objective and Limit Values		Attainment Date
		Concentration	Allowance	
Nitrogen dioxide (NO_2)	1-hour	200 µg/m^3	18 per calendar year[(c)]	31 December 2005[(a)] 1 January 2010[(b)]
	Annual	40 µg/m^3	-	31 December 2005[(a)] 1 January 2010[(b)]
Particulates (PM_{10})	24-hour	50 µg/m^3	35 per calendar year[(d)]	31 December 2004[(a)] 1 January 2005[(b)]
	Annual	40 µg/m^3	-	31 December 2004[(a)]

[50] Environmental Protection UK and Institute of Air Quality Management (January 2017), 'Land-Use Planning and Development Control: Planning for Air Quality' version 1.2

Pollutant	Averaging Period	Air Quality Objective and Limit Values		Attainment Date
		Concentration	Allowance	
				1 January 2005(b)
Particulates ($PM_{2.5}$)	Annual	25 µg/m3(a)	-	1st January 2015(a)
		20 µg/m3(b)	-	1st January 2020(b)

Source: (a) Air Quality (Wales) Regulations 2000 as amended.
(b) EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe and The Air Quality Standards Regulations 2010. Derogations (time extensions) have been agreed by the EU for meeting the NO_2 limit values in some zones/agglomerations.
Notes: (c) Can be expressed as the 99.79th percentile of 1-hour means.
(d) Can be expressed as the 90.41st percentile of 24-hour means.

Table 7.2: Locations at which the Air Quality Objectives Apply

Averaging Period	Where Objectives Should Apply:	Where Objectives Should Not Apply:
Annual	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
24-Hour	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
1-Hour	All locations where the annual mean and 24-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

Source: LAQM-TG16[51]

7.3 Study Area

7.3.1 The study area for the air quality assessment covers human health receptors and designated ecological sites close to roads that meet the EPUK and IAQM[50] criteria of:

- A change of Light Duty Vehicle (LDV) flows of more than 500 Annual Average Daily Traffic (AADT): and/or

[51] Department for Environment, Food and Rural Affairs (2018), Local Air Quality Management – Technical Guidance (16)

- A change of Heavy-Duty Vehicle (HDV)[52] flows of more than 100 AADT.

7.3.2 These roads are hereafter referred to as 'affected' roads. Where the above criteria are met, sensitive human and ecological receptors at worst-case[53] locations up to 200m from the kerb of an affected road would be assessed.

7.4 Assessment Methodology

Introduction

7.4.1 This section sets out the approach for the screening of Scheme traffic data against relevant criteria and assessment of the potential dust risk during the construction and operational phases of the Scheme.

7.4.2 The EPUK and IAQM guidance[50] provides criteria for determining whether a development requires an air quality assessment. The initial criteria screen out smaller developments through establishing whether a development is classed as a 'major development'[54], coupled with more than 10 parking spaces, or a centralised energy facility. If these criteria are met, then an air quality assessment should be undertaken. The Scheme meets the first set of criteria for assessment as it is proposed to be carried out on a site with an area of more than one hectare and has more than 10 additional car parking spaces.

7.4.3 The second set of criteria provide further clarification as to whether an air quality assessment is required and are intended to provide guidance on the need for a 'detailed' assessment (using air dispersion modelling to establish likely impacts from the Scheme), in combination with professional judgement. Criteria relevant to the Scheme are:

- A change of LDV flows of:
  - More than 100 AADT within or adjacent to an AQMA; or
  - More than 500 AADT elsewhere.
- A change of HDV flows of:
  - More than 25 AADT within or adjacent to an AQMA; or
  - More than 100 AADT elsewhere.
- A road realignment change of 5m or more and the road is within an AQMA.

Construction Phase

7.4.4 Construction of the Scheme would result in emissions of NO_2, PM_{10} and $PM_{2.5}$, which are associated with dust generated from construction activities, construction plant and equipment and construction vehicles and travelling to and from the Scheme.

---

[52] A heavy-duty vehicle is any vehicle with a gross weight greater than 3.5 tonnes and usually consists of HGVs, buses and coaches

[53] Worst-case refers to locations that are closest to the road, roads with the largest flows, where the Scheme causes the greatest change in traffic and where ambient air quality is known to be poor.

[54] "major development" means development involving any one or more of the following—

(a) the winning and working of minerals or the use of land for mineral-working deposits;

(b) waste development;

(c) the provision of dwellinghouses where—

(i) the number of dwellinghouses to be provided is 10 or more; or

(ii) the development is to be carried out on a site having an area of 0.5 hectares or more and it is not known whether the development falls within sub-paragraph (c)(i);

(d) the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or

(e) development carried out on a site having an area of 1 hectare or more.

Construction Dust Emissions

7.4.5 Construction activities can result in temporary effects from dust. 'Dust' is a generic term which usually refers to particulate matter in the size range 1-75 microns in diameter; the most common effects from dust emissions are soiling and increased ambient PM_{10} concentrations[55]. Dust can arise from numerous construction activities such as concrete-batching, piling, sand blasting, wind erosion on material stockpiles and earth-moving activities. It can be mechanically transported either by wind or through the movement of vehicles onto the public highway (transport of debris on vehicle wheels, or uncovered loads). Construction dust emissions have not been assessed within this report but would be assess by the contractor using the IAQM[56] guidance prior to construction, and relevant mitigation measures included within a Construction Environmental Management Plan (CEMP). Minimum mitigation measures to reduce the impacts associated with construction on local air quality are, nevertheless, presented in Section 7.8.

Construction Site Plant Emissions

7.4.6 Construction of the Scheme would require the use of different equipment such as excavators, cranes and on-site generators. All construction plant has an energy demand; with some plant resulting in direct emissions to air from exhausts. Guidance from the IAQM[56] [56]notes that effects from exhaust would likely not be significant. Given the nature of the site plant, effects of plant emissions on local air quality are considered of negligible significance relative to the surrounding road traffic contributions on the local road network. Construction plant emissions have therefore not been assessed further as the impacts would likely be *de minimis*. Mitigation measures to reduce the impacts associated with site plant on local air quality are presented in Section 7.8.

Construction Road Traffic Emissions

7.4.7 The EPUK and IAQM guidance indicates that an assessment of traffic emissions is only likely to be required for large, long-term construction sites that would meet the second set of criteria in Section 7.4.3. The HDV movements from the construction works are likely to be less than 100 AADT, which would leave the site via Rotary Way onto the A55 Expressway. The exact figure is not yet known but is anticipated to be below the threshold for further assessment presented in Section 7.4.3 and therefore construction traffic has not been considered further. Construction traffic has, however, been added to roads affected by construction diversions assessment.

7.4.8 Although the construction traffic does not trigger further assessment, road closures would be required during the construction period to enable the works to take place, as such the rerouted traffic as a result of closures and diversions requires consideration. For the purposes of the ES it has been assumed that the full duration of construction would be approximately 20 months, however it is likely that this period would be split into two 10-month construction periods; Construction Section 1: Splash Point to Rotary Way (Area 2) and Construction Section 2: Rotary Way to Porth Eirias (Area 1 and the westernmost section of Area 2), depending on funding (see Chapter 4 Scheme Construction for additional information).

7.4.9 Construction works on Area 2 would result in the full closure of the Promenade highway from Splashpoint to Rotary Way for up to 10 months. During the works, road traffic on the Promenade highway is expected to be diverted to the A547 Abergele Road and onto the eastern section of the Promenade highway via Rotary Way. Traffic surveys for the Scheme were cancelled as a result of Covid-19, as such no traffic data is available for the stretch of Promenade highway from Splashpoint to Rotary Way. The Scheme transport consultant has

[55] British Standards Institution. 1992. Characterization of air quality. BS 6069-4.4:1993, ISO 7935:1992.

[56] Institute of Air Quality Management (2014). 'Guidance on the assessment of dust from demolition and construction.

indicated that it is likely that most vehicles using this road would be visiting the Promenade, and not generally use it to reach the A55 Expressway, for which the A547 via Rotary Way would be more convenient. As such there would likely be a relatively low number of vehicles using this section of road. This section of road has been closed intermittently in recent years due to damage from wave action and was closed from January to July 2020 for the Splashpoint Project emergency works, as such the diversion route is already an established CCBC system. Based on the predicted low flows and the fact that this road has historically had long-term closures, the full closure of the Promenade highway from Splashpoint to Rotary Way has not been assessed further as the impacts are considered to be negligible.

7.4.10 Construction works from Rotary Way to Porth Eirias is also anticipated to last 10 months; although the Promenade highway would only be closed going eastbound, with the westbound lane open to traffic. This road closure would affect much of the traffic travelling to the A55 Expressway via the Promenade highway and Rotary Way and is anticipated to divert more traffic and effect a wider area than the Area 2 road closure; as such it has been modelled as the worst-case. 4088 AADT is predicted to be diverted from the Promenade highway (eastbound), turning south into Marine Road, where the traffic intended for the A55 Expressway would travel along the A5113 Princes Drive and east to access the A55 Expressway via Junction 21. Traffic for Old Colwyn would turn south from Marine Road onto A547 Conway Road/Abergele Road. The total flows diverted meet the thresholds detailed in Section 7.4.3 and therefore have been assessed further.

7.4.11 There would be periods during the Promenade highways works, during which the westbound road would also be closed, however, these would be of limited duration and therefore this has not been considered further.

Traffic Data

7.4.12 Traffic flows in the form of 24-hour AADT flows were used in this assessment. This traffic data (AADT, HDV percentages and speeds(km)) is based on data provided by Conwy Council and Department for Transport (DfT) road traffic statistics[57] and summarised by the Scheme transport consultant. Further information on the transport assumptions is provided in the Transport Statement (ES Volume 2, Technical Appendix 15.1).

7.4.13 The road closure is only anticipated over a 10-month period; however, a full year of closure has been modelled to provide a conservative prediction of pollutant concentrations at roads affected by the construction diversion as a result of the Scheme.

7.4.14 The diverted traffic as a result of the Promenade partial closure have been added to the A55 Expressway, Marine Road, B5133 and A547; traffic data for the 'Do-Minimum' (DM) scenario (the scenario assuming the Scheme does not go ahead and diversions are not in place), and a 'Do-Something' (DS) scenario (which assumes that the Scheme and diversions are in place) is provided in Table 7.3. Construction traffic has also been added to the A55 Expressway, assuming a worst-case of 100 HDV AADT accessing the A55 Expressway via the construction site access to the east, at Junction 22. Figure 7.1 presents the location of the modelled roads.

7.4.15 A 'busy' junction is defined in Defra's LAQM: Technical Guidance 16 guidance[58] as "*one with more than 10,000 vehicles per day*". Traffic speeds on the 'busy' junctions have therefore been reduced to 20km/hr. A 20km/hr reduction on vehicle speed has also been assumed at roundabouts.

[57] Department for Transport road traffic statistics available at https://roadtraffic.dft.gov.uk/

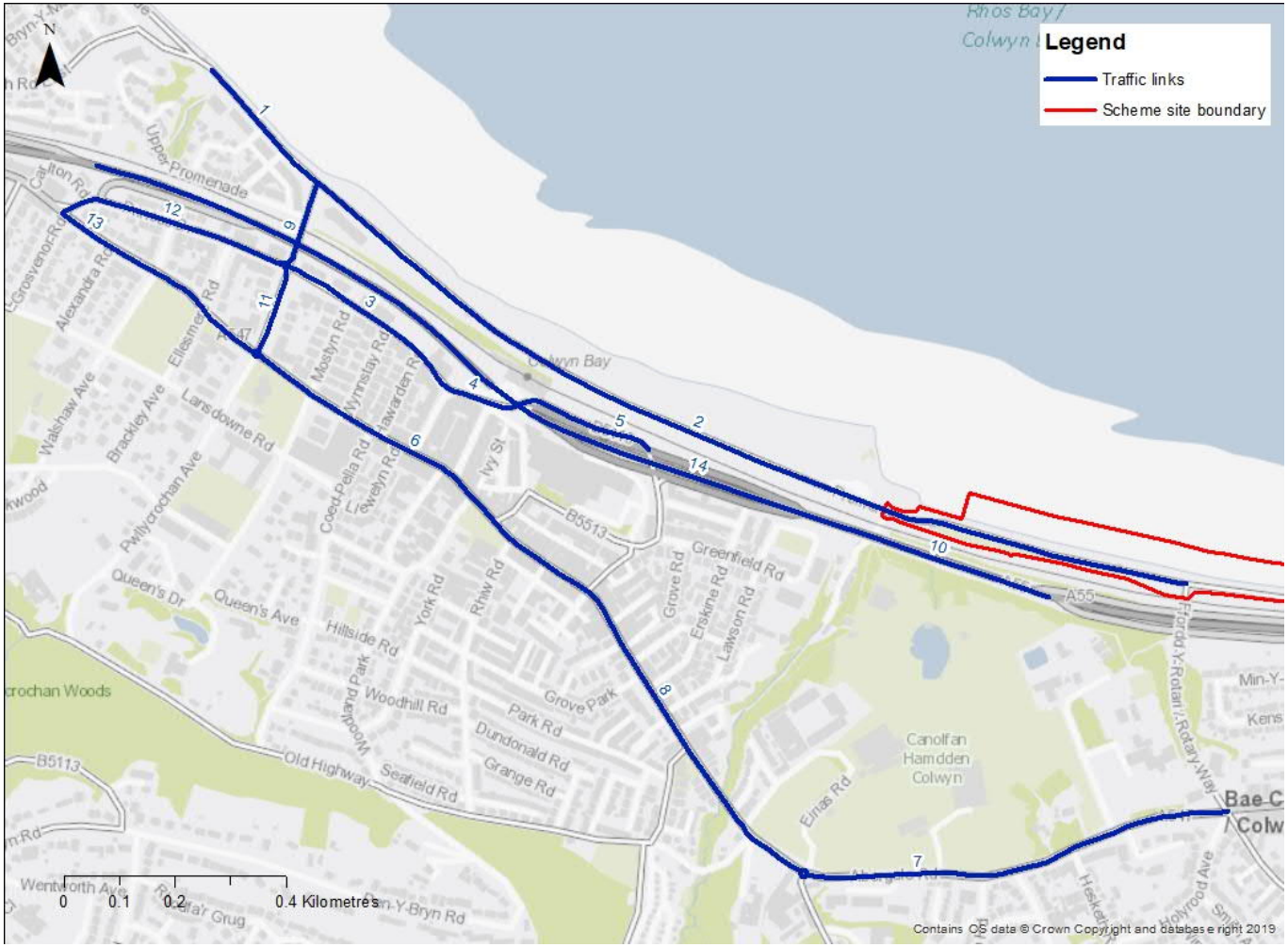
[58] Department for Environment, Food and Rural Affairs (2018), Local Air Quality Management – Technical Guidance (16).

Table 7.3: Traffic Data

Figure ID	Road name	2020 Base		2021 'Do-Minimum'		2021 'Do Something'		2021 'Do-Minimum' – 'Do-Something'		Speed (kph)
		Total vehicle flow (AADT)	HGV (AADT)	Total vehicle flow (AADT)	HGV (AADT)	Total vehicle flow (AADT)	HGV (AADT)	Total vehicle flow (AADT)	HGV (AADT)	
1	West Promenade	10625	62	10714	62	10714	62	0	0	45
2	Promenade	8478	128	8550	130	4462	61	-4088	-68	47
3	B5133	5000	119	5042	120	8312	175	3270	55	42
4	B5133	4902	114	4943	115	8213	170	3270	55	42
5	B5133	5423	108	5468	109	8738	164	3270	55	42
6	A547 Abergele Road	10130	405	10215	409	11033	422	818	14	39
7	A547 Abergele Road	12941	446	13070	450	13888	464	818	14	42
8	A547 Abergele Road	11962	478	12082	483	12899	497	818	14	39
9	Marine Road	2257	44	2280	45	6367	113	4088	68	43
10	A55 Expressway (Jct 21-22)	57917	3246	58496	3278	61866	3433	3370	155	79
11	Marine Road	2257	44	2280	45	3098	59	818	14	43
12	B5133	5000	119	5042	120	5042	120	0	0	42
13	A547	10130	405	10215	409	10215	409	0	0	39
14	A55 Expressway (Jct 20-21)	57917	3246	58496	3278	58596	3378	100	100	79

Source: Old Colwyn Coastal Defence and Active Travel: Transport Statement (ES Volume 2, Technical Appendix 15.1).

Figure 7.1: Modelled Traffic Links



Source: Mott MacDonald Ltd, 2020

Model Selection

7.4.16 The assessment uses a dispersion model called 'ADMS-Roads' (version 5.0.0.1), a PC-based model produced and validated by Cambridge Environmental Research Consultants of the dispersion in the atmosphere of pollutants released from road traffic sources.

7.4.17 The Scheme dispersion model was built by digitising traffic model links and assigning road widths based on aerial mapping.

Meteorological Data

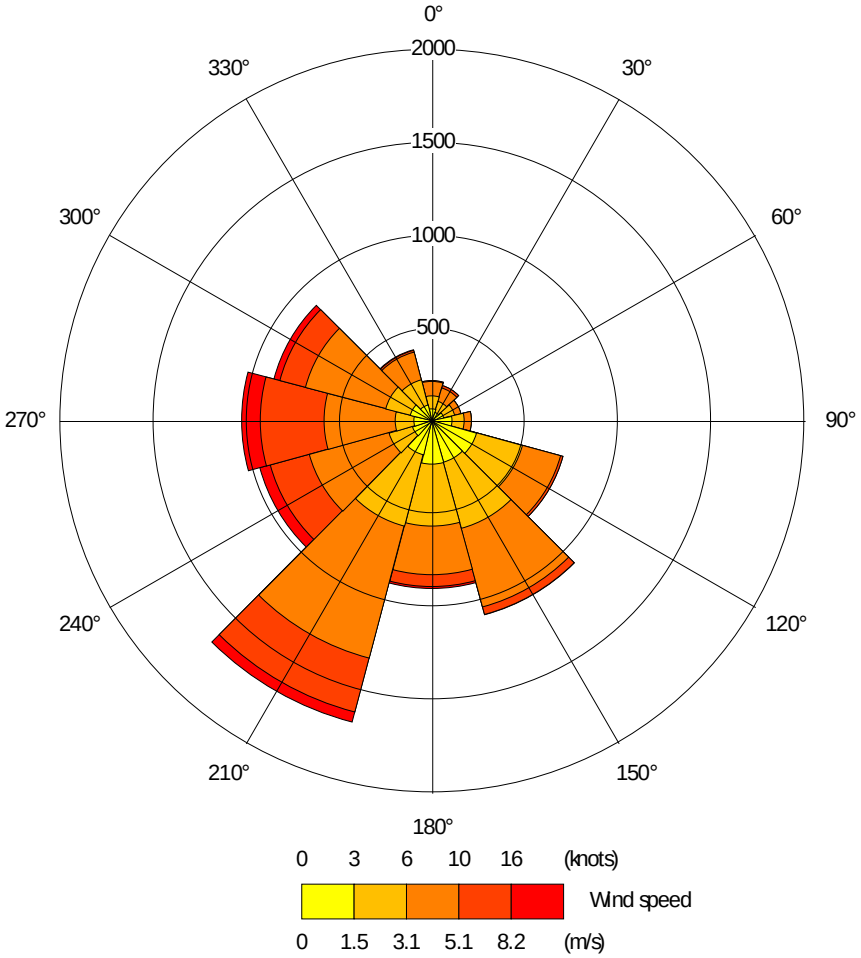
7.4.18 The most important meteorological parameters governing the atmospheric dispersion of emissions are wind direction, wind speed and atmospheric stability as described below:

- Wind direction determines the sector of the compass into which emissions are dispersed;
- Wind speed affects the distance which emissions travel over time and can affect dispersion by increasing the initial dilution of pollutants and, in the case of point sources, inhibiting plume rise; and
- Atmospheric stability is a measure of the turbulence of the air, and particularly of its vertical motion. It therefore affects the spread of the plume as it travels away from the source. ADMS uses a parameter known as the Monin-Obukhov length that, together with the wind speed, describes the stability of the atmosphere.

7.4.19 For meteorological data to be suitable for dispersion modelling purposes, parameters need to be measured on an hourly basis. These parameters include wind speed, wind direction, cloud cover and temperature.

7.4.20 Following consideration of the meteorological data available, data from the Rhyl meteorological station was used as this is the most representative data available for the study area. This meteorological station is located approximately 7km south-east of the Scheme. A wind rose has been generated for the meteorological data used in this assessment, as shown in Figure 7.2. The wind rose illustrates that there is a dominance of strong winds from the south-south-west.

Figure 7.2: Wind rose for Rhys Meteorological Station 2019



Source: ADMS-Roads

Emission factors

7.4.21 The Emissions Factors Toolkit (EFT) (Version 9.0), released in May 2019[59], has been used to provide emissions factors for use within the modelling. A basic split of traffic composition including AADT and percentage of HGVs has been used to generate emission factors for each road link included in the model. This is known as Basic Split within the EFT.

NO_X to NO_2 Relationship

7.4.22 The model used for this assessment provides outputs for oxides of nitrogen (NO_x) which need to be converted to NO_2 to allow comparison with the relevant air quality objectives. Defra provides a spreadsheet-based method, which is available from Defra's Air Information Resource Website[60], for calculating annual mean NO_x to NO_2 conversions. This method has been used

[5959] Defra (2019) Emissions Factors Toolkit https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

[60] Defra (2019). LAQM support, Review and Assessment, Tools. Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

within the assessment and is the most appropriate way of determining NO_2 concentrations from road NO_x contributions.

Predicted Short-Term Pollutant Concentrations

7.4.23 For all discrete receptors assessed, annual mean concentrations of NO_2 have been presented. Defra's TG16 document[61] indicates that the hourly NO_2 air quality objective of 200µg/m^3 (not to be exceeded more than 18 times per year) is unlikely to be exceeded at roadside locations where the annual mean concentration is less than 60µg/m^3. Following this guideline, the hourly objective has not been considered further within this assessment as the annual modelled mean NO_2 concentrations are less than 60µg/m^3.

7.4.24 The prediction of daily mean concentrations of PM_{10} is available as an output option within the ADMS-roads dispersion model for comparison against the short-term air quality objective. However, as the model output for annual mean concentrations is considered more accurate than the modelling of the daily mean, an empirical relationship has been used to determine daily mean PM_{10} concentrations. In accordance with TG16 the following formula has been used:

No. of 24-hour mean exceedances = -18.5 + 0.00145 x annual mean^3 + (206 / annual mean)

7.4.25 Based on this formula, an annual mean PM_{10} concentration of 32µg/m^3 equates to 35 days at or above 50µg/m^3.

Addressing Uncertainty

7.4.26 Dispersion modelling has associated with it an inherent level of uncertainty, primarily as a result of:

- Uncertainties with emissions data
- Uncertainties with recorded meteorological data; and
- Simplifications made in the model algorithms or post processing of the data that represent atmospheric dispersion or chemical reactions.

7.4.27 A process known as model verification aims to address these uncertainties. Verification is done by comparing modelled concentrations with monitored concentrations to identify any disparity. Verification was undertaken using the nearest four local authority monitoring locations (see Table 7.7), unfortunately traffic data was only available for roads close to two of the locations. The verification factor for the two remaining sites was calculated to be 1.2; due to the small number of verification sites, the model outputs have instead been uplifted by a factor of 2 in order to present worst-case results. This is based on professional judgement and experience with undertaking recent air quality assessments where the calculated verification factor is usually less than 2 when assuming emissions based on EFT Version 9.0.

Sensitive Human Receptors

7.4.28 The air quality objectives only apply in locations of relevant exposure. Therefore, receptors have been chosen following the advice set out in Defra TG16.

7.4.29 16 residential receptors were modelled for the construction assessment at worst-case locations within 200m of the roads affected by the diversion, as shown in Table 7.4 and Figure 7.3. Receptors were selected using professional judgement at locations where total pollutant concentrations were expected to be greatest (typically closest receptors to roads), or where the

[61] Department for Environment, Food and Rural Affairs (2018). Local Air Quality Management – Technical Guidance (16).

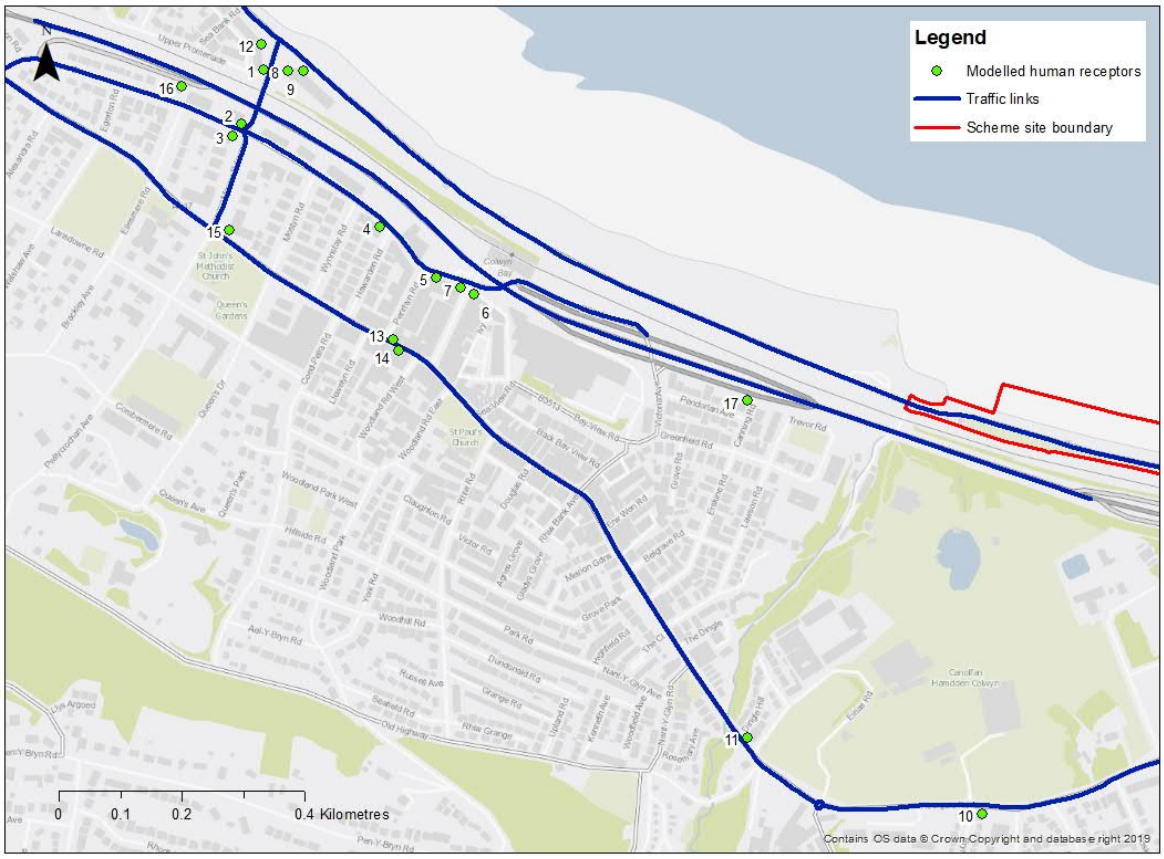
greatest change in air quality was anticipated based on the traffic impacts. One short-term receptor (Centre for Health and Disability Assessment) was modelled, as this is located on the junction with some of the highest diversion flows and members of the general public are regularly present at the Centre for one hour or more. All human receptors were modelled at a height of 1.5m.

Table 7.4: Modelled Human Receptors

Receptor ID	Receptor Name	National Grid reference	Height (m)	Receptor Type
1	Upper Promenade	284690, 379440	1.5	(Residential)
2	Centre for Health & Disability Assessment	284655, 379352	1.5	(Short-term)
3	Marine Road	284640, 379332	1.5	(Residential)
4	Princes Drive	284880, 379186	1.5	(Residential)
5	Penrhyn Road	284972, 379102	1.5	(Residential)
6	Victoria Avenue	285033, 379075	1.5	(Residential)
7	Victoria Avenue	285012, 379085	1.5	(Residential)
8	Princess Court	284730, 379439	1.5	(Residential)
9	Princess Court	284755, 379438	1.5	(Residential)
10	Abergele Road	285859, 378229	1.5	(Residential)
11	Abergele Road	285478, 378353	1.5	(Residential)
12	Upper Promenade	284688, 379481	1.5	(Residential)
13	Abergele Road	284901, 379001	1.5	(Residential)
14	Abergele Road	284911, 378984	1.5	(Residential)
15	Rhoslan Park	284636, 379180	1.5	(Residential)
16	Kingsway	284558, 379414	1.5	(Residential)
17	Canning Road	285478, 378901	1.5	(Residential)

Source: Mott MacDonald, 2020

Figure 7.3: Modelled Human Receptors



Source: Mott MacDonald Ltd, 2020

Sensitive Ecological Receptors

7.4.30 The Upper Dingle Woods Local Wildlife Site (LWS) and Local Nature Reserve (LNR) is located within 200m of a section of the A574 which falls within the affected road network. Although not a statutory site, this site was modelled as the Scheme ecologist advised that the Site may be sensitive to NOx. Points were modelled at 20m intervals along a 200m transect, from the nearest point of the LNR to the affected road network, outwards perpendicularly from the road. The modelled transect points are presented in Table 7.5 and Figure 7.4. All ecological receptors were modelled at ground level.

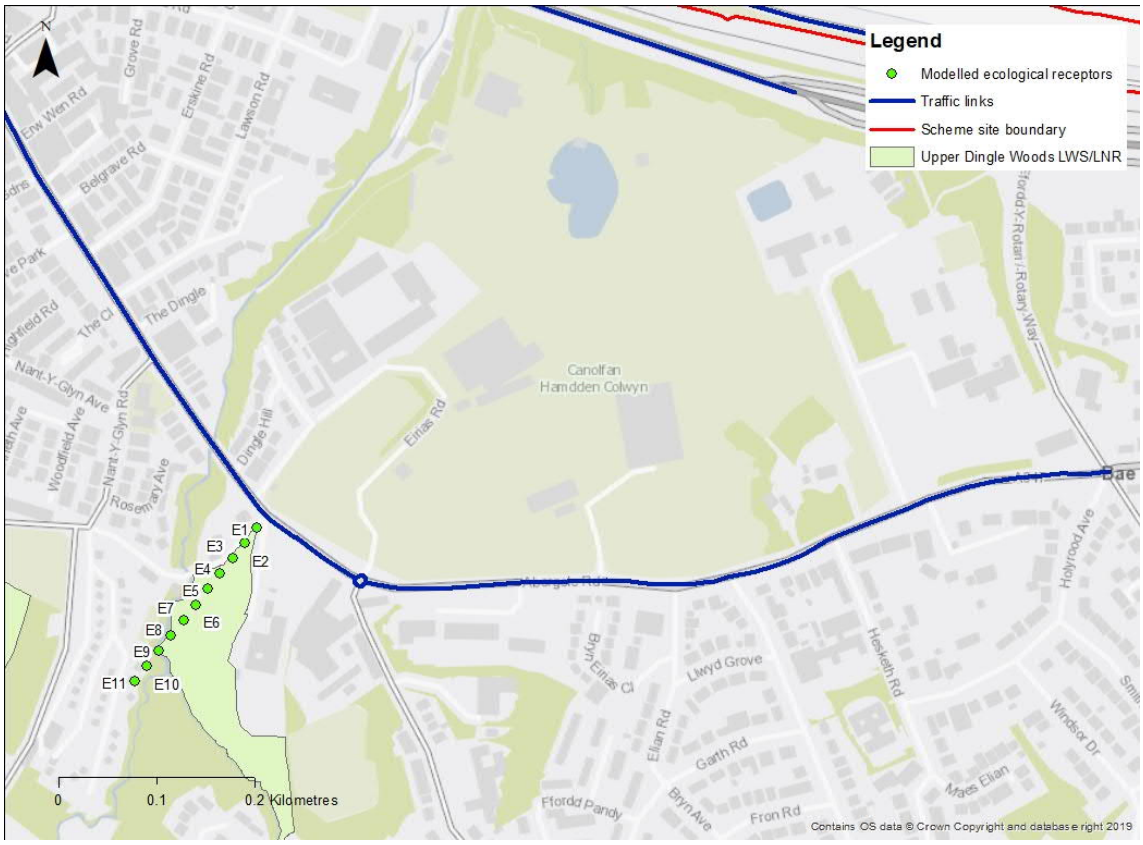
Table 7.5: Modelled Ecological Receptors

Receptor ID	Receptor Name	National Grid Reference	Height (m)
E1	Upper Dingle Woods 0m	285489, 378298	0
E2	Upper Dingle Woods 20m	285477, 378282	0
E3	Upper Dingle Woods 40m	285464, 378266	0
E4	Upper Dingle Woods 60m	285452, 378251	0
E5	Upper Dingle Woods 80m	285439, 378235	0
E6	Upper Dingle Woods 100m	285427, 378219	0
E7	Upper Dingle Woods 120m	285414, 378204	0
E8	Upper Dingle Woods 140m	285402, 378188	0
E9	Upper Dingle Woods 160m	285389, 378172	0
E10	Upper Dingle Woods 180m	285377, 378157	0

E11	Upper Dingle Woods 200m	285364, 378141	0

Source: Mott MacDonald Ltd 2020

Figure 7.4: Modelled Ecological Receptors



Source: Mott MacDonald Ltd 2020

Operational Phase

Operational Road Traffic Emissions

7.4.31 The Scheme is anticipated to result in an increase of less than 20 parking spaces. Whilst the Scheme proposes improvements to the carriageway and active travel infrastructure, there would be substantial or permanent change to the transport network.

7.4.32 Trips associated with the development of the site are not expected to generate additional vehicle flows on the local road network compared to the current level or that exceed the EPUK/IAQM criteria, therefore further assessment of operational traffic has been scoped out. Additional information is provided in the Old Colwyn Coastal Defence and Active Travel: Transport Statement (ES Volume 2, Technical Appendix 15.1).

Significance of Effect

7.4.33 Guidance is available from a range of regulatory authorities and advisory bodies on how best to determine and present the significance of effects within an air quality assessment. It is generally considered good practice that, where possible, an assessment should communicate effects both numerically and descriptively.

7.4.34 Any description of an effect of a development is informed by numerical results; an element of professional judgement must also be involved. To ensure that the descriptions of effects used

within the assessment are clear, consistent and in accordance with the latest guidance, definitions for the assessment of changes in air quality concentration at individual human health receptors have been adopted from the EPUK/IAQM guidance.[50] Table 7.6 provides impact descriptors for changes in pollutant concentrations as a result of the Scheme.

7.4.35 The magnitude of any concentration change identified must be considered in relation to the Air Quality Assessment Level (AQAL), which may be an air quality objective, regulatory limit or target value. The most important aspects to consider are the percentage of long-term average concentrations at the individual receptor in the assessment year in relation to the AQAL and the percentage of change in concentration in relation to the AQAL.

7.4.36 EPUK/IAQM recognises that professional judgement is required in the interpretation of air quality assessment significance. Table 7.6 is intended as a tool to help interpret the results to the air quality assessment and would therefore be employed in conjunction with professional judgement.

Table 7.6: Impact Descriptors for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Year	Change in Concentration Relative to Air Quality Assessment Level (AQAL)			
	1%	2%-5%	6%-10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76%-94% of AQAL	Negligible	Slight	Moderate	Moderate
95%-102% of AQAL	Slight	Moderate	Moderate	Substantial
103%-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Source: Land-Use Planning and Development Control: Planning for Air Quality' guidance produced by EPUK and the IAQM

Notes: [a] AQAL = Air Quality Assessment Level i.e. 40µg/m³ for annual mean NO_2. The table is only designed to be used with annual mean concentrations

[b] Percentage pollutant concentrations are intended to be rounded to whole numbers. For example, the '<1%' category in this table includes all changes from 0.5% to 1.4% (equivalent to an annual mean NO_2 absolute concentration change of between 0.2µg/m³ and 0.6µg/m³). Changes of 0% (i.e. less than 0.5%) are described as negligible.

[c] When defining the concentration as a percentage of the AQAL, use the 'do minimum' concentrations where there is a decrease in pollutant concentration and the 'do something' concentration for an increase.

7.4.37 IAQM Guidance[62] advises for ecological receptors, where the change in relevant predicted pollutant concentrations as a percentage of the relevant critical level or load is less than 1%, effects are deemed in be insignificant. The Project ecologist should be consulted where the change in relevant predicted pollutant concentrations as a percentage of the relevant critical level or load is greater than 1%. However, a change greater than 1% does not automatically indicate a significant effect.

7.4.38 For the purposes of this assessment, impacts of **Moderate Adverse** or **Moderate Beneficial** and above would generally be considered to cause a significant effect, although professional judgment would be applied.

[62] Holman et al (2019). A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.0, Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/airquality-impacts-on-nature-sites-2019.pdf

Assessment Assumptions and Limitations

Assumptions

7.4.39 An assumption has been made that the additional construction vehicles (HDV) would exceed 100 AADT.

7.4.40 Assumptions have been made that the operation of the Scheme:

- Will not lead to an increase in vehicle movements exceeding the EPUK/IAQM thresholds
- Will encourage usage of non-motorised transport along the Promenade due to improvements to the pedestrian and cycle path; and
- Will have no more than 20 additional car parking spaces.

Limitations

7.4.41 Traffic surveys for the Scheme were cancelled due to Covid-19, as such, historic traffic data has been obtained from CCBC. The data provided is from previous phases of work along the waterfront and from a feasibility study looking a one-way system through Colwyn Bay Town Centre. Traffic flow information for the A55 Expressway and the A547 was taken from the DfT Road Traffic Statics website, where manual count or annual estimates are provided.

7.4.42 Unfortunately, due to the restrictions in data collection, count data was only available for 10 road links. To prevent underestimations in the dispersion modelling, road links 11 – 14, which had no available count data, were assumed to have the same amount of traffic as the closest section of the same road. This was agreed with the Scheme transport consultant in lieu of available data.

7.5 Baseline Conditions

Sources of Information

7.5.1 Information on air quality in the UK can be obtained from a variety of sources including local authorities, national network monitoring sites and other published sources. The baseline data most representative of the Scheme site has been obtained from the North Wales Combined Authority Air Quality Progress Report 2019[63] and Defra[64]. The most recent full year of monitoring data available is for 2018. No surveys were required for this Scheme, as sufficient local authority monitoring data is available to provide a robust baseline.

Local Authority Monitoring

7.5.2 CCBC has declared no AQMAs for its administrative area as there are no monitored exceedances of the relevant national objectives. CCBC has no automatic monitoring stations and monitors NO_2 using passive diffusion tubes at 18 locations within Conwy County Borough. Four diffusion tubes are within 1.5km of the Scheme, the monitoring data for which are presented in Table 7.7. No exceedances of the NO_2 annual mean objective have been recorded at any of the nearest diffusion tube locations. The highest 2019 concentration, measured at Kingsway, is 16.3µg/m^3, less than half of the annual mean objective of 40µg/m^3.

The location of these sites is presented in Figure 7.5.

[63] North Wales Combined Authority (2019) Air Quality Progress Report

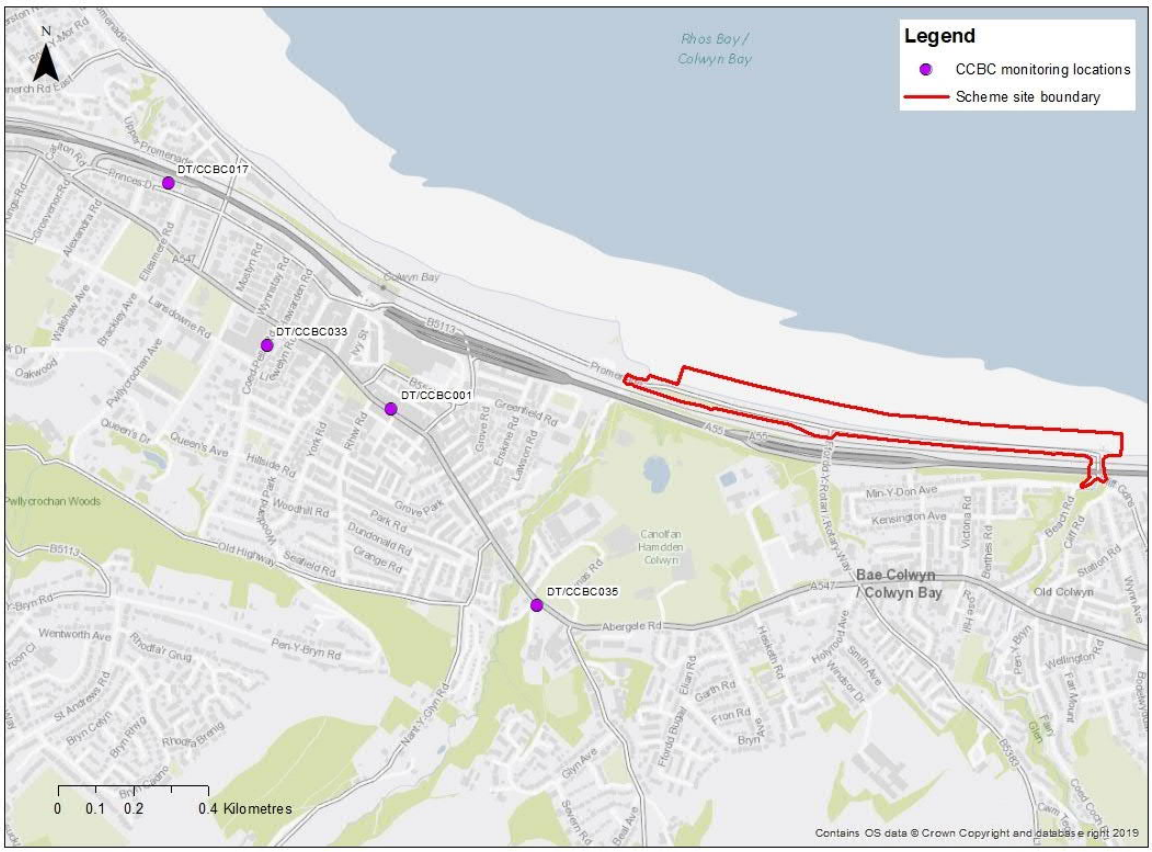
[64] Defra (2019). Background mapping data for local authorities. Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015

Table 7.7 Air Quality Monitoring Data for NO_2

Site ID	Site name	Site type	National Grid Reference		Annual Mean Concentration (µg/m^3)		
					2017	2018	2019
DT/CCBC001	Theatre Colwyn, Colwyn Bay	Roadside	285119	378817	16.9	18.6	16.2[(a)]
DT/CCBC017	Kingsway, Colwyn Bay	Roadside	284526	379417	16.5	17.3	16.3[(b)]
DT/CCBC033	Coed Pella Rd, Colwyn Bay	Roadside	284789	378985	13.0	14.0	12.4[(b)]
DT/CCBC035	Ysgol Bod Alaw, Colwyn Bay	Roadside	285506	378295	15.5	16.5	16.1[(b)]

Source: North Wales Combined Authority, 2019 & correspondence with Principal Environment Officer.
Note: [(a)] Data capture <75%. Data has been annualised.
[(b)] Data capture 100%.
Bias adjustment factor for 2019 was 0.75.

Figure 7.5: Local Authority Monitoring Locations



Source: Mott MacDonald Ltd 2020

Defra Projected Background Concentrations

7.5.3 Defra provides mapped future-year projections of background pollution concentrations for NO_X, NO_2, PM_{10} and $PM_{2.5}$ for each 1km grid square across the UK for all years between 2017 to

2030[65]. The maps include a breakdown of background concentrations by emission source, including road and industrial sources, which have been calibrated against 2017 (the baseline year) UK monitoring data.

7.5.4 Table 7.8 presents background concentrations for the 1km grid squares containing the Scheme in the potential first year of construction, 2021. The maximum background concentrations at the site are all within the relevant objectives.

Table 7.8 Projected Background Concentrations (µg/m^3) of NO_x, NO_2, PM_{10} and $PM_{2.5}$ (maximum concentrations across Scheme)

Pollutant	Year 2021
NOx	12.2
NO_2	9.2
PM_{10}	8.7
$PM_{2.5}$	5.9

Source: Defra 2020. https://uk-air.defra.gov.uk/data/laqm-background-maps

Summary

7.5.5 The closest monitoring locations to the Scheme met the annual mean NO_2 objective in 2019. The monitoring sites are located near Colwyn Bay Town Centre where there are several busy intersecting roads, as opposed to the Site where there is a road, with fewer vehicles adjacent to the seafront, backed by the NWC Railway Line embankment with a higher likelihood of emissions being more readily dispersed. It is, therefore, likely that the objective is met at the Site.

7.5.6 CCBC does not monitor particulate matter (PM_{10} and $PM_{2.5}$) but it is recognised that where concentrations of NO_2 are low and road traffic is the primary source of emissions, the concentration of PM_{10}/$PM_{2.5}$ would also likely be lower than the air quality objectives. In the case of the Scheme, another primary source of particulate matter is contributions from sea salt due to its coastal location. It can be seen in the Defra predictions, however, that these are not expected to exceed the objectives for PM_{10} or $PM_{2.5}$.

7.5.7 Defra's TG16[66] document indicates that the hourly NO_2 air quality objective of 200µg/m^3 (not to be exceeded more than 18 times per year) is unlikely to be exceeded at roadside locations where the annual mean concentration is less than 60µg/m^3. Following this guideline, the hourly objective is therefore considered to also be met, as the monitored mean NO_2 concentrations are less than 60µg/m^3.

7.5.8 The Defra predictions indicate that the background concentrations at the Scheme site are unlikely to exceed the relevant objectives.

7.6 Consultation

7.6.1 In line with the EIA Scoping Report (ES Volume 2, Technical Appendix 1.3), the operational phase of the Scheme has been scoped out of the assessment, given the minimal likely impacts air quality during the operational period as agreed by CCBC in their Scoping Opinion (ES Volume 2, Technical Appendix 1.4). Only the construction phase remains scoped in. No

[65] Defra Background maps (2017) available at: https://uk-air.defra.gov.uk/data/laqm-background-maps

[66] Defra (February 2018) Local Air Quality Management – Technical Guidance (16)

comments were received on the air quality chapter of the EIA Scoping Report contained within the Scoping Opinion.

7.6.2 The overall air quality assessment approach was agreed with the Principal Environment Officer at CCBC on 01/07/2020. Scheme-wide consultation details are provided in Chapter 5.

7.7 Potential Impacts (Pre-Secondary Mitigation)

Primary (Embedded) Mitigation

7.7.1 A number of primary mitigation and enhancement measures have been incorporated into the Scheme proposals, in terms of working methodology and Scheme design. These are outlined below. Unless otherwise stated, these primary mitigation measures have been assessed as part of the Scheme proposals in the "pre-mitigation" effects. The primary mitigation for this Scheme includes the following:

- Efforts have been made to minimise the movement of construction vehicles through reducing the amount of construction materials (see Chapter 5 Materials); and
- Delivery of materials and plant would be via the A55 Expressway at Junction 22. This route does not pass close to any residential properties or other sensitive receptors and avoids the movement of construction traffic through the streets of Colwyn Bay and Old Colwyn.

Construction

Human Receptors

7.7.2 17 human receptors were modelled to assess the air quality impacts from the Scheme construction traffic diversions. The results of the modelling are presented in Table 7.9; the EPUK/IAQM impact descriptors have been applied to the results as per Table 7.6 and the significance of the effect reported.

7.7.3 The highest modelled concentration was at Receptor 2, the short-term receptor, which had a 'Do-Something' concentration of 30.4µg/m^3. This receptor is located on the junction of Marine Road and B5113 Princes Drive, which is predicted to experience an increase of approximately 4000 AADT as a result of the construction diversions. Defra's TG16[61] document indicates that the hourly NO_2 air quality objective is unlikely to be exceeded at roadside locations where the annual mean concentration is less than 60µg/m^3. As the modelled concentrations in 'Do-Minimum' and 'Do-Something' are substantially less than 60µg/m^3, the hourly objective is therefore considered to be met.

7.7.4 The highest modelled concentrations at a residential receptor was at Receptor 1, which experienced a 'Do-Something' concentration of 28.0µg/m^3, with a change in concentration of 2.6µg/m^3. This receptor is located on Marine Road, which experiences an increase of approximately 4000 AADT as a result of the construction diversions. There is a Slight Adverse impact predicted at this receptor and the 'Do-Minimum' and 'Do-Something' concentrations are within the annual mean NO_2 objective of 40µg/m^3.

7.7.5 All other modelled receptors had smaller changes in concentration, lower overall concentrations and all met the annual mean NO_2 objective. Table 7.10 and Table 7.11 present the modelled results for PM_{10} and $PM_{2.5}$ at the receptor locations. The air quality impact at all locations is predicted to be Negligible, and concentrations are within the relevant air quality objectives for both pollutants. The overall effects at worst-case receptor locations are, therefore, considered to be not significant.

Table 7.9: Modelled Annual Mean NO_2 Concentrations (Human Receptors)

Receptor Number	NO_2 Concentrations ($\mu g/m^3$)		Change in NO_2 Concentration ($\mu g/m^3$)	Impact Descriptor	Significance
	2021 'Do Minimum'	2021 'Do Something'			
1	25.4	28.0	2.6	Slight Adverse (Direct)	Not significant
2	26.9	30.4	-	-	-
3	18.5	19.5	0.9	Negligible	Not significant
4	19.1	20.7	1.6	Negligible	Not significant
5	18.8	20.4	1.6	Negligible	Not significant
6	19.6	20.6	1.0	Negligible	Not significant
7	19.0	20.2	1.2	Negligible	Not significant
8	22.5	23.2	0.7	Negligible	Not significant
9	22.3	21.8	-0.5	Negligible	Not significant
10	13.1	13.4	0.3	Negligible	Not significant
11	20.5	21.2	0.7	Negligible	Not significant
12	21.2	22.3	1.2	Negligible	Not significant
13	26.7	27.8	1.2	Negligible	Not significant
14	16.9	17.5	0.6	Negligible	Not significant
15	20.1	20.8	0.7	Negligible	Not significant
16	27.0	27.3	0.3	Negligible	Not significant
17	20.5	20.5	-0.1	Negligible	Not significant

Source: ADMS-Roads
* Short-term receptor, the long-term air quality objectives do not apply.

Table 7.10: Modelled Annual Mean PM_{10} Concentrations (Human Receptors)

Receptor Number	PM_{10} Concentrations ($\mu g/m^3$)		Change in PM_{10} Concentration ($\mu g/m^3$)	Impact Descriptor	Significance
	2021 'Do Minimum'	2021 'Do Something'			
1	12.7	13.3	0.6	Negligible	Not significant
2*	12.9	13.8	-	-	-
3	10.9	11.1	0.2	Negligible	Not significant
4	11.0	11.4	0.3	Negligible	Not significant
5	10.9	11.3	0.4	Negligible	Not significant
6	10.7	10.9	0.2	Negligible	Not significant
7	10.5	10.8	0.3	Negligible	Not significant
8	11.9	12.1	0.1	Negligible	Not significant
9	11.9	11.7	-0.1	Negligible	Not significant
10	9.9	9.9	0.1	Negligible	Not significant
11	11.4	11.5	0.2	Negligible	Not significant
12	11.5	11.8	0.2	Negligible	Not significant
13	12.4	12.7	0.3	Negligible	Not significant
14	9.8	10.0	0.1	Negligible	Not significant
15	10.9	11.1	0.2	Negligible	Not significant

Receptor Number	PM_{10} Concentrations (µg/m^3)		Change in PM_{10} Concentration (µg/m^3)	Impact Descriptor	Significance
	2021 'Do Minimum'	2021 'Do Something'			
16	13.1	13.2	0.1	Negligible	Not significant
17	11.9	11.9	0.0	Negligible	Not significant

Source: ADMS-Roads
* Short-term receptor, the long-term air quality objectives do not apply.

Table 7.11: Modelled Annual Mean $PM_{2.5}$ Concentrations (Human Receptors)

Receptor Number	$PM_{2.5}$ Concentrations (µg/m^3)		Change in $PM_{2.5}$ Concentration (µg/m^3)	Impact Descriptor	Significance
	2021 'Do Minimum'	2021 'Do Something'			
1	8.0	8.3	0.3	Negligible	Not significant
2*	8.1	8.6	-	-	-
3	7.0	7.1	0.1	Negligible	Not significant
4	7.1	7.3	0.2	Negligible	Not significant
5	7.0	7.2	0.2	Negligible	Not significant
6	6.9	7.0	0.1	Negligible	Not significant
7	6.8	6.9	0.1	Negligible	Not significant
8	7.6	7.7	0.1	Negligible	Not significant
9	7.5	7.5	0.0	Negligible	Not significant
10	6.6	6.6	0.0	Negligible	Not significant
11	7.4	7.5	0.1	Negligible	Not significant
12	7.4	7.5	0.1	Negligible	Not significant
13	7.9	8.0	0.1	Negligible	Not significant
14	6.4	6.5	0.1	Negligible	Not significant
15	7.0	7.1	0.1	Negligible	Not significant
16	8.2	8.3	0.1	Negligible	Not significant
17	7.7	7.7	0.0	Negligible	Not significant

Source: ADMS-Roads
* Short-term receptor, the long-term air quality objectives do not apply.

Ecological Receptors

7.7.6 Seven ecological receptor points were modelled for the Upper Dingle Woods LWS/LNR and a nitrogen deposition assessment undertaken to establish the likely change in nitrogen deposition at the designation as a result of the construction diversions. The results are presented in Table 7.12.

7.7.7 The IAQM Guidance[67] advises that where the change in predicted pollutant concentrations as a percentage of the relevant critical level or load is less than 1%, effects are deemed in be insignificant. The change in concentration at the modelled point close to the nearest road experienced a change in NOx concentrations of 0.6µg/m^3, which is equivalent to 2.1% of the critical level (30µg/m^3).

[67] Holman et al (2019). A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.0, Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/airquality-impacts-on-nature-sites-2019.pdf

7.7.8 A nitrogen deposition assessment was undertaken to calculate the change in concentrations in relation to the critical load, which was taken from the APIS website[68] using their search by location function. The minimum critical load was assumed to be 10kgN/ha/year; as such the maximum change in NO_2 deposition in relation to the critical load (modelled at the closest point to the road) was calculated to be 0.1kgN/ha/year, which is equivalent to 1% of the critical load. Based on this, it is considered that the effects at this receptor are insignificant.

Table 7.12: Modelled Annual Mean NOx Concentrations and NO_2 Deposition (ecological receptors)

Receptor ID	Distance from Edge of Designation (m)	NOx Annual Mean Concentration (µg/m^3)			Modelled Road Contribution to NO_2 Dry Deposition (kg(N) ha/yr)		
		2022 DM	2022 DS	Change	2022 DM	2022 DS	Change
E1	0	17.2	17.8	0.6 (2.1% of critical level)	25.6	25.7	0.1 (1% of lower critical load)
E2	20	11.7	12.0	0.3 (0.9% of critical level)	24.8	24.8	0 (0.4% of lower critical load)
E3	40	10.0	10.2	0.2 (0.6% of critical level)	24.5	24.5	0 (0% of lower critical load)
E4	60	9.1	9.3	0.1 (0.4% of critical level)	24.4	24.4	0 (0% of lower critical load)
E5	80	8.6	8.7	0.1 (0.3% of critical level)	24.3	24.3	0 (0% of lower critical load)
E6	100	8.3	8.4	0.1 (0.2% of critical level)	24.2	24.2	0 (0% of lower critical load)
E7	120	8.1	8.1	0.1 (0.2% of critical level)	24.2	24.2	0 (0% of lower critical load)

Source: ADMS-Roads

Operation

7.7.9 No further assessment has been undertaken for operation.

7.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures

Mitigation

Construction

7.8.1 While delivery by road is the anticipated method of delivery, depending on funding and timing constraints, bringing in quarried rock by barge for direct delivery to the beach would be considered. This would reduce the number of construction vehicles on the roads and the associated vehicle emissions.

7.8.2 Retaining access to the westbound route of the Promenade highway during construction would help to minimise the amount of diverted traffic and potential air quality impacts during construction.

7.8.3 A CEMP would be produced by the contractor prior to works being undertaken on site. This would contain a dust risk assessment, in line with the IAQM guidance[56] and relevant air quality and dust management procedures to prevent and reduce impacts during construction. Best

[68] UK Air Pollution Information System (APIS) www.apis.ac.uk [online] Last accessed 30/06/2020.

practice mitigation measures for a site with a low risk of dust effects, as outlined in the IAQM guidance, are presented below. These measures should be incorporated into the CEMP and it is the responsibility of the build contractor to ensure dust and emission control methods presented below are agreed with the local authority and implemented effectively:

General

- Display the name and contact details of person(s) accountable for air quality and dust issues on site boundary;
- Display contractor's head or regional office contact information; and
- Develop and implement a Dust Management Plan (DMP) as part of the CEMP, including regular site inspections.

Site Management

- Record all dust and air quality complaints, identify causes and take appropriate action and record measures to reduce emissions. Make a complaints log available to the local authority when requested; and
- Record any exceptional incidents that cause dust and air quality pollutant emission either on or off the site and the action taken to resolve it.

Monitoring

- Undertake daily on-site and off-site inspection where receptors are nearby to monitor dust;
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked; and
- Increase the frequency of site inspections by the person accountable for air quality and dust issue on site when activities with a potential to produce dust are being carried out during dry or windy conditions.

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are away from receptors, as far as is possible;
- Erect solid screens or barriers around dusty activities or the application site boundary that are at least as high as any stockpiles on site. Keep screens clean using wet methods;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Avoid site run-off of water or mud. A record of any site run off should be kept and actions to prevent reoccurrence;
- Keep site fencing, barrier and scaffolding clean using wet methods;
- Remove materials that have a potential to produce dust from site as soon as possible unless being re-used on site;
- Cover, seed or fence stockpiles to prevent wind whipping;
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques;
- Ensure an adequate water supply on the site for effective dust/ particulate matter suppression/ mitigation using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling;
- Ensure equipment is readily available on site to clean any dry spillages; and

- No burning of waste.

Operating Vehicle/Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles;
- Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable; and
- Impose and signpost a maximum speed limit (15mph on surfaced road, 10mph on un-surfaced road).

Construction

- Avoid surface treatments to concrete or stone (scabbling) if possible; and
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out. Unless this is required for a particular process, in which case ensure that appropriate additional controls are in place.

Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport;
- Record all inspections of haul routes and any subsequent action in a site logbook; and
- Implement a wheel washing system.

Operation

7.8.4 Improvements to the highway would encourage active travel along the Promenade. No additional mitigation is proposed for the operation of the Scheme.

7.9 Assessment of Likely Significant Effects

7.9.1 The assessment of likely significant effects has been undertaken following the methodology described in Section 7.4.

7.9.2 Table 7.13 summarises the Scheme assessment of effects, detailing the potential effect identified and appropriate mitigation measure for a particular receptor.

Table 7.13: Assessment of Effects Summary

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 7.8)	Action by (Contractor/ Designer)	Receptor sensitivity	Residual Significance Category (with mitigation)
CONSTRUCTION					
Human receptors within 200m of the affected road network	Maximum impact was modelled to be Temporary Slight Adverse Direct .	Minimising construction traffic movements through reducing materials and use of barges for transport of materials. Adherence to control measures set out in CEMP.	Contractor	High (Residential)	**Direct, Temporary, Slight Adverse (AQ descriptor), Not Significant**
Ecological receptor within 200m of the affected road network	Temporary Negligible Direct	No mitigation proposed.	N/A	Low (local designation)	**Direct, Temporary, Negligible Adverse (AQ descriptor), Not Significant**

Source: Mott MacDonald, 2020

Likely Residual Significant Effects Recorded (Post-Mitigation)

Construction

7.9.3 Incorporating the mitigation measures as outlined in Section 7.8, the maximum residual effect identified is **Slight Adverse** (not significant).

Operation

7.9.4 No further assessment has been undertaken for operation.

7.10 Requirements for Tertiary Mitigation/Monitoring

7.10.1 There are no requirements for monitoring during the construction or operation of the Scheme.

7.11 Conclusions

7.11.1 In summary, the air quality assessment has shown that with the inclusion of appropriate mitigation measures as outlined in Section 7.8, construction traffic effects on identified worst-case receptors are considered to be not significant.

7.11.2 Any additional mitigation requirements, identified through an IAQM[56] dust risk assessment, would be included within the outline CEMP.

7.11.3 The completed and operational scheme is not expected to result in any significant air quality effects, nor is it considered to conflict with any national, regional or local planning policy within CCBC.

7.12 Drawings

7.12.1 No key drawings accompany this Chapter. Essential figures are included within the chapter text.

7.13 List of Documents Included in ES Volume 2: Technical Appendix 7

7.13.1 No technical appendices accompany this Chapter.

8 Biodiversity (Marine and Terrestrial)

8.1 Introduction

8.1.1 For the purposes of this report, biodiversity relates to the ecological features, namely designations, habitats and species (terrestrial and marine), within the Scheme and surrounding area. This Chapter would identify and assess these terrestrial and marine ecological features using ecological baseline data gathered from desktop records, and field and coastal surveys. An assessment of the likely significant environmental effects from construction and operational activities is included for each ecological receptor (within the categories of ecological protected areas and designations, habitats and protected species). Based on these effects, avoidance and mitigation measures required to prevent, reduce, or offset any significant adverse effects are described, and detailed ecological enhancement measures are proposed to target an overall benefit to biodiversity. Following this, the anticipated residual effects are assessed for each receptor and the Scheme as a whole.

8.1.2 The assessment has been undertaken in accordance with guidance set out within DMRB LA108 (Biodiversity)[69] and the Chartered Institute of Ecology and Environmental Management (CIEEM) (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland –2nd edition[70].

8.1.3 The key drawings referenced in this Chapter can be found in Section 8.12, while the technical appendices are listed in Section 8.13 and can be found in the ES Volume 2, Technical Appendix 8. These include a report to inform a Habitats Regulations Assessment (HRA) in respect of potential effects on the adjacent Liverpool Bay Special Protection Area (SPA).

8.2 Legislative and Policy Framework

8.2.1 The principal legislative and planning context in relation to the assessment of the environmental effects of the Scheme on biodiversity is summarised below. A full outline of the relevant species-specific legislation used to inform this assessment can be found in ES Volume 2, Technical Appendix 8.1.

National Legislation

8.2.2 This chapter has been prepared with reference to the following UK and Welsh legislation of relevance to nature conservation and biodiversity:

- The Conservation of Habitats and Species Regulations 2017[71], as amended;
- The Wildlife and Countryside Act 1981[72], as amended;
- The Well-being of Future Generations (Wales) Act 2015[73]; and
- The Environment (Wales) Act 2016[74].

[69] DMRB (Design Manual for Roads and Bridges), n.d. *LA 108 Bioiversity (formerly Volume 11, ection 3, Part 4 Ecology and Nature Conservtion and IAN 130/10).* Revision 1.

[70] CIEEM (2018). Guidelines for Ecological Impact Assessment. Chartered Institute of Ecology and Environmental Management, Winchester [online]. Available at: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1Update.pdf

[71] The Conservation of Habitats and Species Regulations 2017. [online]. Available at: http://www.legislation.gov.uk/uksi/2017/1012/contents/made

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

[73] Well-being of Future Generations (Wales) Act (2015). 2015 anaw 2. UK: The Stationery Office Limited.

[74] The Environment (Wales) Act 2016. [online]. Available at: http://www.legislation.gov.uk/anaw/2016/3/contents/enacted

8.2.3 Together these documents cover the key ecological protection afforded to biodiversity at a national level. This is supplemented by species-specific legislation, such as for wild mammals (such as badger, deer or seals). Further information on species-specific legislation is provided in ES Volume 2, Technical Appendix 8.1.

8.2.4 Of particular note in Wales, is that under the Environment (Wales) Act 2016, public bodies, including Local Authorities, are required "*to seek to maintain and enhance biodiversity in Wales*" when carrying out their normal functions. Under Section 7 a list of species and habitats of principal importance to the conservation of biodiversity in Wales (also known as 'priority' or 'Section 7' species and habitats) was drawn up which acts as an aid to guide public bodies in implementing their duty. The Local Authority must consider the impact of the proposed works on these Section 7 habitats and species.

8.2.5 Consideration of the legal protection of designated sites, habitats and species under the above context has informed the assessment of scale and 'importance' of each receptor (in line with relevant guidance) as well as the assessment and mitigation requirements.

National Policy

8.2.6 At a national level, Planning Policy Wales (PPW)[75] outlines the land use planning policy for Wales set out by the Welsh Government. It provides a framework for the effective preparation of Local Planning Authorities' development plans. Chapter 6 of PPW (which relates to conserving and enhancing the natural environment) requires Local Authorities to take measures to:

- Promote the conservation of landscape and biodiversity, in particular the conservation of native wildlife and habitats;
- Ensure that action in Wales contributes to meeting international responsibilities and obligations for the natural environment;
- Ensure that statutorily designated sites are properly protected and managed;
- Safeguard protected species; and
- Promote the functions and benefits of soils, and in particular their function as a carbon store.

8.2.7 PPW is supplemented by 21 topic based Technical Advice Notes (TAN). In particular TAN 5 – Nature Conservation and Planning[76] provides advice about how the land use planning system should underwrite the protection and enhancement of biodiversity and geological conservation.

Local Policy

At a local level, planning policies are set out within the Conwy Local Development Plan (Adopted October 2013). Supplementary documentation is in the form of 'Topic Paper 6: Natural Environment' (2018).

Three policies are of relevance to ecology:

- Policy NTE/1 – The Natural Environment;
- Policy NTE/3 – Biodiversity; and
- Policy NTE/5 – The Coastal Zone.

Policy NTE/1 states that:

[75] Welsh Government (2018). Planning Policy Wales – Edition 10. [online]. Available at: https://gov.wales/sites/default/files/publications/2019-02/planning-policy-wales-edition-10.pdf

[76] Welsh Government (2009). Planning Policy Wales - Technical Advice Note 5: Nature Conservation and Planning. [online]. Available at: https://gov.wales/sites/default/files/publications/2018-09/tan5-nature-conservation.pdf

"In seeking to support the wider economic and social needs of the Plan Area, the Council will seek to regulate development so as to conserve and, where possible, enhance the Plan Area's natural environment, countryside and coastline. This will be achieved by:

- *Safeguarding the Plan Area's biodiversity, geology, habitats, history and landscapes through the protection and enhancement of sites of international, national, regional and local importance, in line with Policy DP/6 – 'National Planning Policy and Guidance';*
- *Using Green Wedges and settlement boundaries to control the identity of individual settlements, to prevent coalescence and to protect the immediate landscape surrounding urban areas in line with Policy NTE/2 – 'Green Wedges and Meeting the Development Needs of the Community';*
- *Where appropriate and necessary, improving the quality of statutory and non-statutory landscapes and areas of biodiversity value affected by development, through management agreements, habitat connectivity, improved planting, landscape and maintenance specifications, in line with the Development Principle Policies and Policy NTE/3 – 'Biodiversity';*
- *Working with developers to safeguard protected species and enhance their habitats in line with Policies DP/6 and NTE/3;*
- *Respecting, retaining or enhancing the local character and distinctiveness of the individual Special Landscape Areas in line with Policy NTE/4 – 'The Landscape and Protecting Special Landscape Areas' and as shown on the Proposals Map;*
- *Protecting the Coastal Zone in line with Policy NTE/5 – 'The Coastal Zone'; and*
- *Preventing, reducing or remedying all forms of pollution including air, light, noise, soil and water, in line with Policy DP/6".*

Policy NTE/3 states that:

- "*New development should aim to conserve and, where possible, enhance biodiversity through:*
  - *Sensitive siting; avoiding European protected sites or those of national or local importance;*
  - *Sensitive layout and design which avoids impacts or mitigates through an agreed programme for any identified adverse impact on biodiversity;*
  - *Creating, enhancing and managing wildlife habitats and natural landscapes including connectivity;*
  - *Integrating biodiversity measures into the built environment;*
  - *Contributing to achieving targets in the Conwy Local Biodiversity Action Plan (LBAP);*
  - *Providing for a management agreement with the Local Planning Authority to secure the retention and long-term future of biodiversity interests where applicable.*
- *All proposals should include a Biodiversity Statement detailing the extent of impact on biodiversity.*
- *The Council will refuse proposals which would have a negative impact on a European Site, protected or priority species or habitat unless the impact is adequately mitigated, and appropriate remediation and enhancement measures are proposed and secured by planning conditions or obligations".*

Policy NTE/5 relates to coastal processes but also makes mention of biodiversity, int hat it states that:

"*A Coastal Zone is defined on the Proposals Map. Development in the Coastal Zone, outside settlement boundaries, will only be permitted where the development:*

- *Specifically requires a coastal location;*
- *Does not adversely affect the open character of the zone;*
- *Does not adversely affect the nature conservation value of the zone with any effects identified mitigated for;*
- *Does not detract from the tourism value or facilities;*
- *Does not interfere with natural coastal processes;*
- *Does not impede the function of any existing coastal defence structures;*
- *Accords with the Development Principles of the Plan".*

Other Policy and Guidance

Survey Guidance

8.2.8 The survey and assessment have been undertaken in line with best practice guidance. The methodologies and guidance used for each survey type are outlined in relevant sections below.

8.3 Study Area

8.3.1 The current guidance on ecological impact assessments[77] (CIEEM, 2018) recommends that all ecological features that occur within a Zone of Influence (ZoI) for a proposed development are investigated. The ZoI for this assessment includes:

- Areas directly within the land take for the proposed development and access;
- Areas which would be temporarily affected during construction;
- Areas likely to be impacted by hydrological disruption; and,
- Areas where there is a risk of pollution and noise disturbance during construction and/or operation.

8.3.2 The ZoI is variable depending on the nature of the construction activities and the ecological receptors affected. For this assessment, ZoIs have been defined as summarised in Table 8.1.

Table 8.1: Zone of Influence for this Assessment

Ecological Features	Zone of Influence
Designated sites	2.0km
European designated sites for bats	10.0km
Non-statutory designated sites	2.0km
Protected species records	1.0km
Protected species evidence	Within or adjacent to survey area *

Source: Mott MacDonald Limited, 2020

* Unless surveys outside of this are required by guidance or in order to understand a more mobile receptor (such as birds or marine mammals), in which case this is stated in the relevant sections.

8.3.3 The ecological survey work for the baseline section of this chapter has been undertaken in respect of the entire waterfront (approximately 3.5km). Namely, the combined areas of both the

[77] CIEEM (2018). Guidelines for Ecological Impact Assessment. Chartered Institute of Ecology and Environmental Management, Winchester [online]. Available at: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1Update.pdf

Colwyn Bay Waterfront Project – Phases 1 and 2 and the Scheme. The Phase 1 Habitat Map (Drawing 415437-MMD-00-XX-DR-N-1713 in Section 8.12) has been drawn to show the entire extent for completeness. The area represented on this Phase 1 Habitat Map is hereafter referred to as the 'survey area'. Given the linear nature of the Scheme as well as the types of marine or intertidal habitats present, reviewing the baseline for the entire survey area is considered to provide important ecology context to the site-specific results discussed within the impact assessment.

8.3.4 For the purposes of this assessment, the red line boundary for the Scheme has been taken as the 'Site' (See Red Line Boundary Plan Drawing 415437-MMD-00-XX-DR-N-1707 located in Chapter 1 Introduction, Section 1.8). The survey results of relevance to the Site have been reported within this Chapter (with reference to the survey area only used for context).

8.4 Assessment Methodology

Introduction

8.4.1 This section describes the methodology which has been used for the assessment of ecology and biodiversity (including intertidal marine and terrestrial ecological designations, habitats and species) which may affect, or be affected by, the construction and/or operation of the Scheme. The outcome has been used to aid the development of appropriate mitigation measures in order to avoid or reduce potential adverse effects.

8.4.2 The criteria for determining the value and sensitivity of ecological receptors has been undertaken in line with DMRB guidance (2019) LA108[78] (as this is a linear scheme with highway elements) and with reference to CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland –2nd edition[79].

Baseline Survey Methodologies

Desktop Study

8.4.3 A desk study was undertaken, as recommended in the CIEEM 'Guidelines for Preliminary Ecological Appraisal' – 2nd edition[80], to determine the presence of any designated nature conservation sites and protected or notable species within the ZoI of the Site. To ensure the validity of the data, only records collected in the last 10 years and within the ZoIs described in Table 8.1 were requested. Information to inform the desk study was obtained from the following sources:

- Cofnod (https://www.cofnod.org.uk/Home)[81];
- Multi Agency Geographical Information for the Countryside (MAGIC) website[82];
- Natural Resources Wales (NRW)[83]; and
- Joint Nature Conservation Committee (JNCC)[84].

[78] Design Manual for Roads and Bridges (DMRB) (2020). Sustainability and Environment Appraisal LA108 Biodiversity Revision 1
[79] CIEEM (2018). Guidelines for Ecological Impact Assessment. Chartered Institute of Ecology and Environmental Management, Winchester 2nd Edition [online]. Available at: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1Update.pdf, accessed June 2020
[80] CIEEM (2016). Guidelines for Preliminary Ecological Appraisal. Chartered Institute of Ecology and Environmental Management, Winchester.
[81] Cofnod (2020). Colwyn Bay P2B to P3 Biodiversity Information Search (Ref: E07906).
[82] Multi-Agency Geographic Information for the Countryside Website: http://magic.defra.gov.uk/, accessed June 2020
[83] Natural Resources Wales (2017). [Online] Available at: https://naturalresources.wales/conservation-biodiversity-and-wildlife/find-protected-areas-of-land-and-seas/designated-sites-search/?lang=en
[84] Joint Nature Conservation Council (2017). [Online] Available at: http://jncc.defra.gov.uk/.

8.4.4 The desk study methodology and results are presented in the Preliminary Ecological Appraisal Report (PEAR)[85] (ES Volume 2, Technical Appendix 8.2).

Habitats

8.4.5 Field surveys of the survey area were undertaken by experienced ecologists across multiple visits in December 2019 and January 2020, supplemented by additional visits in June 2020 and also review of photographs taken by local (non-ecology) surveyors[86] in the intervening period.

8.4.6 All terrestrial habitats within the survey area, where accessible, were identified and mapped in compliance with the 'Handbook for Phase 1 Habitat Survey: a technique for environmental audit' (JNCC, 2010). Dominant plant species were noted, as were any protected, uncommon or invasive species listed on Schedule 9 of the WCA (as amended) or Schedule 2 of the Invasive Alien Species (Enforcement and Permitting Order) 2019. The methodologies and assessment criteria used were based on current published guidance.

8.4.7 The potential for any faunal species, including badgers *Meles meles,* other mammals, common reptiles and invertebrates was noted during the course of the Phase 1 survey. Further surveys were recommended as appropriate.

8.4.8 For the intertidal zone, feedback received during the emergency works (Splashpoint Project) from the CCBC Ecologist along with previous survey work indicated that the key concern is the presence of Blue Mussel beds (*Mytilus edulis*). These form a type of Section 7 priority habitat, although it should be noted that this species is very common around the entirety of the UK coastline. On this basis, for ease of interpretation, a separate biotope map has not been undertaken (as was completed for Splashpoint – updating the Countryside Council for Wales (now NRW) biotope mapping) but instead the key intertidal habitat types found within the ZoI for the Scheme have been included in the Phase 1 map along with the extent of Blue Mussel (*Mytilus edulis*) beds and location of *Sabellaria alveolata* reefs as additional features.

8.4.9 Full details of the habitat surveys completed for the project are included within the Preliminary Ecological Appraisal Report (ES Volume 2, Technical Appendix 8.2).

Protected Species Surveys

8.4.10 The scope of survey work completed is summarised below in Table 8.2.

Table 8.2: Scope of Protected Species Surveys

Survey Type	Description	Timing	Guidance
Roosting bats – Preliminary Roost Assessment (buildings)	All of the buildings identified as likely to be impacted by the proposed works were assessed for bat roosting potential (these comprised a kiosk, two shelters and a toilet block).	April and June 2020	Collins (2016)[87]
Roosting bats – Preliminary Roost Assessment (trees)	All trees within the survey area were assessed for bat roosting potential.	April and June 2020	

[85] Mott MacDonald Ltd (2020). Colwyn Bay Preliminary Ecological Appraisal Report (Ref: 410895-MMD-N-R-00-XX-1701).

[86] Due to covid-19 travel and survey restrictions, further visits by ecologists, including marine technical specialists, were not possible so instead the habitats present were reviewed from detailed photographs. This is discussed in the limitations section.

[87] Collins, J. (ed) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London. ISBN-13 978-1-872745-95-1.

Survey Type	Description	Timing	Guidance
Roosting bats – Emergence / re-entry surveys (buildings)	Shelter 1 and the toilet block were assessed as having low bat roosting potential and subject to a single dusk survey.	June 2020	
Wintering bird surveys	The entire survey area was subject to wintering bird surveys, focussing on the intertidal and marine habitats (and any birds associated with the SPA). This was undertaken over five survey visits.	November 2019 – January 2020	British Trust for Ornithology wetland bird survey 'look-see' methodology (Bibby *et al.*, 2000)[88]

Source: Mott MacDonald Limited, 2020

8.4.11 Full methodologies for each species survey are detailed within the species reports as follows:

- Colwyn Bay Splashpoint Project: Wintering Bird Survey Report (January 2020) [89];
- Colwyn Bay: Preliminary Ecological Appraisal Report (July 2020; ES Volume 2, Technical Appendix 8.2) [90];
- Colwyn Bay: Over Wintering Bird Survey Report (February 2020; ES Volume 2, Technical Appendix 8.3) [91]; and
- Colwyn Bay: Bat Survey Report (July 2020; ES Volume 2, Technical Appendix 8.4) [92].

Identification and Assessment of Ecological Receptors

8.4.12 The criteria for determining the value and sensitivity of ecological receptors has been undertaken in line with DMRB (2019) LA108[93] and with reference to CIEEM (2018)[94]. For ecology, assessment of conservation importance includes consideration of the following:

- Designation of the site;
- Rarity of the species or habitats;
- Presence of Red Data Book (RDB) or endemic species;
- Presence of diverse assemblages of plants or animals;
- Plant communities typical of natural/semi-natural habitats;
- Habitat diversity; and,
- Connectivity and presence of large populations of animals which are uncommon or threatened in a wider context.

8.4.13 Taking the above into account, DMRB (2019) LA108 guidance assesses the level of importance (rather than sensitivity) of ecological receptors in terms of their geographic scale (International, UK or National, Regional, County or Local). In effect, this is equivalent to the assessment of receptor sensitivity, in that receptors of International importance are equivalent to 'very high' sensitivity, UK or National is effectively 'high', etc. Features of site value only have been assessed as 'less than local'.

[88] Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S. (2000). Bird Census Techniques. Second Edition. Academic Press, London.
[89] Mott MacDonald Ltd (2020). Colwyn Bay Splashpoint Project: Wintering Bird Survey Report (Ref: 410895- EC-001-A).
[90] Mott MacDonald Ltd (2020). Colwyn Bay Preliminary Ecological Appraisal Report (Ref: 410895-MMD-N-R-00-XX-1701-C).
[91] Mott MacDonald Ltd (2020). Colwyn Bay: Over Wintering Bird Survey Report (Ref: 410895-MMD-N-R-00-XX-1700).
[92] Mott MacDonald Ltd (2020). Colwyn Bay: Bat Survey Report (Ref: 417437-MMD-00-XX-RP-N-1727).
[93] DMRB (2020). Sustainability and Environment Appraisal LA108 Biodiversity Revision 1
[94] CIEEM (2018). Guidelines for Ecological Impact Assessment. Chartered Institute of Ecology and Environmental Management, Winchester [online]. Available at: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1Update.pdf

8.4.14 In line with this approach, each baseline ecological receptor (or resource) has been assigned a geographic level of importance, with reference to the descriptions summarised in Table 8.3 (summarised from DMRB) and using professional judgement.

Table 8.3: Scale for Evaluating the Importance of Ecology Receptors

Biodiversity Resource Importance	Description
International	Very high importance and rarity, international scale and very limited potential for substitution. Examples of this include: • Internationally designated sites (SACs, SPAs, Ramsar sites, etc); • Sites proposed for international designation (cSACs or pSACs); • Biogenetic Reserves, World Heritage Sites (where recognised specifically for their biodiversity value) and Biosphere Reserves; • Undesignated sites which meet the published selection criteria for international designation; • Resident or regularly occurring populations of species which can be considered at an international level where: (i) the loss of these populations would adversely affect the conservation status or distribution of the species at an international scale; (ii) the population forms a critical part of a wider population at this scale; or (iii) the species is at a critical phase of its life cycle at an international scale.
UK or National	High importance and rarity, national scale, and limited potential for substitution. Examples of this include: • National designated sites (SSSIs, NNRs, National Parks, Marine Protection Areas (MPAs) or Marine Conservation Zones (MCZs); • Undesignated sites which meet the published selection criteria for national designation; • UK BAP priority habitats or those listed in the relevant statutory list of priority species and habitats (i.e. Section 7 of the Environment (Wales) Act 2016); • Areas of irreplaceable habitats (including ancient woodland, ancient or veteran trees, blanket bog, limestone pavement, sand dunes, salt marsh and lowland fen); • Undesignated habitats which meet the definition of the above habitats; • Resident or regularly occurring populations of species which can be considered at an international, UK or national level where: (i) the loss of these populations would adversely affect the conservation status or distribution of the species at an national scale; (ii) the population forms a critical part of a wider population at this scale; or (iii) the species is at a critical phase of its life cycle at an national scale.
Regional	High or medium importance and rarity, regional scale, limited potential for substitution. Examples of this include: • Regionally important non-statutory designated sites (including heritage coasts); • Areas of habitats identified (including for restoration) in regional plans or strategies; • Resident or regularly occurring populations of species which can be considered at an international, UK or national level where: (i) the loss of these populations would adversely affect the conservation status or distribution of the species at a regional scale; (ii) the population forms a critical part of a wider population at this scale; or (iii) the species is at a critical phase of its life cycle at a regional scale. • Species identified in regional plans or strategies.

Biodiversity Resource Importance	Description
County	Low or medium importance and rarity, county or other unitary authority (i.e. borough or district) scale. Examples of this include: • Statutory and non-statutory wildlife or nature conservation sites designated at a county (or equivalent) level (including Local Wildlife Sites (LWSs), Local Nature Conservation Sites (LNCSs), Local Nature Reserves (LNRs), Sites of Importance for Nature Conservation (SINCs), Sites of Nature Conservation Importance (SNCIs) and County Wildlife Sites (CWSs)); • Areas of habitats identified in county or equivalent authority plans or strategies (such as local Biodiversity Action Plans); • Resident or regularly occurring populations of species which can be considered at an international, UK or national level where: (i) the loss of these populations would adversely affect the conservation status or distribution of the species at a county (or equivalent) scale; (ii) the population forms a critical part of a wider population at this scale; or (iii) the species is at a critical phase of its life cycle at a county (or equivalent) scale.
Local	Low importance and rarity, local scale. Examples of this include: • Local level designated sites (including all of those listed above for county level); • Areas of habitat considered to appreciably enrich the habitat resource within the local context including features of importance for migration, dispersal or genetic exchange; or • Populations / communities of species considered to appreciably enrich the habitat resource within the local context including features of importance for migration, dispersal or genetic exchange.
Less than local	This level of importance is not specifically included in the DMRB guidance but represents common and/or widespread habitats or species considered of value at the site level only. Loss of these features is unlikely to affect the local population status or conservation significance.

Source: Summarised and adapted from DMRB (2019) LA108 Table 3.9

Magnitude of Impact

8.4.15 The magnitude of impact is determined by the predicted deviation from the baseline conditions and the scale of the effect. In line with CIEEM (2018) guidance, this takes into account: extent; magnitude; duration; frequency and timing; and reversibility of effects. A distinction is also recognised between:

- Habitats – where effects on extent, structure and function of the habitat, as well as distribution and species composition, need to be considered; and
- Species – where effects on abundance and distribution of that species need to be considered.

8.4.16 Taking the above into consideration, the criteria for determining magnitude of impact (or level of effect) has been undertaken in line with DMRB (2019) LA108 and is summarised in Table 8.4.

Table 8.4: Scale for Evaluating the Magnitude with respect to Effects on Ecology – Effects can be Adverse or Beneficial

Magnitude (or Level) of Impact	Typical Description
Major	• Permanent / irreversible damage or improvement to a biodiversity resource; and • The extent, magnitude, frequency, and/or timing of an impact negatively / positively affects the integrity or key characteristics of the resource.
Moderate	• Temporary / reversible damage or improvement to a biodiversity resource; and • The extent, magnitude, frequency, and/or timing of an impact negatively / positively affects the integrity or key characteristics of the resource.
Minor	• Permanent / irreversible damage or improvement to a biodiversity resource; and • The extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
Negligible	• Temporary / reversible damage or improvement to a biodiversity resource; and • The extent, magnitude, frequency, and / or timing of an impact does not affect the integrity or key characteristics of the resource.
No change	• No observable impact, either positive or negative

Source: Summarised from DMRB (2019) LA108

Significance of Effect

8.4.17 Subsequent to identifying an appropriate receptor sensitivity and magnitude of impact using Table 8.3 and Table 8.4, the likely significance category and overall significance of effects has been assessed by using the matrix provided within Table 8.5 along with professional judgement to consider site specific factors that may be of relevance.

Table 8.5: Scale for Evaluating the Significance Category with Respect to Impacts on Ecology receptors – Effects can be Adverse or Beneficial

Resource Importance	Level of Impact: No Change	Negligible	Minor	Moderate	Major
International or European Importance	Neutral	Slight	Moderate or large	Large or very large	Very large
UK or National Importance	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
Regional Importance	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
County or equivalent authority Importance	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
Local Importance	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight
Less than Local Importance	Scoped out of assessment (neutral for all levels)				

Source: Adapted from DMRB (2019) LA108

8.4.18 Effects are identified as Neutral, Slight, Moderate, Large or Very Large; adverse or beneficial.

8.4.19 For the purposes of this assessment, effects of Moderate Adverse or Beneficial and above would be considered to be significant. However, negligible or minor effects could contribute to

in-combination or cumulative effects, which are assessed separately in Chapter 16 Cumulative Effects.

Assessment Assumptions and Limitations

Assumptions

8.4.20 A number of assumptions have been made about the proposed scope of works for the purposes of this assessment. These include:

- If rock revetment delivery by road is required, this would take place throughout Scheme construction (12 months of the year);
- If rock revetment delivery by barge is required:
  - The core wintering bird season (November to February) would or could be avoided. It is understood this would minimise the risk of standing time of the delivery barge during safety/delay risks for moving boulders between barges by transhipment in adverse weather; and
  - 24-hour working would be required to unload the rock delivery and as a result it is assumed that artificial lighting of any barge, support vessel (e.g. tug) and the unloading area would be required.
- Piling activities:
  - Piling would be timed to occur during hours of low tide (for safety and ease of access to the construction area). As a result, piling would not occur within the water column and impacts on marine mammals and fish species from underwater noise and vibration associated with piling are not considered within this assessment. It is possible for noise to propagate through the bedrock and sediments present on site and as a result impacts from noise and vibration is considered with regards to shellfish species; and
  - It is noted for the Scheme that a vibropiling rig would be used.
- During both the construction and operational phases, best practice mitigation with regard to pollution prevention outlined by CIRIA (Construction Industry Research and Information Associated) (2015)[95] would be followed; and
- On-going maintenance activities required under the operational phase of the Scheme would be minor and less than maintenance activities currently required following annual winter storm damage. Any significant repairs would be subject to a separate assessment and, if needed, planning application.

Limitations

8.4.21 Limitations of the survey work are included within individual habitat and species reports as referenced above. Where survey work was constrained by factors such as access and weather, this has been addressed during the survey windows and/or has been taken into consideration during the interpretation of the results. The main limitations are summarised below:

- Biological records obtained from third parties' datasets that are presented in the desk study do not represent a full and complete species list for the area;
- Ecological surveys are limited to factors which affect the presence of plants and animals, such as time of year, migration patterns and behaviour. The Phase 1 habitat survey was undertaken outside of the optimal survey window although this is unlikely to have affected identification of the broad habitat types; and

[95] CIRIA 2015. Charles, P, Edwards, P (eds), Environmental good practice on site guide (fourth edition) (C741)

- Due to the government restrictions in place relating to Covid-19, survey visits from March 2020 onward (including the intertidal walkover and bat roosting assessment of buildings), were suspended. Assessment for the purposes of the intertidal ecological enhancement works has therefore been undertaken by specialist marine ecologists using detailed photographic surveys completed by an experienced local environmental consultant and by experienced bat surveyors using existing information combined with professional judgement and experience for the building assessments, with both being interpreted on a precautionary basis where relevant.

8.4.22 These limitations have been considered in the assessment of these effects and a precautionary approach applied as needed to ensure the assessment is robust.

8.5 Baseline Conditions

8.5.1 The baseline conditions are summarised below for each ecological receptor, whilst the level of importance of each ecological receptor has been assessed in line with DMRB LA108 (summarised in Table 8.3).

8.5.2 As set out above, the ecological survey work for the baseline section of this chapter has been undertaken for the survey area (shown on the Phase 1 Habitat Plan, Drawing 415437-MMD-00-XX-DR-N-1713 in Section 8.12) but the results have been reviewed and reported below in respect of the Site (Red Line Boundary Drawing 415437-MMD-00-XX-DR-N-1707 in Chapter 1 Introduction, Section 1.7.1). On this basis, distances of designations and habitat descriptions may differ from those included in baseline reports.

8.5.3 A series of general Environmental Constraints Drawings including features pertinent to biodiversity can be found in Chapter 3 Scheme Description, Section 3.5.

Sources of Information

8.5.4 The ecological reports produced for this Scheme or other schemes in the survey area to date include the:

- Colwyn Bay Splashpoint Project: Preliminary Ecological Appraisal Report (January 2020);
- Colwyn Bay Splashpoint Project: Wintering Bird Survey Report (January 2020);
- Colwyn Bay Splashpoint Project: A Report to Inform a Habitats Regulations Assessment Appropriate Assessment (January 2020);
- Colwyn Bay: Preliminary Ecological Appraisal Report (July 2020; ES Volume 2, Technical Appendix 8.2);
- Colwyn Bay: Over Wintering Bird Survey Report (February 2020; ES Volume 2, Technical Appendix 8.3); and
- Colwyn Bay: Bat Survey Report (July 2020; ES Volume 2, Technical Appendix 8.4).

8.5.5 In addition, the following historical survey reports have been reviewed to inform the background to the assessment of effects:

- Colwyn Bay Waterfront Project – Phase 1 Engineering Works: Environmental Statement (October 2010);
- Colwyn Bay Waterfront Project: Environmental Statement Addendum of Phase 1b Promenade Enhancement and Phase 1c Coastal Defence (December 2013); and
- Colwyn Bay Waterfront Phase 2: Environmental Appraisal (September 2015).

Ecological Designations

8.5.6 The statutory and non-statutory designated sites identified from the desk study are described below.

Statutory Designated Sites

8.5.7 There are five statutory designated sites within 2.0km of the survey area. No Special Areas of Conservation (SACs) designated for bats were returned within 10.0km of the survey area. A map of these designated sites is provided as Drawing 415437-MMD-00-XX-DR-N-1709 in Section 8.12. Descriptions of the designated sites are provided in Table 8.6.

Table 8.6: Statutory Designations within 2.0km

Name	Status	Details	Distance and Direction	Level of Importance
Bae Lerpwl / Liverpool Bay	Special Protection Area (SPA), Important Bird Area (IBA)	The inshore area of Colwyn Bay lies within the boundary of Bae Lerpwl / Liverpool Bay SPA. The SPA regularly supports more than 1% of the British populations of red-throated diver (*Gavia stellata*), 1% of the biogeographical population of common scoter (*Melanitta nigra*) and more than 60,000 waterfowl during the non-breeding season. Within the entire SPA, peaks of common scoter can reach up to 29,000 birds (60% of total population) and up to 1000 (5%) of the UK red-throated diver population during October to March. The SPA is also designated for little gull (*Hydrocoloeus minutus*) and breeding common tern (*Sterna hirundo*) and little tern (*Sternula albifrons*).	Adjacent to the north	International
Fairy Glen	Local Nature Reserve (LNR)	Ancient broadleaved woodland along the banks of the river Colwyn, supporting species such as grey wagtail (*Motacilla cinereal*).	~0.5km south-east	County
Upper Dingle Woods	LNR	Broadleaved woodland supporting species such as lesser celandine (*Ficaria verna*) and bluebell (*Hyacinthoides non-scripta*).	~0.6km south	County
Pwllycrochan Woods	LNR	Ancient broadleaved woodland supporting species such as great spotted woodpecker (*Dendrocopos major*), treecreeper (*Certhia familliaris*) and tawny owl (*Strix aluco*).	~0.8km south-west	County
Mynydd Marian	SSSI and LNR	Of special interest for its range of limestone (calcicolous) grassland communities as well as its population of the dwarf race of silver studded blue butterflies (*Plebejus argus ssp. Caernensis*). Nationally scarce plant species spring cinquefoil (*Potentilla neumanniana) (P. tabernaemontani*) is also present within stands of calcicolous grassland.	~2.0km south-east	UK or National

Source: MAGiC Cofnod, 2020 & JNCC

Non-Statutory Designated Sites

8.5.8 There are three non-statutory designated sites within 2.0km of the survey area. A map showing the location of these designated sites is provided as Drawing 415437-MMD-00-XX-DR-N-1709 in Section 8.12. Descriptions of these designated sites are given in Table 8.7.

Table 8.7: Non-Statutory Designations within 2.0km

Name	Status	Details	Distance and Direction	Level of Importance
Upper Dingle Woods	LWS	See above LNR description.	~0.6km south	County
Pwllycrochan Woods	LWS	See above LNR description.	~0.8km south-west	County
Coed Rhos Fossil Woodland	LWS	Candidate fossilised woodland, no survey information is currently available.	~2km north-west	County

Source: Cofnod, 2020

Habitats

Summary of Habitats

8.5.9 The habitats within the Site and survey area (where relevant for context) are summarised in Table 8.8 in relation to their dominance along with an assessment of their level of importance.

8.5.10 Full descriptions of the habitats within the survey area are provided within the PEAR (ES Volume 2, Technical Appendix 8.2)[96].

[96] Mott MacDonald Ltd (2020). Colwyn Bay Preliminary Ecological Appraisal Report (Ref: 410895-MMD-N-R-00-XX-1701).

Table 8.8: Summary Descriptions of Habitats (On-site and Within the Wider Survey Area)

Habitat Type	Description	Level of Importance
Marine Habitats		
Intertidal sand	The intertidal area is largely dominated by mobile shifting transient sand, which forms the main habitat type across the Site and wider survey area (notably the Phase 1abc area west of the Site is where a beach recharge exercise has previously been undertaken). Subtidal sands and gravels is a Section 7 are a priority habitat. However, as the red line boundary is at the low tide mark, no subtidal habitats are present in the Site boundary. Intertidal sand is a common and widespread habitat locally and not of any local ecological importance.	Less than local
Shingle and gravel	Areas of shingle / gravel are present throughout the intertidal survey area, largely along the southern edge of the beach adjacent to the coastal defences and surrounding areas of mud and brackish water. Species associated with this habitat were common and widespread save for occasional patches of the tube-building polychaete Honeycomb worm (*Sabellaria alveolata)*, on sand-abraded eulittoral rock and is described separately below. On this basis, this habitat is of low ecological value locally.	Less than local
Boulders / rocks (groynes and other man-made features)	A number of man-made groynes are present along the length of the survey area. These comprise large boulders and a number have navigation markers (metal posts) at the end. Many of the boulders had been colonised by common intertidal green algae, macroalgae and lichens and a range of marine benthic species including *Sabellaria alveolata*. The boulders as part of the groynes and revetments are man-made, embedded in sediment and subject to daily tidal scour, such that they are not considered to have sufficient gaps on the underside to support a valuable under boulder communities. They are therefore not considered to represent the priority habitat 'Intertidal Underboulder Communities'.	Less than Local
Sea wall	A concrete sea wall is present along the boundary of the beach (the front), forming part of the current coastal defences. Parts of the wall have been colonised by common intertidal species such as barnacles, limpets, marine algae and some intertidal Blue Mussels. along with associated invertebrates. This habitat is man-made and does not support any notable species.	Less than Local
Dense and sparse mussel beds	Two Blue Mussel (Mytilus edulis) beds were identified as part of the survey work undertaken, of which only one is located within the Site area (at the eastern end). The mussel bed within the site covers an area of approximately 2440m2, which comprises two areas; one of denser mussel bed to the east (approximately 1160m2) and sparser mussels (approximately 1,280m2) (although it is noted that both are relatively sparse). This mussel bed is interspersed with brown seaweeds, fucoids and barnacles, which have colonised in the middle of the sand. Both the beds on site and off site appear to be in poor condition and appeared to have previously been dense (marked as 'dense' on the mapping as a relative term) but sparse at the time of survey, whilst there were many cracked and empty shells present (this is likely due to the exposed nature of the Colwyn Bay coastline). The mussel beds within the survey area broadly meet the description for the Section 7 priority habitat 'Blue mussel beds on sediment', in that Blue Mussel beds are present within the sand substrate. However, Blue Mussel beds that are classified as a priority habitat are valued as having a role in coastal sediment dynamics, acting as a food source for overwintering waders and	Local

Habitat Type	Description	Level of Importance
	providing an enhanced area of biodiversity and associated biota (typically associated with a range of organisms including fucoids, barnacles, isopods and other fauna). The mussel beds within the survey area are small and in poor condition (fragments and empty shells present on Site), whilst no evidence of any diverse assemblage of associated organisms was recorded during the surveys undertaken. In addition, Mytilus edulis are a species common to the Welsh coastline. On this basis, the habitats on Site are considered to be very poor examples of this priority habitat type and a value of local has been assigned to reflect this.	
Sabellaria alveolata Isolated small patches	A small isolated individual patch of reef formed by polychaete worms was noted within the shingle and gravel area in the centre of the Scheme and further smaller isolated patches were identified within the existing groyne structures across the Site (see Drawing 415437-MMD-00-XX-DR-N-1713 in Section 8.12 for approximate locations). These could meet the description of the priority habitat *Sabellaria alveolata* Reefs. This priority habitat can typically be 30cm to 50cm thick and form large expanses. It is noted that it is possible to assess the 'reefiness' of the *Sabellaria spinulosa* habitat[97], however as the habitat type present on Site is *Sabellaria alveolata* this assessment has not been undertaken. However, the sections of reef present on Site were noted to be relatively small and patchy and isolated in extent. Photographic evidence of these intermittent sections of *Sabellaria alveolata* reef have been analysed by marine ecologists who consider that some of the sections of reef structures on site are in a poor condition and are possibly dying/dead. It has been noted by members of the project team that over the course of the site visits undertaken, the areas of reef may be in decline and despite this species being ephemeral (short-lasting) in nature, this is likely due to the exposed nature of the site and the poor condition of the patches of reef and lack of supporting biota The exposed nature of the site can be seen through the distribution of the *Sabellaria alveolata* which appears to preferentially grow on the eastern side of the groyne structures (lee side of prevailing wind direction). The *Sabellaria alveolata* present on Site is therefore not considered to be a high-quality example of this priority habitat. A search using the Marine Plan Tool[98] shows that Annex 1 reefs are a common habitat type within the region and on this basis, the *Sabellaria alveolata* habitat present on Site has been valued at local level.	Local
Terrestrial Habitats		
Dense / continuous scrub	Dense bramble (*Rubus fruticosus*) is present on the NWC Railway Line embankment in the east of the survey area and on the road embankments south of the Promenade behind the Phase 1abc and Phase 2b areas. This habitat comprises common and widespread species and is limited in extent. It is therefore considered of low ecological value.	Less than local
Scattered scrub	Scattered scrub is present within the semi-improved grassland habitat along the NWC Railway Line embankment in the east of the survey area. Species present include broom (*Cytisus* sp.), gorse (*Ulex* sp.) and blackthorn (*Prunus spinosa*). This habitat comprises common and widespread species and is limited in extent. It is therefore considered of low ecological value.	Less than local

[97] Hendrick, V.J. & Foster-Smith, R.L., 2006. *Sabellaria spinulosa reef: a scoring system for evaluating 'reefiness' in the context of the Habitats Directive.* Journal of the Marine Biological Association of the UK. 86(04): 655 - 677

[98] Marine Plan Online Search Tool, 2020. Available at: https://explore-marine-plans.marineservices.org.uk/

Habitat Type	Description	Level of Importance
Scattered mixed trees	Young scattered trees are present along the NWC Railway Line embankment in the east of the survey area and scattered along the roadside to the north-west, including Scott's pine (*Pinus Sylvestris*), beech (*Fagus sylvatica*), sycamore (*Acer pseudoplatanus)*, elm sp. (*Ulmus* sp.), pedunculate oak (*Quercus robur*), white poplar (*Populus alba*) and ash (*Fraxinus excelsior*). These species are common and widespread whilst the trees are young and limited in extent. This habitat is therefore considered of low ecological value.	Less than local
Poor semi-improved grassland	Poor semi-improved grassland, parts of which were outgrown and appeared unmanaged, is found along much of the extent of the NWC Railway Line embankment in the east of the survey area. Scattered scrub and trees are found within the grassland, with some patches of tall ruderal. This habitat comprises common and widespread species and is limited in extent. It is therefore considered of low ecological value.	Less than local
Tall ruderal vegetation	Patches of dense tall ruderal are found scattered within the poor semi-improved grassland and amongst the dense scrub and scattered trees in the east of the survey area. As a result, this habitat is not mapped but listed here for completeness. This habitat comprises common and widespread species and is limited in extent. It is therefore considered of low ecological value.	Less than local
Running water	A culverted water course runs under the A55 Expressway and outflows at the eastern point of the Promenade in the eastern extent of the Scheme. Due to the small scale of this habitat it is not specifically mapped but described here for completeness. Being culverted, this watercourse is not considered of any notable ecological value.	Less than local
Amenity grassland	Amenity grassland is present throughout the survey area, alongside the existing cycleway and at the base of the NWC Railway Line embankment in the east. The amenity grassland comprised close-mown, regularly managed grassland dominated by common and widespread species. It is therefore considered of low ecological value.	Less than local
Buildings and infrastructure	A number of buildings and structures (including the NWC Railway Line bridge) are present throughout the survey area.	Less than local
Fences and Walls	Fences and stone walls are present throughout the survey area, marking boundaries of the embankments and along the existing Promenades. Given the small scale of these habitats they are not specifically mapped but are described here for completeness.	Less than local
Hardstanding	Hardstanding is present in the form of the existing cycleway and Promenade.	Less than local

Source: Mott MacDonald Limited (2020)

Future Baseline

8.5.11 The do nothing scenario for the Scheme is outlined in Chapter 2 Need for Scheme, Assessment of Alternatives and Basis of Design, Section 2.4 of this EIA, which describes the anticipated degradation of the coastal defences without the proposed intervention and remedial works. In terms of the ecological baseline, in the short term the habitats would stay largely the same with some localised changes in sand and gravel distribution within the intertidal regions as this is a highly mobile environment.

8.5.12 In the long-term under the do-nothing scenario, it is likely for existing structures present on site including the groynes to gradually fail. As a result, it is expected that intertidal sands present on site would gradually be lost due to the action of longshore drift (this is a known occurrence in the area). This would reduce the suitability of the Site for species currently known to be present (see Table 8.9) and would leave the majority of the area as exposed bedrock. In return this would provide decreased coastal protection for the area resulting in increased rates of coastal erosion and an overall decrease in marine biodiversity. The terrestrial habitats would be anticipated to remain largely the same, with some additional scrub cover along the NWC Railway Line embankments where these are not subject to regular management.

Faunal Species

8.5.13 A summary of the species survey findings and assessment for the Site, and where relevant the wider survey area for context, are included in Table 8.9 along with an assessment of their level of importance. Notably for fauna such as wintering birds and marine mammals, these have been assessed for the wider marine habitats north of the Site rather than the Site itself, as these receptors can be affected by disturbance at a greater distance, such that the zone of influence considered would need to be extended beyond the MLWS (Mean Low Water Springs) boundary.

8.5.14 Further details are provided within the PEAR and relevant protected species reports (ES Volume 2, Technical Appendix 8.2 to 8.4) and also the Habitats Regulations Assessment (HRA) Report to Inform an Appropriate Assessment (henceforth referred to as ‘the HRA’; ES Volume 2, Technical Appendix 8.5).

Table 8.9: Summary of Faunal Species Results and Assessment

Habitat Type	Description	Level of Importance
Breeding Birds	The habitats within the Site and wider survey area, namely the NWC Railway Line embankments and landscape tree planting, offer potential for common and widespread nesting birds. However, these habitats are extremely limited in extent such that the Site is not considered of importance for breeding birds at a local level. Liverpool Bay SPA is designated for little tern and common tern (both breeding). These are assessed in relation to the SPA and further detail included in the HRA (see ES Volume 2, Technical Appendix 8.5). There is no known or potential breeding habitat for these species within the Site or near surrounds.	Less than local
Wintering Birds	Liverpool Bay SPA is located along the northern boundary of the Site and is designated for wintering common scoter and red-throated diver, as well as non-breeding use by little gull. Wintering bird surveys recorded a number of wintering bird species in the area including common scoter and red-throated diver, both observed within c.500m of the Site, whilst large rafts of wintering birds (particularly common scoter) were observed further out to sea. As these are key interest features of the SPA, the wintering bird assemblage has been valued on this basis.	International
Roosting Bats	Two buildings with low potential for roosting bats were recorded within the survey area (namely a kiosk and the toilet block). Surveys of these buildings did not record any use by roosting bats. No trees with bat potential were identified within the Site, whilst only a small number of trees with low bat potential were recorded in the wider survey area. On this basis, the Site is not considered of any value for roosting bats.	Less than local
Foraging and Commuting Bats	The Site comprises open and exposed intertidal and foreshore habitats with established street lighting, such that they are considered of low value to foraging bats. The NWC Railway Line embankment forms a linear feature which could be used by bats but is unlikely to be of more than local importance. The emergence survey undertaken of the buildings did not record any foraging or commuting bat activity. On this basis, the Site is considered of no more than low value for bats.	Less than local
Badger	No evidence of use of the Site by badger has been recorded during survey work completed. The NWC Railway Line embankment offers some limited opportunities for this species, but this is likely to be highly disturbed given the exposed location, active railway line and road, and levels of recreational activity. On this basis, the Site is considered to be of low value for badger.	Less than local
Reptiles	The NWC Railway Line embankment offers potential for common reptile species which are known to be present in the local area. Survey work has not been undertaken for reptiles as works to the embankments are limited to enhancement only, so would not be adversely affected. Based on the small extent of these habitats, it is unlikely that they would support a large population of reptiles. On this basis, precautionarily, the site is assessed as having local value for reptiles.	Local
Terrestrial Invertebrates	The NWC Railway Line embankment and grassland habitats offer opportunities for a range of common and widespread invertebrate species. No notable species have been recorded from within the Site. Given the limited extent of habitats, which are common in a local context, the Site is not considered to be of low value for invertebrates.	Less than local

Marine Mammals	A single record of a common porpoise (*Phocoena phocoena*) was returned from within the survey area[99]. The marine habitats off-site to the north could be subject to some occasional use by this species and other marine mammals including common bottlenose dolphin (*Tursiops truncatus*)[100]. It is possible for areas nearby (such as Angel Bay 5.5km north-west of the Scheme) to be used by grey seal (*Halichoerus grypus*)[101] as pupping sites or resting places. A local level of value has been assigned to reflect this potential for infrequent use of the area.	Local
Fish	The marine intertidal habitats on Site and the habitats off-site to the north are likely to support a range of common and widespread fish species of various life stages, which is demonstrated through the popularity of the area by the angling community. A desktop search[102] shows that the wider area surrounding Colwyn Bay and areas further offshore to the north of the Site are considered to be a high intensity spawning ground for plaice (*Pleuronectes platessa*), cod (*Gadus morhua*), sand eel *(Ammodytes tobianus*) and sole (*Solea solea*), as well as a high intensity nursery ground for cod (*Gadus morhua*), sole (*Solea solea*) and whiting *(Merlangius merlangus*). Due to the importance of the area as a spawning and nursery ground for various fish species, a value of regional level has been assigned.	Regional
Benthic species* (infauna and epifauna)	Consideration with regards *to Sabellaria alveolata* and Blue Mussel beds as habitat types have been assessed separately in Table 8.8. Photographic surveys of the intertidal area on site have been assessed by a marine ecologist and it is confirmed the intertidal section of the Site supports acorn barnacles (*Balanomorpha*), sea lettuce (*Ulva lactuca*), spiral wrack (*Fucus spiralis*), common limpet (*Patella vulgata*), toothed wrack (*Fucus serratus*), beadlet anemone (*Actinia equina*), dogwhelk (*Nucella lapillus*), periwinkle (*Littorina littorea*), Darwin barnacles (*Elminius modestus*) and Hydroids (*Plumularia catharina*). From assessment of Site photographs, the Site has also been assessed to contain habitat suitable to support common shore crab (*Carcinus meanas*) and the velvet swimming crab (*Necora puber*). All of these species are particularly common around the UK intertidal zone coastline very similar to Colwyn Bay, however due to their likelihood to be present on and near to the site, a precautionary approach has been taken and as a result a value of local importance has been assigned.	Local

Source: Mott MacDonald Limited (2020)

*It should be noted that for the purposes of this report, benthic species relates to any species residing at the bottom of the water column, with 'infauna' being species that habituate within the sediment at the bottom of the water body and 'epifauna' relating to those species habituating on the surface of the seabed.

[99] Cofnod (North Wales Environmental Information Service), 2020. Cofnod data search.

[100] DEFRA, n.d. *MAGIC Map online tool.* Available at: https://magic.defra.gov.uk/magicmap.aspx

[101] Marine Plan Online Search Tool, 2020. Available at: https://explore-marine-plans.marineservices.org.uk/

[102] Marine Plan Online Search Tool, 2020. Available at: https://explore-marine-plans.marineservices.org.uk/

Baseline Receptor Summary

8.5.15 From the baseline data above, all ecological receptors valued at Local level and above, and considered to have potential to be affected by the Scheme have been scoped into the assessment. These are summarised within Table 8.10 using the sensitivity scale in Table 8.3.

Table 8.10: Identified Receptors

Receptor	Details	Level of Importance	Reasoning
Liverpool Bay SPA	Located immediately north of the Site and designated for wintering and breeding bird assemblages.	International	The SPA is an international designation.
Mussel Beds	A single area of sparse and dense mussel beds is present in the east of the Site. This habitat was noted to be isolated and in poor condition.	Local	The mussel beds are a Section 7 priority habitat but the habitat on site has been assessed as being in poor condition. The level of importance has been downgraded to local to reflect this.
Sabellaria alveolata reefs	Small patches of Honeycomb worm reef are present on three groynes and in two areas of intertidal sand and shingle within the Site. This habitat was noted to be patchy and potentially in decline/already dead. It is therefore not considered of notable value.	Local	*Sabellaria alveolata* reefs are a Section 7 priority habitat, but the habitat on site has a patchy distribution and the segments of reef are in poor condition. The level of importance has been downgraded to local to reflect this.
Wintering Birds	Wintering birds are present within the SPA, with common scoter and red-throated diver both recorded within c.500m of shore as well as large rafts of wintering birds further out to sea.	International	The wintering bird species common scoter and red-throated diver are designated interest features of the SPA. This receptor has been valued on this basis. Note that whilst breeding birds are also an interest feature of the SPA, there are no nesting sites within or adjacent to the Scheme. Foraging birds are assessed as part of the SPA and within the HRA (ES Volume 2, Technical Appendix 8.5).
Reptiles	The NWC Railway Line embankments could be used by common reptile species.	Local	The NWC Railway Line embankments could be used by common reptiles but are considered unlikely to support large numbers. Local level has been assigned to reflect this.

Receptor	Details	Level of Importance	Reasoning
Marine Mammals	The marine habitats off-site could be used occasionally by marine mammals.	Local	Marine mammals make occasional use of the wider marine habitats surrounding the site. To reflect this low-level use of the area, local value has been assigned. All species of cetacean are protected under the Wildlife and Countryside Act 1981 (as amended).
Fish	The wider marine environment surrounding the site and further offshore is identified as a high intensity spawning ground and a high intensity nursing ground for certain fish species.	Regional	The wider area is defined as a high intensity spawning ground and high intensity nursery ground for certain species of fish, some of which are listed as vulnerable on the International Union for Conservation of Nature red list. The area is also important within the angling community.
Marine benthic species	The site spans the intertidal area which could be used by benthic species when covered by tidal waters.	Local	Infauna and epifauna found on site are common within the local area and general UK coastline. However, as areas of the site are anticipated to be suitable and it is likely these species are on site, a precautionary approach has been taken and a Local importance value has been assigned.

Source: Mott MacDonald Limited (2020)

8.6 Consultation

8.6.1 No specific comments were received from CCBC in the Scoping Response (ES Volume 2, Technical Appendix 1.4) with relevance to biodiversity, some minor comments received form NRW have been addressed (Chapter 5 Consultation, Section 5.4). However, a number of related schemes have been completed along the Colwyn Bay Waterfront, most recently emergency works at Splashpoint, for which NRW and the County Ecologist were consulted as part of the planning process. Comments from this process have therefore been reviewed as being relevant to the Scheme. No specific comments were received from NRW in response to the Splashpoint works. Comments were received from the County Ecologist which focussed on potential disturbance to Blue Mussel beds as a result of the works, confirming that detail of percentages affected is required to inform an assessment of effects.

8.7 Potential Impacts (Pre-Secondary Mitigation)

Primary (Embedded) Mitigation

8.7.1 A number of primary mitigation and enhancement measures have been incorporated into the Scheme proposals, in terms of working methodology and Scheme design. These are outlined below and are also referenced, where relevant, in the Assumptions (Section 8.4). Unless otherwise stated, these primary mitigation measures have been assessed as part of the

Scheme proposals in the “pre-mitigation” effects. The primary mitigation for this Scheme includes:

- The core wintering bird season (October to March inclusive) would be avoided for the delivery of revetment rock via barge (should this delivery method be selected). This would avoid disturbance to SPA bird species and also would minimise the risk of standing time due to storms and safety/delay risks for moving boulders between barges by transhipment in bad weather;
- Vessels present in the intertidal area of the Site at high tide (for the unloading of rock via barge) would not be allowed to drop anchor and instead barges would be guided and positioned by tugs or small support vessels. This would avoid any potential impact on mussel bed or *Sabellaria alveolata* habitat as a result of coming into contact with anchors;
- As outlined in Chapter 4 Scheme Construction, piling works would be undertaken at exposed low tides. This would avoid piling within the marine water body, therefore avoiding the propagation of underwater noise through the water column and avoiding any resultant impacts on marine mammals and finfish. As a result, acoustic underwater noise impacts on marine mammals and fish are not considered further in this assessment. Impacts from noise and vibration on shellfish species are considered in the relevant sections below;
- A number of enhancement measures have been built into the Scheme design including new rocky shore habitats and biodiverse landscaping. For ease of assessment, whilst these measures do form part of the Scheme proposals, they have been described under the Enhancements section and assessed as part of the residual effects; and
- Throughout the construction and operational phases, best practice guidance in reference to pollution prevention would be followed; CIRIA (2015)[103].

Construction

8.7.2 The assessment of anticipated impacts from the construction phase of the Scheme in the absence of mitigation (other than the embedded measures already described above) are described in Table 8.11.

8.7.3 Note that whilst it is anticipated that best practice measures would be implemented as standard practice under a CEMP, the specific safeguards included in the CEMP have been tailored to the Scheme and the document is proposed alongside the ES for review. To reflect that this document may be subject to change, the CEMP is considered as secondary rather than primary (embedded) mitigation and the below assessment of effects is prior to implementation of the CEMP.

[103] CIRIA 2015. Charles, P, Edwards, P (eds), Environmental good practice on site guide (fourth edition) (C741)

Table 8.11: Assessment of Construction Impacts of the Scheme (Pre-mitigation)

Receptor	Location and Importance	Assessment of Construction Impacts	Level of Impact	Significance of Effect
Liverpool Bay SPA	Adjacent to Scheme International	The SPA is immediately north of the Site. No habitat loss is anticipated as a result of construction works. Given the nature of works, there is a risk of oil and fuel spills into this environment from machinery and vehicles in and adjacent to the intertidal habitats, as well as from the barge and associated vessels should this be required (although this would be outside of October – March so would primarily affect summer rather than wintering species). This could result in a degradation of the SPA and adversely impact the designated interest features (wintering or breeding birds) directly as well as reducing food availability (adversely affecting fish and shellfish, as described separately below). The designated interest features common scoter and red-throated diver, both winter visitors, were recorded during the wintering bird surveys within *c*.500m from the shore. These species are known to be vulnerable to oil spills [104] [105] [106] (but have been shown to recover) as well as being highly sensitive to disturbance. Within the entire SPA, peaks of common scoter can reach up to 29,000 birds (60% of total population) and up to 1000 (5%) of the UK red-throated diver population during October to March. On this basis, as set out within the primary (embedded) mitigation section, no barge delivery would be undertaken between October to March (inclusive) in order to avoid disturbance during this most sensitive period. There is a small chance that birds may be present within September and April, but this would be anticipated to be limited to smaller numbers of birds and highly weather dependent. A more detailed assessment of potential construction impacts on the designated interest features of the SPA is set out within the HRA (ES Volume 2, Technical Appendix 8.5). These impacts and effects are broadly summarised below: ● Noise and vibration – resulting from piling works (anticipated to last a number of months (intermittently) and which could be undertaken over winter), machinery, vehicle movements (including barge and transhipment vehicles if required) and personnel. Any such sources of disturbance close to the shoreline could disturb or displace individuals using these areas for foraging, whilst disturbance out at sea from a barge and associated transhipment could disrupt any larger rafts of birds (if present outside October to March);	Major adverse	**Direct, Temporary, Large Adverse (Significant)**

[104] RSPB (2020) https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/common-scoter/ (last accessed 16/06/2020)

[105] Banks, A.N., Sanderson, W.G., Hughes, B., Cranswick, P.A., Smith, L.E., Whitehead, S., Musgrove, A.J., Haycock, B. and Fairney, N.P., 2008. The Sea Empress oil spill (Wales, UK): Effects on Common Scoter *Melanitta nigra* in Carmarthen Bay and status ten years later. Marine pollution bulletin, 56(5), pp.895-902

[106] Gomersall, C.H., Morton, J.S. and Wynde, R.M., 1984. Status of breeding Red-throated Divers in Shetland, 1983. Bird Study, 31(3), pp.223-229.

Receptor	Location and Importance	Assessment of Construction Impacts	Level of Impact	Significance of Effect
		• Visual disturbance – from increased human activity and machinery along the Promenade and intertidal area, which could disturb and displace birds foraging closer to shore; • Artificial lighting – there is a requirement to use artificial lighting at night if the delivery of rocks via barge is required to be undertaken during hours of darkness to make use of the periods of high tide. This is also the case for the hours of darkness in the winter months within the standard site working hours. This could disturb and displace birds using areas closer to shore or, for lighting associated with barges and transhipment, could affect larger rafts of birds out at sea (if present outside October to March); and • Changes in turbidity – it is possible for sediment to be disturbed and released through construction activities and deliveries of material to site (e.g. dropping of rocks onto beach via barge). This could adversely impact submerged seaweeds/plants and filter feeding organisms which provide prey for birds, as well as affecting fish-eating birds close to the coast. An assessment of the likely impacts of the Scheme on the designated interest features of the SPA (wintering and breeding species) is included within the HRA (ES Volume 2, Technical Appendix 8.5), drawing from the results of the survey work undertaken and a review of the scientific literature for these species. This has concluded that: • Non-breeding (Wintering) Species: Survey work undertaken on site indicated only small numbers of common scoter and red-throated diver appeared to come within c.500m of shore (<25 individuals or small rafts) (whilst no little gull were recorded) and so, where impacts are anticipated from the shoreline only, it is anticipated that disturbance would be of individual or small numbers of birds. The habitats within this distance of the Scheme are not known to support any significant shellfish or cocklebeds, whilst the Site represents approximately 1.2% of the total shoreline (i.e. area within 500m of the coast) of the entire SPA such that extensive alternative feeding grounds are available. Disturbance from barge movements would be restricted to small numbers arriving in September or still present in April (weather dependent) but would not affect the key wintering period. On this basis, effects are considered to be limited to disturbance of small groups of wintering brids which may displace them further out from shore until or unless they habituate to increased disturbance levels; • Non-breeding (Passage) Species: The SPA is also designated for non-breeding use by little gull, which were not recorded during the wintering bird survey. WeBS data[107] reports that peak counts of this species are typically in late summer which indicates migratory passage of birds returning from breeding grounds. The habitat in Colwyn Bay has not been shown to provide feeding areas typically used by this species. This species could be disturbed by delivery of		

[107] WeBS data https://app.bto.org/webs-reporting/ (last accessed 30.06.2020)

Receptor	Location and Importance	Assessment of Construction Impacts	Level of Impact	Significance of Effect
		revetment by barge but this is considered likely to only affect small numbers which would readily disperse and would be temporary; and • Breeding (Summer) Species: The SPA is also designated for summer use by common and little terns. The upper shore habitats within the Scheme footprint do not offer any particular breeding opportunities for these species. Common terns are known to breed on shingle beaches and gravelly areas, which are notably absent from the Site, whilst only one known little tern breeding colony is known in Wales at Gronant Dunes[108] (approximately 24km north-east). At this distance, no direct or indirect effects on breeding sites are anticipated as a result of the works. Individual birds foraging in the SPA are considered likely to be using the areas approximately 1km from the shoreline[109] and so are considered unlikely to be affected by disturbance from construction activities at the shoreline or in the intertidal habitats. Disturbance effects would be temporary, during the construction works only, and are not anticipated to last for more than one wintering season. Oil spills and pollution events would have more permanent impacts and, although populations have been shown to recover, this is long-term so a precautionary view has been taken. These effects would be considered to adversely affect the integrity of the population. The impacts have been assigned to reflect the most severe effect (a pollution event).		
Statutory Ecological Designations: • Mynydd Marian SSSI and LNR • Upper Dingle Woods LNR • Pwyllycrochan Woods LNR • Fairy Glen LNR	Within 2.0km National / UK – County	All statutory designations lie fully outside of the Scheme construction footprint such that no direct impacts from habitat loss or damage are anticipated. All of the designated sites are well separated from the Scheme (the closest being 0.5km away) and no hydrological links have been identified, such that no indirect effects from noise, dust or hydrological changes are anticipated. Air quality guidance (Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) criteria – see Chapter 7 Air Quality for details) identifies potential for increased nitrogen deposition to affect sensitive sites within 200m of roads where traffic movements have increased by 100 Annual Average Daily Traffic (AADT) for Heavy Duty Vehicles (HDV) or 500 AADT for Light Duty Vehicles (LDV). As confirmed in the Transport Statement (ES Volume 2, Technical Appendix 15.1), the only designated site where traffic volumes within 200m are anticipated to exceed these thresholds is Upper Dingle Woods LNR. As woodland is known to be sensitive to changes in nitrogen deposition, anticipated nitrogen	No change	**Neutral (Not Significant)**

[108] Reference properly - https://northwaleslittleterns.weebly.com/ (last accessed 16/06/2020)

[109] Perrow, M.R., Skeate, E.R., Lines, P., Brown, D. and Tomlinson, M.L., 2006. Radio telemetry as a tool for impact assessment of wind farms: the case of Little Terns *Sterna albifrons* at Scroby Sands, Norfolk, UK. Ibis, 148, pp.57-75.

Receptor	Location and Importance	Assessment of Construction Impacts	Level of Impact	Significance of Effect
		deposition has been modelled for this woodland (see Air Quality Chapter 7 which confirms no significant impact is anticipated. During construction works the closure of the Promenade could result in increased recreational pressure on surrounding designated sites for dog walking and other recreational activities. However, this would be temporary and likely dispersed over a wide range of sites, including other areas of coastline which are more likely to be a draw for visitors, such that significant increases at any one site would be considered extremely unlikely. In any event, the closest of these designations are all LNRs (Fairy Glen, Upper Dingle and Pwllycrochan Woods) which are well set up and managed for recreational use such that they could likely accommodate small increases in visitor numbers without any discernible effects.		
Non-statutory Designations: • Mynydd Marian SSSI and LNR • Upper Dingle Woods LNR • Pwyllycrochan Woods LNR • Fairy Glen LNR	Within 2.0km County	No direct effects (habitat loss or damage) on any non-statutory designations within 1.0km or indeed any more distant national level designations are anticipated as these lie fully outside of the construction footprint. In terms of indirect effects: • Upper Dingle LWS and Pwllycrochan Woods LWSs are also LNRs and are assessed above (no construction impacts, air quality effects or recreational effects are anticipated); and • Coed Rhos Fossil Woodland LWS is a geological designation and so is outside of the scope of this assessment. However, as this feature is buried by sand and lies fully outside of the Site boundary, no adverse effects are anticipated from construction. On this basis, no adverse effects are anticipated to LWSs from the Scheme construction.	No change	**Neutral (Not Significant)**
Wintering birds	Associated with Liverpool Bay SPA International	Effects on wintering birds are assessed above in respect of the Liverpool Bay SPA.	Major adverse	**Direct, Temporary, Large Adverse (Significant)**
Reptiles	NWC Railway Line embankment Local	Habitat enhancement works proposed as part of the Scheme (see embedded mitigation and also enhancements section below) would involve some modification to the railway embankment habitats. In the short term, vegetation modification and management could lead to the killing or injury of reptiles, if present. These works would be temporary and would not be anticipated to adversely affect the integrity of any reptile population present. However, killing and injury would constitute an offence under the	Negligible Adverse	**Neutral (Not Significant)**

Receptor	Location and Importance	Assessment of Construction Impacts	Level of Impact	Significance of Effect
		Wildlife and Countryside Act 1981 (as amended) and as such these works would be managed to be within the Law.		
Mussel beds (*M. edulis*)	Within the east of the Site Local	Both dense and sparse mussel bed habitats are present within the eastern end of the Site, although it is noted that these are considered to be in poor condition. Mussel beds present on site are likely to be susceptible to direct effects from: • Physical damage – the Scheme would result in the tracking of plant, machinery and personnel across the Site area in order to undertake construction. It is unlikely that the entire mussel bed would be able to be avoided by tracking plant, however limiting the area for tracking to the sparse sections and avoiding dense areas would lead to minimal temporary impacts on the mussel bed only. There is a possibility that rock for the creation of the revetment on site would be delivered to the beach via a barge. The use of the barge in the intertidal area, along with necessary marine support vessels provides the potential for physical damage to the mussel beds; and • Acoustic underwater noise and vibration (piling) – the Scheme would involve piling within the intertidal area at low tide. Vibration when not properly mitigated can propagate through the bedrock and sediment and has been found to impact on shellfish species (both the fitness of individuals and mussel beds of *Mytilus edulis* due to disruption of natural valve movements[110]. The potential for indirect effects on Blue Mussel beds include: • Water pollution - given the nature of works, there is a risk of oil and fuel spills into the environment from machinery and vehicles in, and adjacent to the intertidal habitats, as well as from the barge and associated vessels should this be required. This release of pollutants could prove toxic to this shellfish species, resulting in the loss and degradation of this habitat type; and • Changes in turbidity & impacts on coastal water quality – it is possible for sediment to be disturbed and released through construction activities and deliveries of material to site (e.g. dropping of rocks onto beach via barge). Despite *Mytilus edulis* being a species relatively tolerant to high levels of turbidity[111], large increases in turbidity can reduce the levels of dissolved oxygen in the water column, resulting in decreases in respiration rate and the eventual closing of valve systems which can lead to mussel death[112]. It is unlikely that the	Major adverse	**Direct, Temporary, Slight Adverse (Not Significant)**

[110] Roberts, et al., 2015. *Sensitivity of the mussel Mytilus edulis to substrate-borne vibration in relation to anthropogenically-generated noise.* Marine Ecology Progress (538).

[111] Mainwaring, et al., 2014. *Assessing the sensitivity of Blue Mussels (Mytilus edulis) to pressures associated with human activities*. Joint Nature Conservation Committee.

[112] Tang, B., & Riisgard, H.U., 2018. *Relationship between oxygen concentration, respiration and filtration rate in Blue Mussel Mytilus edulis*.

Receptor	Location and Importance	Assessment of Construction Impacts	Level of Impact	Significance of Effect
		proposed works would result in sediment disturbance large enough to impact on the *Mytilus edulis* present and any impact would be temporary, short-term and is not anticipated to cause any significant effects.		
Honeycomb worms (*Sabellaria alveolata*)	On groynes (1, 2 and 3) and within two areas of intertidal sands and shingles near to groynes 1 and 2. Local	Evidence of *Sabellaria alveolata* reefs have been found on site. These are mostly present along the eastern sides of the groyne structures, with a further submerged section present on a gravel bed that is only exposed during low spring tides. It is considered that on Site these reefs are in decline and in poor condition. These segments of reef structure are likely to be susceptible to direct effects from: • Physical damage – the Scheme would result in the tracking of plant, machinery and personnel across the Site area in order to undertake construction. There is a possibility that rock for the creation of the revetment on site would be delivered to the beach via a barge. The use of the barge in the intertidal area provides the potential for physical damage to the *Sabellaria alveolata.* Additionally, under the Scheme modular ecological armouring units would be installed on the groyne structures to enhance the area for biodiversity. In order to install these structures approximately 1m^3 of groyne structure would be required to be removed from groynes 2 and 3 (see Drawing 415437-MMD-00-XX-DR-N-1713 in Section 8.12). This would likely result in the permanent loss of some small patches of *Sabellaria alveolata* reef. The potential for indirect effects on the reef structures include: • Water pollution – given the nature of works, there is a risk of oil and fuel spills into the environment from machinery and vehicles in, and adjacent to the intertidal habitats, as well as from the barge and associated vessels should this be required. This release of pollutants could prove toxic to the polychaete worm that builds these honeycomb reef structures, resulting in the further loss and degradation of this habitat type.	Major adverse	**Direct, Temporary, Slight Adverse (Not Significant)**
Marine Mammals	Marine habitats Local	Marine mammal species have differing sensitivities with regards to underwater noise and related impacts can include auditory injuries and behavioural changes[113]. As outlined in Section 8.7, impacts on marine mammals from underwater noise associated with piling on the Scheme are scoped out. Potential impacts on marine mammals related to the Scheme therefore include: • Underwater noise and vibration (associated with rock delivery by barge) – the Scheme may require the use of tugs and barges to deliver rock to Site. It is considered that any noise and vibration associated with the dropping of rocks onto the Site would be negligible due to the likely distance of marine mammals from the Site. However, it should be noted that the sound	Negligible adverse	**Neutral (Not Significant)**

[113] Bailey, H., et al. (2010). *Assessing underwater noise levels during pile-driving at an offshore windfarm and its potential effects on marine mammals.* Marine Pollution Bulletin 60(6).

Receptor	Location and Importance	Assessment of Construction Impacts	Level of Impact	Significance of Effect
		levels associated with the use of inboard engines on a tug can propagate through the marine environment. The area is infrequently used by marine mammals and species would be able to swim away from increases in underwater noise. Additionally, the use of tugs is temporary and so any resulting impacts would be short-lived. • Water pollution – given the nature of works there is a risk of oil and fuel spills into the marine environment from machinery and vehicles in, and adjacent to the intertidal habitats, as well as from the barge and associated vessels should this be required. Due to the likely distance of marine mammals from the site, any pollution event would likely disperse and dilute through the water column due to tidal action in locations where marine mammals are found. However, pollution levels nearer to the site could be toxic to some species if they were in the nearer area.		
Fish	Marine habitats Regional	Potential impacts on fish associated with the Scheme include: • Underwater noise and vibration (associated with rock delivery by barge) - despite the mobility of fish and their ability to swim away from increases in underwater noise, sudden intense bursts of underwater noise would place stress on some fish species resulting in behavioural changes, and can lead to physical damage, including (in worse case scenarios) mortality[114]. • Physical damage – if rock is delivered to Site via barge it would be dropped at high tide into shallow waters near to the high tide line before waiting for the tide to recede when vehicles can move the rock to the desired location. There is a chance that when the rock is dropped any fish in the shallow waters could be crushed. However, this is an unlikely occurrence due to the disturbance of underwater noise associated with the use of the tug which would likely deter fish from the area. • Water hydrocarbon or solid waste plastic pollution incidents- given the nature of works there is a risk of oil and fuel spills into the marine environment from machinery and vehicles in, and adjacent to the intertidal habitats, as well as from the barge and associated vessels should this be required. There is the potential (dependent on the scale of a spill event) for levels of pollution to be toxic to fish species, resulting in fish kills on site.	Major adverse	**Direct, Temporary, Large Adverse (Significant)**

[114] Slabbekoorn H. (2016) *Aiming for Progress in Understanding Underwater Noise Impact on Fish: Complementary Need for Indoor and Outdoor Studies.* In: Popper A., Hawkins A. (eds) The Effects of Noise on Aquatic Life II. Advances in Experimental Medicine and Biology, vol 875. Springer, New York, NY

Receptor	Location and Importance	Assessment of Construction Impacts	Level of Impact	Significance of Effect
		• Turbidity – increases in turbidity can impact on fish with regards to their feeding and behaviour[115], however the likely sedimentation disturbance resulting from the Scheme would be minimal and not to an extent considered sufficient to cause any impact on fish species. • Artificial lighting – there is a requirement to use artificial lighting at night if the delivery of rocks via barge is required to be undertaken during hours of darkness to make use of the periods of high tide. This is also the case for the hours of darkness in the winter months within the standard site working hours. There is the potential for this to disturb fish species and potential increase their chances of predation as the water column is illuminated. However, the area that would be lit artificially is extremely limited in comparison to the wider surrounding marine area and so any impact is considered to be negligible.		
Marine benthic species	Intertidal and marine habitats Local	Benthic species on site have been identified through the use of photographic evidence and professional knowledge. Impacts with the potential to cause effects on these species resulting from the works include: • Underwater noise and vibration (associated with rock delivery by barge) - benthic species detect underwater noise through particle motion due to their lack in gas filled organs. Loud increases in underwater noise have been found to lead to crustacean mortality and behavioural changes such as burrowing deeper into sediments or reducing activity levels[116]. It is possible for underwater noise impacts associated with the engines used for support vessels and the dropping of revetment rock into the intertidal area to impact on some benthic species such as crabs in this way. • Physical damage – if rock is delivered to Site via barge it would be dropped at high tide into shallow waters near to the high tide line before waiting for the tide to recede when vehicles can move the rock to the desired location. There is a chance that when the rock is dropped any benthic species below could be crushed. • Fuel or hydrocarbon pollution - given the nature of works there is a risk of oil and fuel spills into the marine environment from machinery and vehicles in, and adjacent to the intertidal habitats, as well as from the barge and associated vessels should this be required. There is the potential (dependent on the scale of a spill event) for levels of pollution to be toxic to benthic species with many of these species being unable to move out of the affected area due to low mobility.	Minor adverse	**Direct, Temporary, Slight Adverse (Not Significant)**

[115] Kjelland, *et at*., (2015). *A review of the potential effects of suspended sediment on fishes: potential dredging-related physiological, behavioural, and transgenerational implications*. Environment Systems and Decisions, 35 (334-350).

[116] Edmonds, *et al.,* (2016). *A review of crustacean sensitivity to high amplitude underwater noise: Data needs for effective risk assessment in relation to UK commercial species.* Marine Pollution Bulletin. 108 (1-2).

Receptor	Location and Importance	Assessment of Construction Impacts	Level of Impact	Significance of Effect
		• Artificial lighting – there is a requirement to use artificial lighting at night if the delivery of rocks via barge is required to be undertaken during hours of darkness to make use of the periods of high tide. This is also the case for the hours of darkness in the winter months within the standard site working hours. There is the potential for this to disturb benthic species and potential increase their chances of predation as the water column is illuminated. However, the area that would be lit artificially is extremely minor in comparison to the wider surrounding marine area and so any impact is considered to be negligible.		

Source: Mott MacDonald Limited (2020)

Operation

8.7.4 The Scheme is for essential repair and renovation works along the waterfront. On this basis, it is anticipated that the main features and use of the waterfront during the operational phase of the Scheme would be comparable to the baseline use in terms of recreation, traffic, lighting and any other potential sources of disturbance.

8.7.5 The operational Scheme would require maintenance in the form of on-going checks and minor repairs to the coastal defences, as well as any maintenance and seasonal monitoring of new habitat features such as the intertidal enhancements. As stated in the primary (embedded) mitigation measures, it is assumed that best practice pollution prevention would be incorporated into any maintenance works. It is also anticipated that the frequency and duration of maintenance works would be reduced in comparison with the baseline, particularly as emergency repair works (typically in winter) should no longer be required.

8.7.6 As described above in relation to Primary Mitigation, enhancement measures that form part of the Scheme design have been described separately below (in the enhancement section) and the benefits of these are assessed as part of the residual effects.

8.7.7 On this basis, the assessment of anticipated impacts from the operational phase of the Scheme in the absence of mitigation (other than the primary mitigation measures already described above) are described in Table 8.12.

Table 8.12: Assessment of Operational Impacts of the Scheme (Pre-mitigation)

Receptor	Location and Importance	Assessment of Operational Impacts	Level of Impact	Significance of Effect
Liverpool Bay SPA	Adjacent to Scheme International	Long term impacts are considered to relate to the minor on-going maintenance works required for the Scheme. Overall levels of disturbance are likely to be reduced in comparison with the baseline, particularly winter disturbance where a reduction in emergency repairs to the coastal defences are anticipated. The overall scheme would therefore likely benefit wintering birds by reducing the frequency and duration of potential disturbance from unavoidable works which might otherwise deter birds from foraging closer to shore. Given the nature of such effects, these are considered temporary and short to medium term and would not be anticipated to have a significant effect on the bird population as a whole. However, as such benefits are difficult to quantify, this has precautionarily been assessed as 'neutral' (no change to the baseline). Disturbance from use of the Promenade and beach for recreation is not considered likely to change significantly from the current baseline use. A more detailed assessment of potential operational impacts on the designated interest features of the SPA is set out within the Habitats Regulations Assessment (ES Volume 2, Technical Appendix 8.5).	No change	**Neutral (Not Significant)**
Other Statutory Designations	Within 2.0km County to National	No significant impact pathways have been identified to any statutory designations from the operational Scheme. Notably, there would be no significant change in traffic, air quality or recreational use from the existing baseline.	No change	**Neutral (Not Significant)**
Non-statutory designations	Within 2.0km County	No significant impact pathways have been identified to any statutory designations from the operational Scheme. Notably, there would be no significant change in traffic, air quality or recreational use from the existing baseline.	No change	**Neutral (Not Significant)**
Wintering birds	Associated with Liverpool Bay SPA International	Effects on wintering birds are assessed above in respect of the Liverpool Bay SPA.	No change	**Neutral (Not Significant)**
Reptiles	NWC Railway Line embankment Local	In the long-term, the habitat improvement works proposed should benefit this group. Maintenance of the habitats is not considered to be any more significant than the current maintenance regime (indeed it is likely to be less frequent). In the absence of safeguards, reptiles could be killed or injured during vegetation	Minor beneficial	**Direct, Permanent, Slight Beneficial (Not Significant)**

		management which would be an offence. However, at a population level, this species group would benefit from the proposals.		
Mussel beds	Within the east of the Site Local	Given the nature of the Scheme, which is repair and upgrade works to coastal defences and the Promenade, the long-term operational use of the Scheme is not considered to differ significantly from the current baseline. During the operational phase occasional inspections and repairs may be required which may result in the need to track plant and machinery across the intertidal area which could result in physical damage to mussel beds although this impact would be temporary.	No change	**Neutral (Not Significant)**
Honeycomb worms	On groynes (1, 2 and 3) and within two areas of intertidal sands and shingles near to groynes 1 and 2. Local	Given the nature of the Scheme, which is repair and upgrade works to coastal defences and the Promenade, the long-term operational use of the Scheme is not considered to differ significantly from the current baseline. During the operational phase occasional inspections and repairs may be required which may result in the need to track plant and machinery across the intertidal area which could result in physical damage to *Sabellaria alveolata* habitat, although this impact would be temporary.	No change	**Neutral (Not Significant)**
Marine mammals	Marine habitats Local	Given the nature of the Scheme, which is repair and upgrade works to coastal defences and the Promenade, the long-term operational use of the Scheme is not considered to differ significantly from the current baseline. Any likely disturbance from operational phase activities would be minimal due to the likely distance of marine mammals from, and their infrequent use of the Site.	No change	**Neutral (Not Significant)**
Fish	Marine habitats Regional	General maintenance and repairs of the Site would be required in the operational phase which may require working within the intertidal zone. However, this potential future maintenance is not considered to differ significantly from the current existing baseline.	No change	**Neutral (Not Significant)**
Benthic species	Intertidal and marine habitats Local	General maintenance and repairs of the Site would be required in the operational phase which may require working within the intertidal zone. However, this potential future maintenance is not considered to differ significantly from the current existing baseline.	No change	**Neutral (Not Significant)**

Source: Mott MacDonald Limited (2020)

8.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures

8.8.1 The Scheme has been designed, as far as possible, to minimise effects on ecology and biodiversity, as set out in the assumptions (Section 8.4) and Primary Mitigation (Section 8.7). Appropriate mitigation options have been identified based on a review of best practice guidance and using professional judgement.

Secondary Mitigation

8.8.2 For both construction and operational effects, no mitigation is considered necessary where effects are assessed as having a neutral significance (i.e. either no change or negligible adverse effects at a Local level). However, where measures are implemented in line with best practice or to avoid potential for an offence (e.g. for protected species), these are included below for completeness.

8.8.3 On this basis, secondary mitigation measures for the Scheme are outlined below.

Construction

8.8.4 Secondary mitigation measures during construction largely relate to safeguarding habitats and species from works. An outline CEMP has been completed as part of the planning submission, which would include measures to manage and reduce potential risks to the environment. The CEMP would include, but not be limited to the following:

- Marine Pollution Contingency Plan (to include information on the prevention of the release of hydrocarbons, solid waste and plastics into the marine environment and how to deal with these should a pollution event of this nature occur);
- Marine Bio-security Plan (this should consider how to prevent the potential introduction and spread of INNS (Invasive and Non-Native Species) and disease within the marine environment on site e.g. biosecurity protocols to follow for vessels associated with the works. It should also outline contingency actions to take should INNS or disease be discovered on site) (see the Biosecurity Risk Assessment in ES Volume 2, Technical Appendix 8.6);
- Erosion prevention measures (to include restricting plant movement on vegetated and unvegetated ground (including intertidal sands), avoidance of repeated tracking and the provision of erosion matting);
- Use of tree-protection fencing (in line with BS5837-2012[117]) and other demarcation fencing to protect retained habitats from construction encroachment;
- Best practice measures to reduce noise and vibration during construction;
- Damping down of dust sources and other measures to minimise air quality effects to habitats;
- Best practice construction and hygiene measures (avoiding littering, fires, storage of foods, etc);
- Best practice pollution prevention measures;
- Construction safeguards to include, where relevant, timing of works to avoid sensitive seasons and/or check surveys and supervised clearance of habitats to safeguard nesting birds, reptiles and mammals (including badger and common burrowing mammals), as follows:
  - **Nesting Birds:** Any woody vegetation clearance or building demolition to be undertaken outside of the nesting bird season (widely considered to be from March to August inclusive but can vary depending on the species/or seasonal constraints). Where this is

[117] The British Standards Institution (2012) BS5837 Trees in relation to design, demolition and construction. Recommendations

not possible, pre-clearance checks must be undertaken by an experienced ecologist to identify if any birds are nesting within or close to the vegetation due to be removed. If a bird's nest is found, it must be left in-situ and protected from the works. No works can be undertaken in that area until the young birds have fledged from the nest site, which may take up to 6 weeks depending on the species;

  - **Reptiles:** Vegetation clearance (NWC Railway Line embankments) to be undertaken between April and the end of October, if possible, whilst reptiles are active. Vegetation clearance would be undertaken in a phased manner under ecological supervision and preceded by a hand search for reptiles. Any reptiles encountered would be moved to outside of the working area; and
  - **Badgers (and other mammals):** An update check would be undertaken 12 weeks prior to the commencement of works on the NWC Railway Line embankments to ascertain whether there is any evidence of badger or other mammals. Works should avoid any recorded or potential tunnels or burrows, where possible. In the unlikely event badgers are recorded, setts would be avoided during works. General best practice should be followed within the construction zone (including avoiding storage of large piles of earth near the woodland and no open excavations to be left overnight without a mammal ladder or ramp).

- Measures to minimise light spill onto sensitive habitats (including use of directional lighting as well as minimising night working); and
- Adherence to a Surface Water Management Plan.

8.8.5 Where additional secondary mitigation measures are identified for ecology, including safeguards for faunal species, within the construction phase these are included within Table 8.13.

Table 8.13: Secondary Construction Mitigation Measures

Receptor	Pre-mitigation Impact and Effect	Secondary Construction Mitigation
Liverpool Bay SPA	Major Adverse Large Direct	Mitigation for the SPA is described within the HRA (ES Volume 2, Technical Appendix 8.5) and is summarised below. Pollution prevention measures and contingency planning would be implemented through the CEMP to ensure the marine environment and associated species/features are safeguarded during the works. Toolbox talks would be undertaken with site staff prior to works commencing to highlight the importance of the SPA habitat and wintering birds, in order to limit any disturbance and further reduce the risk of pollution. The coastal defence works are highly constrained by tidal patterns and cannot be flexible in programme or location. In particular, screening or stopping works is not feasible without compromising delivery. Mitigation options to minimise disturbance are therefore limited to the following: • Best practice measures under the CEMP to reduce noise; • Use of vibropiling instead of percussive piling; • Avoidance of excessive working hours on site (save for where barge unloading is required); and • Use of directional lighting, hoods and cowls to reduce light spill onto marine habitats.
Other Statutory Designations	No change Neutral	None required.
Non-statutory designations	No change Neutral	None required.
Mussel beds	Major Adverse Slight Direct	Pollution prevention measures and contingency planning would be implemented through the CEMP to ensure these features are safeguarded during the works. Delivery via barge and stockpiling would not be permitted in the area of the Blue Mussel bed to avoid any potential physical impact on as a result of offloading revetment rocks. A walkover by a marine ecologist and the Contractor would be undertaken approximately 6 weeks prior to the start of construction. This would ensure that the area is fully assessed for any changes in area of the mussel bed (e.g. growth or decline of the habitat) and any changes would be fully accounted for in updates to a site environmental constraints plan. This area on the constraints plan should be flagged during toolbox talks with site staff to ensure that it is avoided as much as possible during the tracking of vehicles or plant in this area at low tide, which could physically damage this habitat. It is noted that access to the intertidal area (for plant and machinery) is necessary for the rock revetment construction. It is proposed for this to be undertaken within an approximate working buffer of 20-30m from the base of the proposed 30m deep revetment (approximate maximum of 50-60m from the sea wall). This would avoid unnecessary tracking across the whole

Receptor	Pre-mitigation Impact and Effect	Secondary Construction Mitigation
		mussel bed and therefore reducing large scale physical damage to the mussel bed from plant/machinery. It is likely that some tracking over the mussel bed itself would be necessary (to allow a ramp to be installed to take plant over the groyne structures), however the site walkover with a marine ecologist would take place at least six weeks prior to the works occurring, which would enable suggestions to be made to the contractor to allow tracking over the sparse section of mussel bed only and avoid the dense area. It should be noted that due to the poor condition of the mussel bed, any impact from the tracking of plant would be minimal and temporary, as it is anticipated the mussel bed would re-colonise the area following any impact. Additionally, it is planned for the eastern end of the revetment to be constructed first which may avoid unnecessary tracking over the mussel bed, although it is noted that tracking through this path may still be required for access to the remainder of the site. The unloading of rocks from the barge would be undertaken at high tide to allow the rocks to be pushed off the barge onto an area slightly covered by water, reducing the repeated vibration impacts through the water column on the mussel bed. Any piling undertaken on site would be done via vibropiling. A piling rig with a variable frequency control should be used and a high frequency should be adhered to where possible. This would minimise noise and vibration impact on the mussel bed which can be sensitive to low frequency impacts. Toolbox talks would be undertaken with site staff prior to works commencing to highlight the importance of this habitat and to ensure its avoidance during the works.
Honeycomb Worms	Major Adverse Slight Direct	Pollution prevention measures and contingency planning would be implemented through the CEMP to ensure these features are safeguarded during the works. A walkover by a marine ecologist and the Contractor would be undertaken approximately 6 weeks prior to the start of construction. This would ensure that the area is fully assessed for any changes in area of the *Sabellaria alveolata* (e.g. growth or decline of the habitat) and any changes should be fully accounted for in updates to a site environmental constraints plan. This area on the constraints plan should be flagged during toolbox talks with site staff to ensure that it is avoided during the tracking of vehicles or plant in this area at low tide, which could physically damage this habitat. Delivery via barge and stockpiling would not be permitted in the isolated areas of Honeycomb Worms located near the low tide mark to avoid any potential physical impact on as a result of offloading revetment rocks. Rock revetment construction would be undertaken within an approximate working buffer of 20-30m from the base of the proposed 30m deep revetment (approximate maximum of 50-60m from the sea wall). This would avoid unnecessary tracking across the intertidal area from machinery and plant associated with the construction, thus avoiding potential physical damage. Toolbox talks would be undertaken with site staff prior to works commencing to highlight the importance of this habitat and to ensure its avoidance during the works.
Wintering birds	Major Adverse	See above for Liverpool Bay SPA.

Receptor	Pre-mitigation Impact and Effect	Secondary Construction Mitigation
	Large Direct	
Reptiles	Negligible adverse Neutral	No mitigation required but, in order to ensure no offence is committed during works, the following safeguards would be proposed: • Any vegetation clearance would be undertaken in a phased manner under ecological supervision. • Vegetation clearance would be undertaken between April and the end of October, whilst reptiles are active following a reptile sensitive methodology (to be included as part of the CEMP); and • A toolbox talk would be provided to all those working on-site. If evidence of reptiles is found, work would cease until advice has been obtained from the site ecologist.
Marine Mammals	Negligible Adverse Neutral	None required. Nonetheless, measures to mitigate noise and vibration from the unloading of rocks via barge are covered within this chapter. The possible presence of marine mammals near to the site would also be included within toolbox talks for works associated to the delivery of rock to site via barge. If a marine mammal is spotted during this activity, works would cease, and an appropriately qualified marine ecologist would be contacted.
Fish	Major Adverse Large Direct	Pollution prevention measures and contingency planning would be implemented through the CEMP to ensure fish species are safeguarded during the works. The unloading of rocks from the barge would be undertaken at high tide to allow the rocks to be pushed off the barge onto an area slightly covered by water, reducing the repeated vibration impacts through the water column on any nearby fish. If night-time working is required to make use of certain stages of the tide (e.g. unloading of rocks by barge), lighting of the water column and intertidal area would be avoided. If this is not possible then lighting would be minimised as much as possible. Toolbox talks would be undertaken with site staff prior to works commencing to highlight the importance of fish species on site.
Benthic species (infauna and epifauna)	Minor Adverse Slight Direct	Pollution prevention measures and contingency planning would be implemented through the CEMP to ensure benthic species are safeguarded during the works. Toolbox talks would be undertaken with site staff prior to works commencing to highlight the risks of working within the intertidal area and likely disturbance to benthic species and their associated habitat. This would highlight to site workers what to do should they encounter intertidal species on site (e.g. common shore crab (*Carcinus meanas*)). Rock revetment construction would be undertaken within an approximate working buffer of 20-30m from the base of the proposed 30m deep revetment (approximate maximum of 50-60m from the sea wall). This would avoid unnecessary tracking across the intertidal area from machinery and plant associated with the construction, thus avoiding potential physical damage to benthic species. The unloading of rocks from the barge would be undertaken at high tide to allow the rocks to be pushed off the barge onto an area slightly covered by water, reducing the repeated vibration impacts through the water column on any nearby

Receptor	Pre-mitigation Impact and Effect	Secondary Construction Mitigation
		benthic species. Piling undertaken on site would also be done so via vibropiling with variable frequency control, which would stick to higher frequencies to reduce vibration impacts on benthic species. If night-time working is required to make use of certain stages of the tide (e.g. unloading of rocks by barge), lighting of the water column and intertidal area would be avoided. If this is not possible then lighting would be minimised as much as possible.

Source: Mott MacDonald Limited (2020)

Operation

8.8.7 All operational effects were assessed as neutral (no change) from the baseline or beneficial. This assessment took into account primary (embedded) mitigation measures such as best practice pollution prevention. On this basis, no secondary mitigation is required.

8.8.8 In the long-term it is anticipated that the habitat creation and management measures proposed would benefit retained habitats and provide an overall enhancement for certain groups. Enhancements are described in a separate section below.

Ecological Enhancements

8.8.9 A suite of ecological enhancement measures are proposed to compliment the design of the new waterfront especially in the intertidal zone. These focus on the integration of rocky shore habitat creation into coastal defences and wildflower grassland and scrub creation or enhancement into the landscape design.

8.8.10 It is anticipated that this management would be implemented by CCBC as part of a modification to the existing management regime already in place.

8.8.11 The proposed habitat creation measures are described separately below:

Rocky Shore Habitat Creation

8.8.12 The rocky shore habitat creation proposed has been designed to support and enhance coastal biodiversity (by increasing environmental heterogeneity and creating more possible ecological niches), promoting local biodiversity and valuable ecosystem support services for birds and other wildlife. Proposed enhancements (see the technical specification in ES Volume 2, Technical Appendix 3.2 and Scheme Drawings in ES Volume 2, Technical Appendix 3.1) include:

- The creation of approximately eighteen (six clusters of three) interlocking artificial tidal pool areas within the new rock revetment structures at locations identified as being of optimum value*. Rock pools would naturally be found in a rocky shore environment and these would enhance the site to provide areas of refuge for some species, whilst also providing suitable habitat and micro niches for other species that rely on being permanently submerged by seawater such as marine invertebrates;
- The creation of enhanced rock revetment areas (primarily areas of more complex rock) to encourage colonisation in and around the tidal pool areas (through making the texture of rocks more complex, e.g. scoring of rocks, drilling and creating depressions and groves). The more complex an area, the wider the variety of species it can support. The aim here is to increase the biodiversity of the site through these enhancements. It is anticipated that approximately 25-30% of rocks in two 80m lengths would be enhanced through this process;
- Enhancements to the sea wall through the use of “ECO sea wall” formliners (supplied by ECOconcrete© or similar) which has a specific admixture to enhance colonisation by marine life and includes grooves and areas that would provide micro niches. This would be used at the bottom of the access steps. In total thirteen panels would be installed on site which are 0.8m x 4m, providing a large area of ecological enhancement;
- Enhancement of existing outfall/groyne areas through adding complexity via the installation of six ‘ecological armouring units’. These units are modular, pre-cast concrete block structures that have complexities / beneficial ecological enhancements incorporated into them. They can be retrofitted into existing structures. It is anticipated for two blocks would

each be positioned on groynes 2, 3 and 4 respectively, as close to the low water mark as possible. However, in order to install these blocks, sections of the groyne would likely be required to be removed (approximately 1m^3 per block). This would likely result in the loss of some marine life that currently habituates on the groyne structures (i.e. small patches of *Sabellaria alveolata* and algal growth), however the benefits of their installation for the marine environment outweigh the potential loss of established marine features. Therefore, the exact location along the groyne structures that these armouring units would be installed would be decided on site in advance of works by a marine ecologist to avoid the removal of existing patches of *Sabellaria alveolata* as much as possible;

- The creation of approximately fifteen 'vertipool' features to retain seawater (approximately 1.5 – 10L) on vertical surfaces at lower tidal states. This would likely provide suitable micro niches for marine invertebrates that require constant submersion in seawater. Some of these would be placed in accessible areas for educational purposes; and
- Initiatives to reduce plastic usage. The site has the potential to become a single-use plastic free beach zone and this is being considered. This would be achieved through the use of effective signage and awareness raising and education of the public/visitors to the local area. Due to the detrimental consequences that single-use plastics can have on the marine environment (e.g. ingestion and entanglement of biota, along with the fragmentation of plastics resulting in the creation of secondary microplastics), the implementation of this would greatly benefit marine ecology not only in the local area but wider region also.

* Careful placement to consider water depth and risk of sediment smothering would be required.

Wildflower Grassland and Landscape Planting

8.8.13 New landscaped areas would be designed to incorporate habitats of increased diversity and wildlife value to maximise biodiversity benefit. These would be managed sympathetically to ensure they are of landscape and ecological value.

8.8.14 Plans of the proposed landscaping enhancements are included in ES Technical Appendix 3.1 and the specification detailed in Technical Appendix 3.3. It is anticipated that exact specifications and management prescriptions would be set out within a Landscape and Ecology Management Plan (LEMP). However, the habitat creation and enhancement measures proposed broadly include:

- NWC Railway Line Embankment Enhancement (Subject to Network Rail Approval): Enhancement of existing landscaped areas and the adjacent railway embankment through planting and the sowing of wildflower mixes, to include scrapes along the railway embankment sown with a coastal grassland species mix to increase structural and species diversity;
- Wildflower Grassland Creation: Re-seeding of existing amenity road verges (following appropriate management to reduce nutrient load) with wildflower meadow mix to be attractive as well as ecologically beneficial for pollinators;
- Landscaping Planting: New or existing landscape planting to incorporate native species or species of wildlife value (i.e. fruit bearing shrubs and trees); and
- Habitat management: Retained and newly created habitats to be subject to an ecologically sympathetic management regime; including rotational or low intensity cutting to encourage fruits and flowers; re-use of arisings for habitat piles; and avoiding use of herbicides;

Faunal Enhancements

8.8.15 Bat and bird boxes: Bat and bird boxes integrated into, or installed on, any buildings and trees to provide enhanced roosting and nesting opportunities within the site in appropriate locations; and

8.8.16 Insect boxes: Insect boxes installed in retained or enhanced landscaping areas to provide enhanced nesting opportunities for invertebrates.

Raising Awareness and Education

8.8.17 It is anticipated that on-going maintenance for repairs to coastal defences would be reduced in the long-term but, given the sensitivity of birds and other identified marine ecological features locally, further measures to reduce potential for disturbance during maintenance are proposed to benefit these receptors. These include the following measures to raise of awareness of the sensitivity of ecological features in the area:

- Production of a guidance note for the council maintenance team on the optimal timing of maintenance activities for use in programme planning;
- Provision of an information leaflet for council maintenance workers and inclusion of this in contractor briefing packs (this would identify known locations of sensitive habitats such as the presence of *Sabellaria alveolata* and Blue Mussel beds, along with newly enhanced areas that need to be left undisturbed to allow colonisation by marine species. This would ensure these areas can be avoided during future maintenance works); and
- Erection of wildlife information boards and signage along the Promenade, close to vehicular access points to the beach, to highlight the importance and sensitivity of birds and marine species in the area, along with information outlining the importance of the new ecological enhancements on site and how the changes made would benefit local species.

8.9 Assessment of Likely Significant Effects

8.9.1 The assessment of likely significant effects has been undertaken following the methodology described in Section 8.4.

8.9.2 Table 8.14 summarises the Scheme assessment of effects, detailing the potential effect identified and appropriate mitigation measures for a particular receptor. The receptor sensitivity and magnitude of impact has been estimated followed by the identification of the significance category after mitigation and enhancement measures have been taken into account (as detailed in Section 8.8).

Table 8.14: Assessment of Effects Summary

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 8.8	Action by (Contractor/ Designer)	Receptor Sensitivity	Residual Magnitude	Residual Significance Category (with mitigation)
Construction						
Liverpool Bay SPA	Impacts include: • Pollution risk (oil spills); • Disturbance to wintering birds from noise, vibration, human presence and artificial light; • Changes in turbidity (increased sediment affecting foraging and habitats); and • Disturbance to foraging birds (outside of winter months) from the above activities as well as barge and transhipment (if required).	Mitigation to include: • Pollution prevention measures and contingency planning would be implemented through the CEMP; • Toolbox talks to be delivered to all contractors on sensitivity of SPA and bird species present; • Best practice measures in CEMP to reduce noise; • Vibropiling with a variable frequency control that would stick to higher frequencies to reduce vibration effects; and • Avoidance of night-working where possible (or excessive hours) and avoid or minimise artificial light spill (use of directional lighting, louvres, etc).	Contractor and ECoW	International	Negligible Adverse	**Direct, Temporary, Slight Adverse (Not Significant)**
Other Statutory Designations (SSSIs and LNRs)	All pre-mitigation construction impacts assessed as no change.	None required.	N/A	National / UK – County	No change	**Neutral (Not Significant)**
Non-statutory Designations (LWSs)	All pre-mitigation construction impacts assessed as no change.	None required.	N/A	County	No change	**Neutral (Not Significant)**
Wintering Birds	(See above in relation to Liverpool Bay SPA)			International	Negligible Adverse	**Direct, Temporary Slight Adverse (Not Significant)**

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 8.8	Action by (Contractor/ Designer)	Receptor Sensitivity	Residual Magnitude	Residual Significance Category (with mitigation)
Reptiles	Impacts include: • Risk of killing and injury of reptiles during habitat enhancement works (to NWC Railway Line embankment).	Mitigation safeguards in CEMP to include the following measures: • Toolbox talks to all contractors prior to vegetation clearance/habitat enhancement works; • Phased vegetation clearance under ecological supervision; and • Timing of vegetation clearance (April to October).	Contractor and ECoW	Local	Negligible Adverse	**Neutral (Not Significant)**
Blue mussel bed (*Mytilus edulis*)	Impacts include: • Physical damage; • Increases in noise and vibration; and • Water pollution.	Mitigation to include: • Delivery via barge and stockpiling would not be permitted in the area of the Blue Mussel bed; • Site walkover 6-8 weeks prior to construction by a marine ecologist to ensure any changes in area of mussel bed are recorded, the site environmental constraints plan is updated, and a suitable approach to tracking plant over the mussel bed is agreed; • Tracking of plant for the rock revetment construction would be undertaken within an approximate working buffer of 20-30m from the base of the proposed 30m deep revetment (approximate maximum of 50-60m from the sea wall), with tracking to occur only over the sparse section of mussel bed and avoidance of the dense section to be adhered to; • Construction of the eastern end of the revetment first (if possible) to avoid repeated tracking of plant over the mussel bed; • Toolbox talks with site workers and copies of the site environmental constraints plan to be made available; • Vibropiling with a variable frequency control would be used and higher frequencies would be adhered to in order to reduce vibration effects; and • The unloading of rocks from the barge would be undertaken at high tide to reduce vibration effects; and	Contractor	Local	Minor Adverse	**Direct, Temporary, Slight Adverse (Not Significant)**

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 8.8	Action by (Contractor/ Designer)	Receptor Sensitivity	Residual Magnitude	Residual Significance Category (with mitigation)
		• Pollution prevention measures and contingency planning would be implemented through the CEMP to ensure these features are safeguarded during the works.				
Honeycomb worm reefs (*Sabellaria alveolata*)	Impacts include: • Physical damage; and • Water pollution.	Mitigation to include: • Site walkover to be undertaken by a marine ecologist 6-8 weeks prior to the start of construction to establish if the area of *Sabellaria alveolata* habitat has changed and updates to be made to the site environmental constraints plan; • Delivery via barge and stockpiling would not be permitted in the vicinity of the isolated Honeycomb worm reef located on intertidal sands/gravels; • Revetment construction undertaken within an approximate working buffer of 20-30m from the base of the proposed 30m deep revetment (approximate maximum of 50-60m from the sea wall). • Toolbox talks with site workers and copies of site environmental constraints plan made available; and • Pollution prevention measures and contingency planning would be implemented through the CEMP to ensure these features are safeguarded during the works.	Contractor	Local	Minor Adverse	**Direct, Temporary, Slight Adverse (Not Significant)**
Marine mammals	Impacts include: • Underwater noise and vibration; and • Water pollution	Mitigation to include: • The unloading of rocks from the barge would be undertaken at high tide to allow the rocks to be pushed off the barge onto an area slightly covered by water, reducing the repeated vibration impacts through the water column; and • Pollution prevention measures and contingency planning would be implemented through the CEMP to ensure these features are safeguarded during the works.	Contractor	Local	Negligible Adverse	**Neutral (Not Significant)**

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 8.8	Action by (Contractor/ Designer)	Receptor Sensitivity	Residual Magnitude	Residual Significance Category (with mitigation)
Fish	Impacts include: • Underwater noise and vibration; • Physical damage; • Water pollution; and • Artificial lighting.	Mitigation to include: • The unloading of rocks from the barge would be undertaken at high tide to reduce noise and vibration impacts; • The unloading of rocks from the barge to be supervised by an EcoW and works to be halted if any individual fish or shoals are observed nearby; • Toolbox talks would be undertaken with site staff prior to works commencing to highlight the importance of fish species on site; • Pollution prevention measures and contingency planning would be implemented through the CEMP to ensure these features are safeguarded during the works; and • Lighting of the water column and intertidal area would be avoided. If this is not possible then lighting would be minimised as much as possible.	Contractor	Regional	Minor Adverse	**Direct, Temporary Slight Adverse (Not Significant)**
Benthic species	Impacts include: • Underwater noise and vibration; • Physical damage; • Water pollution; and • Artificial lighting.	Mitigation to include: • The unloading of rocks from the barge to be undertaken at high tide to reduce the impacts from noise and vibration; • Vibropiling with a variable frequency control would be used and higher frequencies would be adhered to in order to reduce vibration effects; • Toolbox talks would be undertaken with site staff prior to works commencing. This would highlight to site workers what to do should they encounter intertidal species on site (e.g. common shore crab (*Carcinus meanas*)); • Revetment construction would be undertaken within an approximate working buffer of 20-30m from the base of the proposed 30m deep revetment (approximate maximum of 50-60m from the sea wall);	Contractor	Local	Minor Adverse	**Direct, Temporary Slight Adverse (Not Significant)**

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 8.8	Action by (Contractor/ Designer)	Receptor Sensitivity	Residual Magnitude	Residual Significance Category (with mitigation)
		• Pollution prevention measures and contingency planning would be implemented through the CEMP to ensure these features are safeguarded during the works; and • Lighting of the water column and intertidal area would be avoided. If this is not possible then lighting would be minimised as much as possible.				
Operation						
Liverpool Bay SPA	No significant adverse impacts identified. Reduced disturbance to wintering birds anticipated as a result of reduced maintenance requirements.	No mitigation required. However, measures to raise awareness of bird sensitivity by contractors and visitors proposed in the form of a guidance note, information leaflet and signage. Given that the results of these measures cannot be guaranteed in the long-term, the residual effects have been assessed as temporary rather than permanent as a precaution.	Contractor and Ecologist	International	Negligible Beneficial	**Indirect, Temporary Slight Beneficial (Not Significant)**
Other Statutory Designations (SACs, SSSIs, LNRs)	No significant impacts identified in the operational phase.	No mitigation required.	N/A	National / UK – County	No change	**Neutral (Not Significant)**
Non-statutory Designations (LWSs)	No significant impacts identified in the operational phase.	No mitigation required.	N/A	County	No change	**Neutral (Not Significant)**
Wintering Birds	(see above in relation to Liverpool Bay SPA)					**Temporary Slight Beneficial (Not Significant) Indirect**

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 8.8	Action by (Contractor/ Designer)	Receptor Sensitivity	Residual Magnitude	Residual Significance Category (with mitigation)
Reptiles	No significant adverse impacts identified.	No mitigation required. Habitat enhancement measures such as scrapes along NWC Railway Line embankment would benefit reptiles in the long-term.	Contractor	Local	Minor Beneficial	**Indirect, Permanent Slight Beneficial (Not Significant)**
Other Habitats and Species	None identified (scoped out of impact assessment)	Habitat creation measures are proposed in the form of: • Scrapes along the NWC Railway Line embankment and sowing of coastal grass mix; • Wildflower grassland creation on amenity verges; • Native tree and shrub planting in landscaped amenity areas; • Provision of bird and bat boxes; • Provision of insect boxes. • These would be managed in the long-term as part of a Landscape and Ecology Management Plan (LEMP).	Contractor	Less than Local	Major Beneficial	**Indirect, Permanent Slight Beneficial (Not Significant)**
Blue mussel bed (*Mytilus edulis*)	No impacts identified in the operational phase.	Enhancements include: • Addition of complexities on site provide potential new areas suitable for colonisation by *Mytilus edulis*.	Contractor	Local	Minor Beneficial	**Indirect, Permanent Slight Beneficial (Not Significant)**
Honeycomb worm reefs (*Sabellaria alveolata*)	No impacts identified in the operational phase.	Enhancements include: • Addition of complexities on site provide potential new areas suitable for colonisation by *Sabellaria alveolata*.	Contractor	Local	Minor Beneficial	**Indirect, Permanent Slight Beneficial (Not Significant)**
Marine mammals	No impacts identified in the operational phase.	Enhancements on site are unlikely to benefit marine mammal species.	n/a	Local	No Change	**Neutral (Not Significant)**

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 8.8	Action by (Contractor/ Designer)	Receptor Sensitivity	Residual Magnitude	Residual Significance Category (with mitigation)
Fish	No impacts identified in the operational phase.	Enhancements include: • Creation of suitable habitat for fish species through the added complexities on site; • Addition of refugia habitat across the site would benefit any nursery populations of fish; and • General scheme enhancements would likely result in increased biodiversity to site, increasing feeding opportunities available for fish.	Contractor	Regional	Minor Beneficial	**Indirect, Permanent Slight Beneficial (Not Significant)**
Benthic species	No impacts identified in the operational phase.	Enhancements include: • Creation of micro niches on site (ecological armouring units, vertipools, complexities on sea wall and rocks on revetment) would create suitable areas for colonisation and likely result in an increase in population numbers.	Contractor	Local	Major Beneficial	**Indirect, Permanent Slight Beneficial (Not Significant)**

Source: Mott MacDonald, 2020

Likely Residual Significant Effects Recorded (Post-Mitigation)

Construction

8.9.3 Incorporating the mitigation and enhancement measures as outlined in Section 8.8, the maximum residual effect identified is **Slight Adverse**. Therefore, no significant residual effects have been identified for marine or terrestrial ecological receptors during the construction phase.

Operation

8.9.4 No significant residual effects (adverse or beneficial) have been identified for marine or terrestrial ecological features during the operational phase (when considering the mitigation and enhancement measures in place).

8.9.5 It should be noted that all operational effects have been assessed as either neutral or beneficial under the operational phase of the Scheme. Whilst none of the beneficial effects have individually been assessed as more than "Slight" significance following the LA108 guidance, the benefits at a local level have been assessed as moderate or major significance for many of the receptors whilst other local ecological features scoped out of this assessment would also benefit from the enhancements proposed. Providing management and maintenance is successful in the long-term and these habitats mature and are colonised as anticipated, it is considered that the long-term cumulative benefits of these multiple enhancements is more substantial as a package, particularly if considered in a local context. To reflect this, the Scheme as a whole is considered to be of **Slight-Moderate Beneficial** significance.

8.10 Requirements for Tertiary Mitigation/Monitoring

8.10.1 Overall only a slight adverse effect has been concluded from the construction phase in respect of Liverpool Bay SPA and a number of marine receptors. As such, there are no long-term requirements of monitoring. However, in line with best practice, monitoring of certain receptors is proposed in order to inform on-going maintenance and enhancements. This includes:

- Habitats and Faunal Enhancements: Monitoring, maintenance and aftercare for newly created marine and terrestrial habitats, in order to ensure these establish and develop as required to be of biodiversity benefit. This would include annual checks to ensure that these are on track (in line with the management prescriptions), in good condition and, in the case of point features, are not missing or damaged; and
- *Sabellaria alveolata* and *Mytilus edulis* (Blue Mussel bed): Pre-construction photographic condition surveys have been undertaken of the marine habitats on site. It is important to take ongoing images of the site immediately after construction is completed as this would enable records to be taken of the amount of existing habitat that was lost to incorporate the site enhancements (e.g. sections of groynes and associated *Sabellaria alveolata* that were removed to enable the installation of ecological armouring units). This would provide a suitable baseline against which to assess any improvement in colonisation of the enhanced areas of the site over the future years.

8.10.2 It is anticipated that the above monitoring as well as prescriptions for the creation and management of new terrestrial and intertidal habitats would be set out within a Landscape and Ecological Management Plan (LEMP), to be delivered by an appointed contractor under the guidance of, and with specialist input from, ecologists as needed. It is recommended that this LEMP takes into account management of the marine environmental enhancements over a ten year period to ensure enough time for establishment once construction and then colonisation by marine species.

8.11 Conclusions

8.11.1 In summary, the assessment above has shown that, on the basis of the current information available and with the inclusion of appropriate mitigation measures, construction stage effects on identified receptors are not considered to be significant, with an on-balance maximum construction stage effect significance anticipated to be **Slight Adverse**.

8.11.2 Providing management and maintenance is successful in the long-term and the proposed new habitats mature and are colonised as anticipated, it is considered that the long-term cumulative benefits of these multiple enhancements is more substantial as a package, particularly if considered in a local context. To reflect this, the Scheme as a whole during operation is considered to be of **Slight-Moderate Beneficial** significance.

8.12 Drawings

8.12.1 Key drawings in support of this Chapter are included here and comprise the following:

- Drawing 415437-MMD-00-XX-DR-N-1713 Phase 1 Habitat Survey; and
- Drawing 415437-MMD-00-XX-DR-N-1709 Statutory and Non-Statutory Designated Sites within 2.0km.

Colwyn Bay Waterfront Project – Phase 2b Area

Colwyn Bay Waterfront Project – Phase 1abc Areas

Old Colwyn Coastal Defence and Active Travel

Groyne 1

Groyne 2

Groyne 3

Groyne 4

Location Map

Key to Symbols

- Target note
- Phase boundaries
- Trees with low bat potential
- Honeycomb Worm Reef - sparse (approximate location)
- A3.1 - Broadleaved parkland/scattered trees
- A2.1 - Scrub - dense/continuous
- A3.1 - Broadleaved parkland/scattered trees
- B6 - Poor semi-improved grassland
- C1.1 - Bracken - continuous
- G1.6 - Standing water - brackish
- H1.1 - Intertidal - mud (approximate location)
- H1.1 - Intertidal - sand
- H1.2 - Intertidal - shingles/cobbles (approximate location)
- H1.3 - Intertidal - boulders/rocks (Groynes and man-made features)
- J1.2 - Cultivated/disturbed land - amenity grassland
- J3.5 - Artificial sea wall
- J3.6 - Buildings & infrastructure
- J5 - Hardstanding
- Mussel bed - dense (approximate location)
- Mussel bed - sparse (approximate location)

Notes

1. For information only, not for construction.
2. Contains Ordnance Survey data © Crown copyright and database rights 2019 Ordnance Survey. All rights reserved. Mott Macdonald OS License: 0100026791.
3. Contains public sector information licensed under the Open Government Licence v3.0.
4. Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
5. Phase 1c beach recharge extended into the Phase 2b area while transitioning back to existing beach levels and Phase 2a promenade improvements straddled the Phase1 and Phase2 boundary.

Rev	Date	Drawn	Description	Ch'k'd	App'd
P5	23/07/20	SA	For information	NsS	JB

Mott MacDonald
2 Callaghan Square
Cardiff
CF10 5BT
T +44 (0)2920 467800
W www.mottmac.com

Client: Conwy County Borough Council

Title: Old Colwyn Coastal Defence and Active Travel Scheme
Phase 1 Habitat Survey

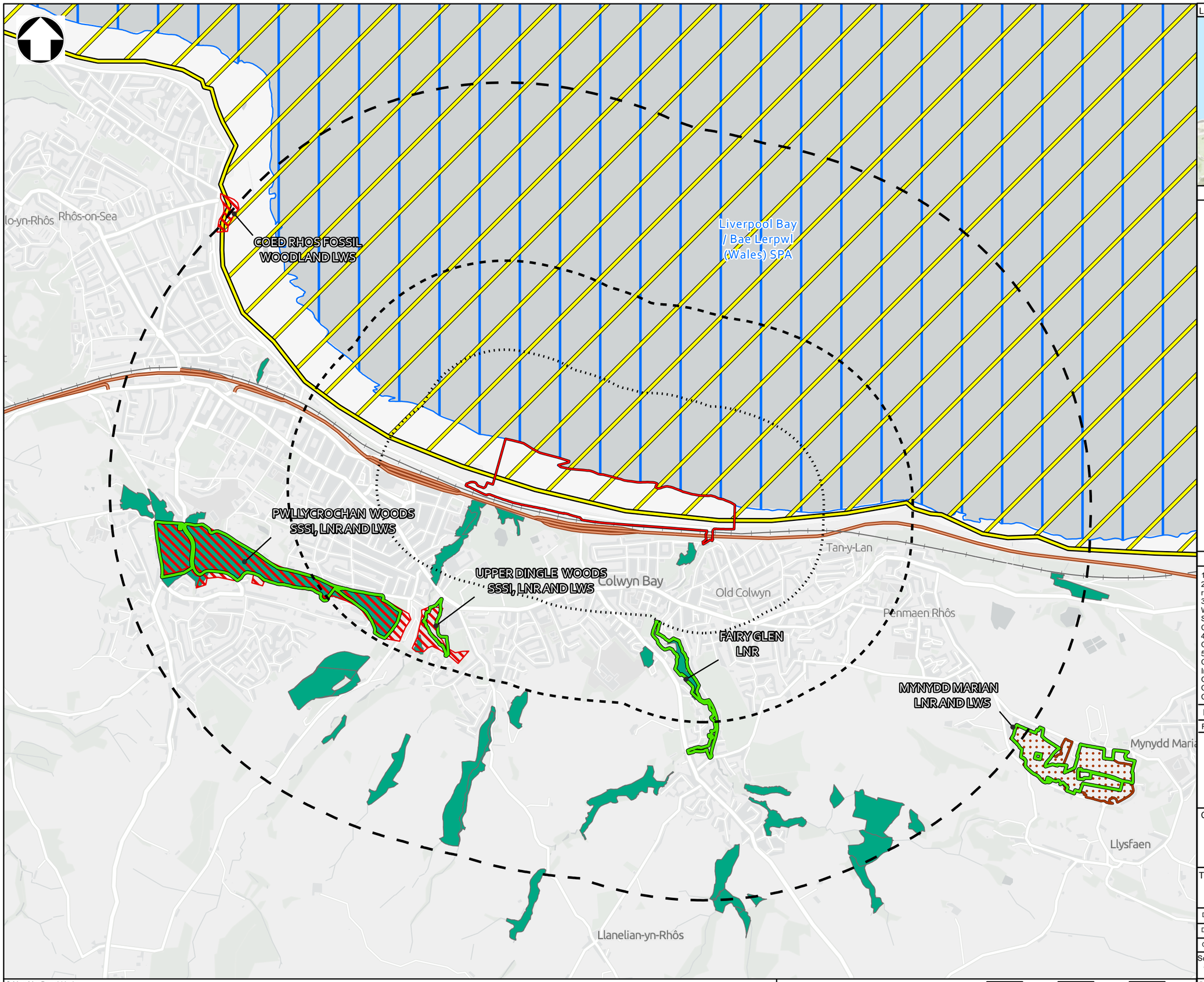
Designed	L Woolley	LW	Eng. Check	N Spofforth	NS
Drawn	S Anstice	SA	Coordination	L Woolley	LW
GIS Check	H Wheldon	HW	Approved	J Bates	JB

Scale at A3	Status	Rev	Security
1:10,000	INF	P5	STD

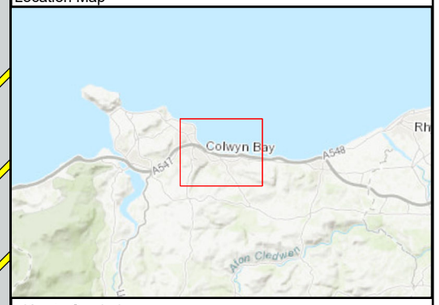
Drawing Number: 415437-MMD-00-XX-DR-N-1713

0 100 200 300 400 500 Meters

C:\Users\ANS90589\Mott MacDonald\410895 - Colwyn Bay Waterfront Phase 2b - GIS\MXD\ECO_410895_MMD_SplashPoint_20200107_P01\ECO_410895_MMD_SplashPoint_20200107_P01.aprx



Location Map



Key to Symbols

- Scheme extents
- 500m buffer of scheme extent
- 1km buffer of scheme extent
- 2km buffer of scheme extent
- London to Holyhead Railway
- A55
- Important Bird Area (IBA)
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)
- Ancient Woodland
- Local Wildlife Sites (LWS)

Notes

1. For information only, not for construction.
2. Contains Ordnance Survey data © Crown copyright and database rights 2019 Ordnance Survey. All rights reserved.
3. Contains Natural Resources Wales information © Natural Resources Wales and Database Right. All rights Reserved. Contains Ordnance Survey Data. Ordnance Survey Licence number 100019741. Crown Copyright and Database Right.
4. Data reproduced with the permission of RSPB. © Crown Copyright. Ordnance Survey licence number 100021787 (2020).
5. Contains OS data © Crown Copyright and database right 2020 Contains data from OS Zoomstack, Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	23/07/20	MH	For information	NS	CW

MOTT MACDONALD

Mott MacDonald House
5 Woodland Road West
Colwyn Bay
LL29 7DH
T +44 (0)2920 467800
W www.mottmac.com

Client

CONWY CYNGOR BWRDEISTREF SIROL COUNTY BOROUGH COUNCIL

Conwy County Borough Council

Title: Old Colwyn Coastal Defence and Active Travel Scheme
Statutory and Non-Statutory Designated Sites within 2km of the Scheme

Designed	N Spofforth	NS	Eng. Check	N Spofforth	NS
Drawn	M Hayward	MH	Coordination	N Spofforth	NS
GIS Check	G O'Donovan	GO	Approved	C Williams	CW

Scale at A3	Status	Rev	Security
1:20,000	INF	P1	STD

Drawing Number: 415437-MMD-00-XX-DR-N-1709

0 200 400 600 800 1000 Meters

C:\Users\ANS90589\Mott MacDonald\410895 - Colwyn Bay Waterfront Phase 2b - GIS\MXD\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620.aprx

8.13 List of Documents Included in ES Volume 2: Technical Appendix 8

- Appendix 8.1: Legislation Summary;
- Appendix 8.2: Preliminary Ecological Appraisal Report;
- Appendix 8.3: Wintering Bird Survey Report;
- Appendix 8.4: Bat Survey Report;
- Appendix 8.5: Habitats Regulations Assessment (HRA) – Report to Inform an Appropriate Assessment; and
- Appendix 8.6: Bio Security Risk Assessment Report.

9 Climate

9.1 Introduction

9.1.1 It has been established that as a result of rising concentrations of carbon dioxide (CO_2), and other greenhouse gases (GHG) in the atmosphere, a degree of climate change is inevitable and is expected to have significant implications for the future. It is therefore imperative to reduce emissions wherever possible. In addition, stringent targets have been set to reduce the UK emissions to zero by 2050.

9.1.2 This chapter considers only the impact of the Scheme on climate through construction due to the embodied carbon emissions of construction materials, emissions of construction plant and emissions from transport of materials.

9.1.3 A Carbon Management Plan (CMP) has been produced alongside this chapter to detail how the Scheme has minimised GHG emissions. The CMP can be found in ES Volume 2, Technical Appendix 9.1.

9.2 Legislative and Policy Framework

9.2.1 The principal legislative and planning context in relation to the assessment of the environmental effects of the Scheme on Climate is discussed below.

European Legislation

The Commission Implementing Regulation (2014/749/EU)

9.2.2 Article 17 states that Member States shall report approximated greenhouse gas inventories as referred to in Article 8(1) of Regulation (EU) No 525/2013 at a level of disaggregation of source categories reflecting the activity data and methods available for the preparation of estimates for the year X-1. An explanation for the main drivers for the trends in emissions should also be reported[118]. Whilst the UK is no longer a member of the EU, it is continuing to abide by these obligations.

EU EIA Directive

9.2.3 EU Directive 2014/52/EU (hereafter 'the revised EIA Directive') amends EIA Directive 2011/92/EU. The amended regulations introduce climate change as a new topic, broadening the potential scope of an EIA. The regulations require the impact that the project would have on climate change to be assessed alongside an assessment of the project's vulnerability to climate change.

National Legislation

The Environment (Wales) Act, 2016

9.2.4 The Environment (Wales) Act Part 2 Climate Change sets out that a requirement in legislation for the government to ensure the net Welsh emissions for the year 2050 are at least 80% lower than the baseline. In addition, the Plan sets out the requirement for interim emission targets and carbon budgets for Wales with the first period running 2016-2020.

[118] Official Journal of the European Union (2014) Commission Implementing Regulation (2014/249/EU) [online] available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0749 (last accessed June 2020)

9.2.5 The Welsh government aim to reach net zero by 2050 however it has been recommended by the Committee on Climate Change that Wales aims for 95% reduction, amendments to Regulations are anticipated to be completed in 2020[119].

Climate Change Act 2008

9.2.6 The Climate Change Act 2008 forms part of the UK government's plan to reduce GHG emissions, committing the government to a reduction of GHG by at least 80% of 1990 levels by 2050. The government has now committed to net zero GHG emissions by 2050, amending the Climate Change Act 2008[120].

9.2.7 The Climate Change Act creates an approach to managing and responding to climate change in the UK, by:

- Setting ambitious, legally binding emission reduction targets;
- Taking powers to help meet those targets;
- Strengthening the institutional framework;
- Enhancing the UK's ability to adapt to the impact of climate change; and
- Establishing clear and regular accountability to the UK Parliament and to the devolved legislatures.

9.2.8 Key provisions of the 2008 Act in respect of climate change mitigation include the requirement for the government to set legally binding carbon budgets capping the amount of GHGs emitted in the UK over a 5-year period, as set out in Table 9.1. These would be updated in line with the commitment to net zero GHG emissions (currently updates are expected in September 2020).

Table 9.1: UK Carbon Reduction Targets

Carbon Budget	Carbon Budget Level	Reduction Below 1990 Levels
3rd carbon budget (2018- 2022)	2,544MtCO_2e	37% by 2020
4th carbon budget (2023- 2027)	1,950MtCO_2e	51% by 2025
5th carbon budget (2028- 2032)	1,725MtCO_2e	57% by 2030

Source: Department for Business Energy and Industrial Strategy 2016[121]

9.2.9 Key provisions of the Act in respect of climate change adaptation include:

- A requirement for the government to report, at least every six years, on the risks to the UK of climate change, and to publish a programme setting out how these would be addressed. This Act also introduces powers for government to require public bodies and statutory undertakers to carry out their own risk assessment and make plans to address those risks; and
- The Adaptation Sub-Committee of the Committee on Climate Change, would provide advice to, and scrutiny of, the government's adaptation work.

9.2.10 Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017[122].

[119] Welsh Government, press release 11/06.2019 [online] https://gov.wales/wales-accepts-committee-climate-change-95-emissions-reduction-target (last accessed June 2020)

[120] Gov.uk (2019) Climate Change Act 2008 [online] https://www.legislation.gov.uk/ukpga/2008/27/section/1 (last accessed June 2020)

[121] Department for Business Energy and Industrial Strategy (2016). *Carbon Budgets* [online] https://www.gov.uk/guidance/carbon-budgets#policies-and-proposals-to-meet-carbon-budgets (last accessed July 2020)

[122] Gov.uk (2017) Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 [online] available at https://www.legislation.gov.uk/wsi/2017/567/contents/made

9.2.11 The requirements of the 2014 amended EU EIA Directive to include an assessment of climate change were transposed into UK law by the UK Town and Country Planning (Environment Impact Assessment) Regulations 2017 and came into force on the 16th May 2017.

National Policy

The Climate Change (Carbon budgets) (Wales) Regulations 2018[123]

9.2.12 Following the requirement from the Environment Wales Act the first two carbon budgets are set out in this regulation, these are as a percentage reduction from the 1990 baseline as follows:

- Carbon budget 1 (2016-20): Average of 23% reduction; and
- Carbon budget 2 (2021-25): Average of 33% reduction.

9.2.13 The Committee on Climate Change is due to provide updated advice to the Welsh Government later in 2020 around the level of the third Welsh carbon budget (covering 2026-30), as well as advice on updated levels of the second carbon budget (2021-25)[124].

Prosperity for All: A Low Carbon Wales 2019[125]

9.2.14 The Prosperity for All Plan sets out the Welsh Government's approach to cut emissions and increase efficiency to maximise wider benefits for Wales. There are 100 policies set out within the Plan in addition to details of the carbon budgets and interim targets for Wales are presented, as shown below:

- 2020: 27% reduction;
- 2030: 45% reduction; and
- 2040: 67% reduction.

The Carbon Plan 2011

9.2.15 The Carbon Plan was presented to UK Parliament pursuant to Sections 12 and 14 of the Climate Change Act 2008. The plan sets out how the UK would achieve decarbonisation within the framework of the energy policy. UK Local Authorities and regional level authorities must report on their CO_2 emissions.

Local Policy

Conwy Local Development Plan, 2007 - 2022

9.2.16 The Conwy Local Development Plan was adopted in 2013[126]. Within the plan Policy DP/1 – Sustainable Development Principles references making efficient and effective use of resources, taking account and addressing the potential impact of climate change and reducing waste production. The Natural Environment Strategic Statement, within the plan, states the

[123] Welsh Statutory Instruments (2018). The Climate Change (Carbon Budgets) (Wales) Regulations 2018 [online] available at: http://www.legislation.gov.uk/wsi/2018/1303/made (last accessed June 2020)

[124] CCC, The Sixth Carbon Budget and Welsh emissions targets – Call for Evidence, December 2019 [online] https://www.theccc.org.uk/the-sixth-carbon-budget-and-welsh-emissions-targets-call-for-evidence/#gf_9 (last accessed June 2020)

[125] Welsh Government (2019). Prosperity for All: A Low Carbon Wales [online] available at https://gov.wales/sites/default/files/publications/2019-06/low-carbon-delivery-plan_1.pdf (last accessed June 2020)

[126] Conwy County Borough Council (2013). Conwy Local Development Plan 2007-2022 [online] available at: https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Adopted-Local-Development-Plan-LDP/Assets-written-proposals-maps/Conwy-Local-Development-Plan-2007-2022.pdf (last accessed June 2020)

developments must seek to limit the impact on the environment 'by minimising resource use, increasing energy efficiency and reducing carbon emissions.

Other Policy and Guidance

Infrastructure Carbon Review

9.2.17 The Infrastructure Carbon Review[127] sets out carbon reduction actions required by infrastructure organisations. In terms of the Scheme, this means that emission reduction actions should be taken into account when developing Scheme specific mitigation measures, where relevant.

Publicly Available Specification (PAS) 2080:2016 Carbon Management in Infrastructure

9.2.18 PAS2080[128] sets out a common approach and understanding of whole life carbon management in the provision of economic infrastructure as a result of the Infrastructure Carbon Review. It promotes reduced carbon, reduced cost infrastructure delivery, more collaborative ways of working, and a culture of challenge in the infrastructure value chain.

9.3 Assessment Methodology

Introduction

9.3.1 This section describes the methodology used for the assessment of effects on climate change. The assessment of climate is fundamentally different to the other topics assessed within EIA. The effects on climate focuses upon the impact the Scheme has upon the climate, as the receptor, due to emissions of GHGs during the construction of the Scheme.

9.3.2 The assessment approach for Climate follows the guidance presented within DMRB Volume 11 Section 2 Part 4 LA114 (Climate)[129] in combination with PAS 2080: Carbon Management in Infrastructure, focusing on the impacts of projects on climate section, along with professional judgement.

9.3.3 Further detail on the methodology used is contained within ES Volume 2, Technical Appendix 9.1.

Assessment Methodology

9.3.4 The assessment methodology covers:

- Assessment of the GHGs emitted during construction (production of the materials used to construct the Scheme, often referred to as embodied carbon), use of plant through construction, and the transport of materials to site (see Table 9.3);
- GHG emissions are measured in tonnes of CO_2 equivalents (tCO_2e) to include the GHGs additional to CO_2 and to account for differing global warming potential of these GHGs in one consistent unit;
- Estimates for GHG emission savings through already implemented reductions have been calculated using the Carbon Portal and are presented for information;
- Opportunities for mitigation to reduce embodied and operational carbon in the Scheme design. This is covered in greater detail within ES Volume 2, Technical Appendix 9.1; and

[127] HM Treasury (2013) Infrastructure Carbon Review [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/260710/infrastructure_carbon_review_251113.pdf (last accessed June 2020)

[128] BSI (2016) PAS 2080: Carbon management in infrastructure

[129] LA 114 Climate Design Manual for Roads and Bridges (2019)

- Assessment of significance conducted by comparing estimated GHG emissions arising from the Scheme with the Wales carbon budgets, and the associated reduction targets. The Wales carbon budgets are set out as a percentage reduction from the baseline rather than a value. Therefore, the two carbon budgets have been estimated by using the reduction percentages and the baseline published by the National Atmospheric Emissions Inventory (NAEI)[130] as shown in Table 9.2.

Table 9.2 Wales Carbon Budget

Period	Reduction from Baseline	Estimated Carbon Budget or Baseline ($MtCO_2e$)
1990 Baseline	N/A	56.4
2016-2020 (5 year budget)	23%	217
2021-2025 (5 year budget)	33%	189

Source: National Atmospheric Emissions Inventory

9.3.5 The assessment of the impact of the Scheme on climate is presented by lifecycle stage of the project. The PAS 2080 lifecycle stages scoped into the assessment of impacts on climate and their study areas are explored in Table 9.3.

Table 9.3 Lifecycle Stages within Scope of Assessment and the Affected Study Area

Lifecycle Scope	Study Area	Emissions Scope	Calculation Method
A1-3 Products and materials	Permanent construction materials within the construction Site boundary and the supply chains associated with these would be included.	Primary raw material extraction, manufacturing, and transportation within the supply chain of materials required for the permanent assets.	The Moata Carbon Portal, which is PAS 2080 certified, has been used for assessment of construction emissions.
A4 Transport to works Site	Transport of permanent construction materials to Site using Royal Institute of Chartered Surveyors assumptions if Scheme specific data is not available.	Emissions from vehicles transporting materials to Site.	Benchmarks from the Royal Institute of Chartered Surveyors have been used for construction transport emission calculations[131]
A5 Construction plant	Construction process within the construction Site boundary	Emissions from construction plant.	Plant emissions, where plant specification data is available. If direct fuel consumption data is available this would be used.
B2 Maintenance	Within the Site boundary	Emissions from maintenance of assets during operation.	Assess qualitatively.
B6 Operational energy use	Within the Site boundary	Emissions from the use of energy (lighting and kiosk) during operation.	Published data on potential energy use from street lighting[132]. Other energy use assumed minimal.

[130] National Atmospheric Emissions Inventory (2020). Devolved Administration GHG Inventory 1990-2018.

[131] Royal Institute of Chartered Surveyors (2017). Whole life carbon assessment for the built environment.

[132] Boyce, Peter & Fotios, Steve & Richards, M. (2009). Road lighting and energy saving. Lighting Research & Technology - LIGHTING RES TECHNOL. 41. 245-260. 10.1177/1477153509338887

Source: PAS 2080 lifecycle stages

9.3.6 Land use change has been scoped out from the effects on climate assessment, it is also assumed there would be no replacement during the design life of the project.

Assessment Assumptions and Limitations

9.3.7 The following assumptions, limitations and estimation of quantities are of relevance to the assessment of construction effects on climate:

- The quantities were estimated from the tender design cost estimate bill of quantities, drawings and further detail provided through discussion with the design team;
- The material quantities obtained from the design information, where appropriate, were converted into the relevant unit required in Mott MacDonald's internal tool, the Moata Carbon Portal;
- Items without a direct match in the Moata Carbon Portal were assessed using similar items;
- Carbon reductions have been estimated using quantities provided by the design team or estimated from the proportions of the tender design cost estimate;
- A number of the design aspects were omitted due to current level of design information or information on quantities and carbon emissions not being available. These include the following:
  - Removal of timber groynes;
  - Street furniture – including benches, bins and projectors;
  - Concessions kiosk; and
  - Flood gates.
- Travel distances for the materials were assumed based on local, national and European categories in line with Royal Institute of Chartered Surveyors (RICS) methodology[133];
- The carbon budgets for Wales used as a comparison to the emissions from the Scheme was based on estimating the budget from the published reduction target and the baseline data published by NAEI. This is due to the Wales carbon budget value not being readily available;
- The emissions associated with the operation of the Scheme have been quantified in part for the use of street lighting using benchmark data, the use of the concessions kiosk has not been estimated at this stage due to lack of data on projected operational energy use at this time; and
- Maintenance emissions have not been quantified due to the uncertainty related to the maintenance requirement.

9.4 Baseline Conditions

9.4.1 The UK construction industry is the largest consumer of natural resources with an average of over 400 million tonnes of material consumed every year. This accounts for approximately 10% of the total UK carbon emissions[134]. Therefore, assuming the same percentage of Wales national emissions it has been estimated that approximately 3.9 million tonnes of CO_2 are attributed to the embodied carbon of construction materials in Wales as a whole based on 2018 emissions[130].

[133] RICS professional statement (PS), Whole life carbon measurement: implementation in the built environment (1st edition)

[134] Institute of Civil Engineers (ICE) (2014): Energy Briefing Sheet: Embodied Energy and Carbon [online] available at: https://www.ice.org.uk/ICEDevelopmentWebPortal/media/Documents/Disciplines%20and%20Resources/Briefing%20Sheet/Embodied_Energy_and_Carbon.pdf (last accessed June 2020).

9.5 Consultation

9.5.1 Within the Scoping Response (ES Volume 2, Technical Appendix 1.4) no specific comments were received for the Climate assessment.

9.5.2 No additional consultation specific to Climate has been required. Scheme-wide consultation details are provided in Chapter 5.

9.6 Potential Impacts (Pre-Secondary Mitigation)

Primary (Embedded) Mitigation

9.6.1 A number of primary mitigation and enhancement measures have been incorporated into the Scheme proposals, in terms of working methodology and Scheme design. These are outlined below. Unless otherwise stated, these primary mitigation measures have been assessed as part of the Scheme proposals in the "pre-mitigation" effects. The primary mitigation for this Scheme is outlined below.

9.6.2 Mitigation measures for effects on climate consist of strategic approaches that drive reduction across all lifecycle stages, as well as encouraging carbon reduction behaviours specific to the separate lifecycle stages.

9.6.3 The following high-level approach (as defined within PAS 2080) has been recommended:

1. Build nothing: evaluate the basic need for an asset and/or programme of works and explore alternative approaches to achieve outcomes set by the asset owner/manager;
2. Build less: evaluate the potential for re-using and/or refurbishing existing assets to reduce the extent of new construction required;
3. Build clever: consider the use of low carbon solutions (including technologies, materials, and products) to minimise resource consumption during the construction, operation, and user's use stages of the asset or programme of work; and,
4. Build efficiently: use techniques (e.g. construction, operational) that reduce resource consumption during the construction and operation phases.

9.6.4 To encourage resource efficiency and reduce GHG emissions a Mott MacDonald Ltd Design for Resource Efficiency (D4RE) Workshop was undertaken on 4th March 2020. The workshop involved members of the design team including Project Manager, Applicant representatives, coastal team lead, landscape team lead, waste lead, environmental and sustainability specialists, all discussing the Scheme and determining ideas to increase its resource efficiency. The ideas were then ranked on effectiveness and ease of implementation to determine which ideas were to be taken forward, as shown in ES Volume 2, Technical Appendix 9.2. A number of these ideas have been implemented and quantified which are shown in Table 9.4. The quantifiable savings have resulted in a reduction of GHG emissions by approximately 32%.

Table 9.4 Quantified Carbon Savings from Primary Mitigation

Description	D4RE Reference	Status	Carbon Saving (tCO_2e)
Implemented and accounted for in current footprint			
Reuse of existing rock armour	5	Audit of materials require	7,046
In Area 1 raise only the Promenade not the road also	22	Fully implemented and accounted for in calculations	1,113

Description	D4RE Reference	Status	Carbon Saving (tCO_2e)
Implemented and accounted for in current footprint			
Reuse existing wave return wall within scheme design	24	Fully implemented and accounted for in calculations	100
Recycle existing asphalt as fill within scheme	34	Fully implemented and accounted for in calculations	14
Remove existing concrete Promenade to be reused as fill.	N/A	Fully implemented and accounted for in calculations	179
Reduce the number of headland structures from 3 to 1	1	Fully implemented and accounted for in calculations	3,359
Use of rock armour rather than precast concrete armour	4	Fully implemented and accounted for in calculations	9,355
Reduction of fishing platforms from 3 to 1	17	Fully implemented and accounted for in calculations	53
Total			**21,220**
Implemented but not accounted for in current footprint			
Use of recycled cement replacement	10	Included within specification	238
Steepen revetments to minimise material requirements	18	Optimisation on-going, current estimate at 3-5% saving	1,167
Total			**1,405**

Source: Mott MacDonald, 2020

Construction

9.6.5 The construction of the Scheme would result in GHG emissions to the atmosphere which would contribute towards climate change. Embodied carbon emissions from the use of construction materials would be the main contributor to climate change from the construction of the Scheme, with additional GHG emissions arising from the direct use of plant and transport of materials.

Operation

9.6.6 The operation of the Scheme has the potential to result in carbon emissions through the provision of electricity in the kiosk and lighting for the Scheme. In addition, the maintenance and repair of the Scheme over the design life would result in carbon emissions through material use, construction plant and transport of materials.

9.7 Design Mitigation (Secondary Mitigation) and Enhancement Measures

9.7.1 The Scheme has been designed, as far as possible, to minimise effects on Climate. Appropriate mitigation options have been identified based on a review of guidance provided in Section 9.3 and using professional judgement.

9.7.2 The Scheme is being assessed under the Civil Engineering Environmental Quality Assessment and Award Scheme (CEEQUAL). A number of the questions being assessed revolve around carbon reduction including producing a carbon management approach, identifying and measuring reduction targets.

9.7.3 This section provides the main measures implemented and the resulting carbon saving of these measures. Further detail on the general approach to carbon management can be found in ES Volume 2, Technical Appendix 9.1.

Secondary Mitigation

9.7.4 In line with the Prosperity for All Plan and the UK Government's carbon reduction plan, the Scheme should continue through construction to seek to reduce GHG emissions as far as practicable to contribute to the national net reduction in carbon emissions and maximise the potential for reducing GHG emissions.

9.7.5 The high-level approach (as defined within PAS 2080) outlined above in Section 9.6 (Primary Mitigation) should be applied and developed, with a particular focus on the hotspots identified in Section 9.8 and those discussed below.

9.7.6 Throughout the Scheme's construction, plant equipment and vehicles to be used would be selected based on their relative environmental performance taken from a technical specification. Construction works would be carried out in accordance with the best practicable means, as described in Section 79 (9) of the Environmental Protection Act (EPA) 1990, to reduce fumes or emissions. This would include all vehicle engines and plant motors to be switched off when not in use.

9.7.7 Through the D4RE workshop there are a number of measures that have not been included to date. Some of these are to be implemented at a later date or are the responsibility of the Contractor. Where possible these have been quantified and shown in Table 9.5 below.

Table 9.5 Quantified Carbon Savings from Secondary Mitigation

Description	D4RE Reference	Status	Potential Carbon Saving (tCO_2e)
Reuse of fill from other site for Promenade raising and revetment fill	28	Contractor responsibility	359
Use of precast concrete rather than in-situ concrete where possible	16	Contractor responsibility	1,506
Source slate waste as fill to use for raising levels	20	Contractor responsibility	98
Transport rock revetment material from Scotland or Norway by barge	4	Contractor responsibility	919 - 1,749
Total			**2,882 – 3,712**

Source: Mott MacDonald, 2020

9.7.8 Transport of materials to Site has been assumed to be by road and is accountable for 12% of construction emissions. To reduce these emissions a suggestion in the D4RE workshop was to obtain the rock revetment materials from a quarry in Scotland or Norway and transport by barge to Old Colwyn. Based on the assumptions detailed in Section 9.3, this shows a saving of up to approximately 1,749 tCO_2e which accounts for 34% of the transport emissions, as shown in

Table 9.5. Through procurement of materials the assumptions would be checked and if these remain valid this option would be taken forward, further detail shown in ES Volume 2, Technical Appendix 9.1.

9.8 Assessment of Likely Significant Effects

Construction

9.8.1 The assessment of likely significant effects has been undertaken following the methodology described in Section 9.3. Carbon emissions would all be permanent adverse effects.

9.8.2 The carbon assessment from the Moata Carbon Portal tool has indicated that the Scheme would result in emissions of approximately 44,6tCO_2e for construction- lifecycle stages A1-3, A4 and A5. As a comparison for scale, this makes up 0.02% of the 2nd Welsh Carbon Budget (189MtCO_2e).

9.8.3 The three greatest contributors, as split by category and by individual item are shown in Table 9.6.

Table 9.6 Construction Carbon Hotspots

Item	Percentage of Total Construction Emissions
Category	
Revetments	86%
Roads and Paving	9%
Retaining Walls	2%
Individual Item	
Supply and deliver primary armour for revetments	52%
Supply and deliver underlayer for revetments	24%
Imported regulating course to make up levels	6%

Source: Mott MacDonald, 2020

9.8.4 The carbon output specifically from the materials (lifecycle stages A1 - 3) are estimated to be 37,820tCO_2e. When compared to the 10% contribution from construction materials to the annual Wales emissions, this only contributes 0.97% (refer to the final paragraph within Section 9.4 for further details).

9.8.5 The transport of materials to Site (A4 lifecycle stage) would result in 5,221tCO_2e and emissions from construction plant (A5 lifecycle stage) of 1,546tCO_2e would be produced throughout construction.

9.8.6 In the absence of established assessment criteria for the effects on climate, it is considered that the construction stage effects of the Scheme are not significant on climate, due to the relatively low quantity (less than 1%) of emissions in comparison to overall Wales emissions for construction as explored within the baseline (see Table 9.7). However, despite the Scheme's impact not being considered significant, it is recognised that it is important to consider mitigation measures to reduce embodied carbon from the Scheme.

Operation

9.8.7 There would be approximately 1.2km of street lighting in the Scheme, this has been estimated at 246tCO_2e over the 50 year lifetime of the Scheme (specification for the Scheme is unknown

and emissions have been based on a typical installation specification and operating hours). In the absence of data to calculate the carbon emissions associated with the operation of the kiosk, considering the emissions from street lighting it is anticipated that the operational energy and carbon emissions from operation are likely to be relatively low and not significant.

9.8.8 As noted in Chapter 12 Materials, the maintenance requirement would not include a total replacement of the Scheme. There would be a requirement to conduct visual inspections multiple times per year, these inspections would not be expected to generate significant emissions. The Scheme is being designed with a 50 year lifetime and, unless significant replacement was identified through the routine inspections, the maintenance footprint is considered to be minimal.

9.8.9 Therefore, considering the Construction assessment resulted in a not significant effect, the effects from operation of the Scheme are also assessed to be not significant.

Table 9.7: Assessment of Effects Summary

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 9.8)	Further Actions	Residual Significance Category (with mitigation)
Construction				
Climate	The construction of the Scheme would result in GHG emissions through embodied carbon of the materials, use of construction plant and transport of materials to site. The carbon emissions are estimated at 44,586tCO_2e.	Through the design process a large number of carbon savings have been implemented. To date the quantifiable reductions implemented prior to the carbon assessment being completed have resulted in 21,220tCO_2e of savings or 32%**.**	Further mitigation measures have been determined that are the contractor's responsibility or are yet to be implemented. These are detailed in Section 9.7 and ES Volume 2, Technical Appendix 9.1. It is estimated these could result in a saving up to 5,117tCO_2e.	**Direct, Permanent, Not Significant**
Operation				
Climate	The operation of the Scheme would result in GHG emissions through operational energy use and maintenance required. Estimated at 246tCO_2e over the lifetime for street lighting.	Through the design process assets have been designed with longevity in mind.	Energy efficiency should be considered in the specification of operating equipment such as the street lighting (designer).	**Direct, Permanent, Not Significant**

Source: Mott MacDonald Ltd, 2020

Likely Residual Significant Effects Recorded (Post-Mitigation)

Construction

9.8.10 Due to the relatively small scale of the GHG emissions compared to the UK carbon budget and the incorporation of the mitigation measures as outlined in Section 9.6 and 9.7 and ES Volume 2, Technical Appendix 9.1, the maximum residual effect identified is **not significant** adverse.

9.9 Requirements for Tertiary Mitigation/Monitoring

9.9.1 Monitoring of GHG emissions throughout construction is not deemed necessary.

9.10 Conclusions

9.10.1 In summary, the Climate assessment has shown that due to the relatively small scale of the emissions and with the inclusion of appropriate mitigation measures as outlined in Section 9.6 and, construction stage effects are not considered to be significant.

9.10.2 However, the emissions associated with construction of the Scheme are not immaterial as all GHG emissions contribute to climate change and must be reduced wherever possible, particularly considering the strict government targets for Net Zero Carbon. Therefore, the mitigation detailed in Section 9.7 and ES Volume 2, Technical Appendix 9.1, must be considered and through the subsequent stages of the Scheme wherever possible GHG emissions must be minimised.

9.11 Drawings

9.11.1 No key drawings have been produced to accompany this chapter.

9.12 List of Documents Included in ES Volume 2: Technical Appendix 9

- Appendix 9.1: Carbon Management Plan.
- Appendix 9.2: D4RE Spreadsheet.

10 Coastal Processes and Flood Risk

10.1 Introduction

10.1.1 The evolution and development of a shoreline is linked to the interaction between the natural coastal processes applying both offshore and inshore, the geological/geomorphological form and profile of natural shoreline features and the form/profile of artificial coastal defence structures.

10.1.2 This chapter considers the impact of the Scheme on coastal processes and flood risk, resulting from overtopping of the coastal defence structure. This includes direct impacts on sediment dynamics and hydrodynamics, any indirect effects these could have on other environmental aspects and any effects on Water Framework Directive (WFD) quality elements. An overview of the baseline hydrodynamic conditions, the local geomorphological setting and water quality conditions is provided, including an assessment of the potential impacts the Scheme may have on these. Mitigation measures to avoid or reduce these impacts are presented along with a discussion of residual impacts.

10.1.3 The key drawings referenced in this chapter can be found in Section 10.12, while the technical appendices are listed in Section 10.13 and can be found in the ES Volume 2, Technical Appendix 10.

10.2 Legislative and Policy Framework

10.2.1 This presents the principal legislative and planning context relevant to the coastal processes and flood risk aspects of the Scheme and the EIA.

National Legislation

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

10.2.2 The Water Framework Directive (WFD) (2000/60/EC) is implemented in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The Regulations require that Environmental Objectives are set for all surface water (including river, lake, coastal and transitional waters) and groundwaters in England and Wales to enable them to achieve a Good status by 2015. Where this is not possible and subject to the criteria set out in the Directive, the aim is to achieve Good status by 2021 or 2027. Mitigation measures have been developed for waterbodies to help them to achieve their Environmental Objectives.

The Wildlife and Countryside Act

10.2.3 The Wildlife and Countryside Act 1981 (as amended) provides statutory protection of Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs) and Ramsar Sites.

10.2.4 The Wildlife and Countryside Act 1981 has been amended by subsequent Acts, including the following relevant to this chapter:

- The Environmental Protection Act 1990;
- The Countryside and Rights of Way Act 2000 (including strengthened protection of SSSIs);
- The Natural Environment and Rural Communities Act 2006; and

- The Marine and Coastal Access Act 2009 (MCAA, 2009) (allowing the creation of marine conservation zones and the creation of marine SSSIs below the mean low water mark).

National Policy

Planning Policy Wales (Edition 10, December 2018)

10.2.5 Planning Policy Wales (PPW) sets out current land use planning policy for Wales. The following excerpts are relevant to coastal processes and flood risk:

10.2.6 (6.5 Coastal Areas) 6.5.20 "*In considering new coastal defence works, account should be taken of all potential environmental effects, both on and off-shore, including the impacts on habitat fragmentation and consequential 'coastal squeeze', as well as information contained in Shoreline Management Plans and other relevant documents such as Area Statements".*

10.2.7 (6.6 Water and Flood Risk) 6.6.28 *"New or improved flood defences in coastal and/or riverside locations should be carefully planned, ensuring all potential environmental effects, both on and off-shore, and relevant Shoreline Management Plan policies are taken into account. Flood defence works can provide opportunities to achieve wider social, economic and environmental benefits, which should be maximised where possible. Nature based solutions should be the first consideration given the opportunity to deliver other multiple benefits, including habitat creation, biodiversity enhancement and water quality improvements. Overall, green infrastructure opportunities can benefit ecosystem resilience and provide opportunities for leisure facilities or renewable energy generation".*

Technical Advice Notes

10.2.8 PPW is supplemented by 21 topic-based Technical Advice Notes (TANs). Procedural guidance is given in Welsh Office / National Assembly for Wales / Welsh Government Circulars. Each TAN provides detailed planning advice on a different subject.

10.2.9 The TANs relevant to coastal processes and flood risk are:

- TAN 5 - Nature Conservation and Planning (2009) provides advice on developmental control issues for environmental designated areas;
- TAN 14 - Coastal Planning (1998) describes the coastal zone as a complex and dynamic area of mutually interdependent land and adjacent sea defined by the local authority in consultation with neighbouring authorities. The guidance details a number of issues which must be taken into account because of their potential effects on physical processes and ground conditions, as well as the overall balance, sensitivity and conservation of the area; and
- TAN 15 - Development and Flood Risk (2004) provides guidance on flooding as a material consideration in development control decisions, runoff and increasing the risk of flooding on or off site, coastal protection works and flood defence works (refer to Chapter 6 for more info).

National Strategy for Flood and Coastal Erosion Risk Management in Wales

10.2.10 The first National Strategy for Flood and Coastal Erosion Risk Management in Wales was published in 2011. The strategy was compiled under the terms of the Flood and Water Management Act 2010 and sets out the key objectives for the management of flood and coastal erosion risk in Wales. This was reviewed in 2016 and considers both the Wellbeing of Future Generations Act 2015 and the Planning Wales Act 2015.

10.2.11 The key objectives of this strategy aim to "*reduce the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion; raising awareness of and engaging people in their response to flood and coastal erosion risk; providing an effective and sustained response to flood and coastal erosion events; and prioritising investment in the most at risk communities".*

Welsh National Marine Plan (November 2019)

10.2.12 This Welsh National Marine Plan (WNMP) is the first marine plan for Wales and represents the start of the process of shaping Welsh inshore and offshore marine waters to support economic, social, cultural and environmental objectives. It sets out how proposals would be considered by decision makers for the sustainable development of the marine area. Marine planning would guide the sustainable development of the marine area by setting out how proposals would be considered by decision makers.

10.2.13 It has been prepared and adopted under the MCCA, 2009. The WNMP and supporting material should be used by applicants to shape proposals and licence applications for the sustainable development of the Plan area. Refer to Table 6.1 in Chapter 6 for more information on relevant plan objectives.

Regional Policy

Shoreline Management Plan

10.2.14 The North West England and North Wales Shoreline Management Plan covers the North Wales Coast (SMP22, sub-cell 11a) August 2016, within which the policy for the frontage is to Hold the Line for the next 100 years: "*This policy includes those situations where work is carried out in front of the existing defences (such as beach recharge, rebuilding the toe of a structure, building offshore breakwaters and so on) to improve or maintain the standard of protection provided by the existing defence line. It also includes work behind existing defences (such as building secondary flood defences) where this work would form an essential part of maintaining the current coastal defence system*". For more information see Chapter 2 Need for Scheme, Assessment of Alternatives and Basis of Design, Section 2.2.

Western Wales River Basin Management Plan

10.2.15 This plan focuses on the protection, improvement and sustainable use of the water environment. Many organisations and individuals help to protect and improve the water environment for the benefit of people and wildlife. River basin management is the approach used to ensure combined efforts achieve the improvement needed in the Western Wales River Basin District.

10.2.16 This plan has been prepared under the WFD, which requires all Member States to manage the water environment to consistent standards. Each country has to:

- Prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters;
- Aim to achieve at least good status for all water bodies by 2015. Where this is not possible and subject to the criteria set out in the Directive, aim to achieve good status by 2021 or 2027;
- Meet the requirements of WFD Protected Areas;
- Promote sustainable use of water as a natural resource;
- Conserve habitats and species that depend directly on water;

- Progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants;
- Contribute to mitigating the effects of floods and droughts.

Whilst the UK is no longer a member of the EU existing legislative commitments are being maintained.

10.2.17 The plan describes the river basin district, and the pressures that the water environment faces. It shows what this means for the current state of the water environment, and what actions would be taken to address the pressures.

Local Policy

The Conwy Local Development Plan 2007-2022, Adopted October 2013

10.2.18 According to mapping within the Local Development Plan (LDP), the Scheme is located within the Coastal Zone, a strategic regeneration area, and from Rotary Way to the west, within the Colwyn Bay Masterplan Area.

10.2.19 The following LDP policy is considered to be particularly relevant to this chapter:

- POLICY NTE/5 - THE COASTAL ZONE;

This policy note states that development within the coastal zone outside settlement boundaries, would only be permitted where the development:

a) Specifically requires a coastal location; b) Does not adversely affect the open character of the zone; c) Does not adversely affect the nature conservation value of the zone with any effects identified mitigated for; d) Does not detract from the tourism value or facilities; e) Does not interfere with natural coastal processes; f) Does not impede the function of any existing coastal defence structures; g) Accords with the Development Principles of the Plan.

Conwy Local Flood Risk Management Strategy (February 2013)

10.2.20 This local strategy aims to complement and support the Welsh governments 'The National Strategy for Flood and Coastal Erosion Risk Management (Wales)'. CCBC have been designated as a Lead Local Flood Authority (LLFA) and is required under the Flood and Water Management Act 2010 to develop, maintain and monitor a local flood risk management strategy in its area and forms a new chapter within the Flood and Coastal Erosion Risk Management for Conwy.

Other Policy and Guidance

EurOtop 2018

10.2.21 The EurOtop manual provides guidance on the analysis and prediction of wave overtopping for coastal flood defences. The manual uses 4 general categories to categorize the impacts of wave and overtopping effects; damage to defence structure(s), hazard to people (pedestrian, cyclist or in a vehicle), damage to property and low depth flooding.

10.3 Assessment Methodology

Overview

10.3.1 This section describes the methodology which has been used for the assessment of coastal processes and flood risk which may affect, or be affected by, the construction and operation of the Scheme.

10.3.2 The assessment approach for this linear Scheme (with highways elements) has been adapted from the guidance presented within DMRB Volume 11 Section 2 Part 4 LA104 (Environmental Assessment and Monitoring)[135] and Volume 11 Section 3 Part 11 HA LA113 (Road Drainage and the Water Environment) [135] using professional judgment.

10.3.3 The assessment has also utilised NRW guidance notes for Marine Physical Processes Guidance to inform EIA[136] and the guidance for assessing activities and projects for compliance with the Water Framework Directive[137]. These guidance documents have been considered when reviewing the available data for the baseline and any impacts the Scheme may have.

10.3.4 Following the identification of baseline conditions and key receptors, the assessment methodology comprises the assessment of the value (or sensitivity) of the identified receptors that have the potential to be affected by the construction and operation of the Scheme. A combination of the sensitivity of the receptor under consideration and the magnitude of the impact in relation to the receptor has been used to determine the significance of effects.

10.3.5 The outcome has been used to aid the development of appropriate mitigation measures in order to avoid or reduce potential adverse effects.

Sensitivity of Receptors

10.3.6 The criteria for determining the sensitivity (value) of receptors that could be impacted by changes to coastal processes and flood risk is presented in Table 10.1.

Table 10.1: Scale for Evaluating the Sensitivity (Value) of Receptors

Receptor Value (Sensitivity)	Coastal Processes and WFD Quality Elements Typical Examples	Description: Flood Risk Receptors Typical Examples
Very High (very high importance and rarity, international scale and very limited potential for substitution).	• Site protected/designated under UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water)/Species protected by UK legislation. • Watercourse having a WFD classification shown in a RBMP and Q95 ≥ 1.0 m^3/s. • Large scale wider than the SMP cell changes to coastal processes	• Essential infrastructure or highly vulnerable development: – Essential transport infrastructure which has to cross the area at risk and utility infrastructure which has to be located within the flood risk area for operational reasons. – Police, ambulance and fire stations required to operate during flooding.
High (high importance and rarity, national scale, and limited potential for substitution)	• Species protected under UK legislation. • UK Bathing Waters. • UK Shellfish Waters.	• More vulnerable development including: – Hospitals. – Residential institutions such as care homes.

[135] Design Manual for Roads and Bridges, LA104, Environmental Assessment and Monitoring, July 2019

[136] GN041, Marine Physical Processes Guidance to inform Environmental Impact Assessment (EIA), NRW,

[137] OGN72, Guidance for assessing activities and projects for compliance with the Water Framework Directive, NRW, 2018

Receptor Value (Sensitivity)	Coastal Processes and WFD Quality Elements Typical Examples	Description: Flood Risk Receptors Typical Examples
	• Watercourse having a WFD classification shown in a RBMP and Q95<1.0m^3/s. • Large scale SMP cell changes to coastal processes.	– Non-residential uses for health services and nurseries.
Medium (medium or high importance and rarity, regional scale, limited potential for substitution).	• Watercourses not having a WFD classification shown in a RBMP and Q95 >0.001m^3/s. • Changes to the coastal processes in the sub cell.	Less vulnerable development including: – Buildings for shops, financial and other services. – Land and buildings used for agriculture and forestry.
Low (low or medium importance and rarity, local scale).	• Watercourses not having a WFD classification shown in a RBMP and Q95 ≤ 0.001m^3/s. • Localised changes to the coastal processes.	Water compatible development including: – Flood control infrastructure. – Sand and gravel working. – Docks, marinas and wharves.
Negligible	Very low importance and rarity, local scale.	

Source: Adapted from DMRB Volume 11 Section 3 Part 11 HA (LA109 and LA113) using professional judgment

Magnitude of Impact

10.3.7 The magnitude of impact is determined by the predicted deviation from the baseline conditions and the scale of the effect. The qualitative magnitude of each impact (in the absence of quantitative data) has been determined according to the descriptions provided within Table 10.2.

Table 10.2: Scale for Evaluating the Magnitude with respect to Effects on Coastal Processes and Flood Risk

Magnitude of Impact	Typical Description	Coastal Processes/WFD Quality Element Typical Examples	Flood Risk Typical Examples
Major	Adverse: Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.	• Loss or extensive permanent change to a designated nature conservation site. • Long term (>2 years) changes to beach erosion/sediment dispersion patterns. • Loss or extensive change to a fishery. • Reduction in water body WFD classification.	• Increase flood levels by >100mm. • Increase of overtopping rates to cause structural failure to sea wall and assets behind.
	Beneficial: Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.	• Improvement in water body WFD classification.	• Decrease in flood levels >100mm. • Decrease of overtopping rates to result in significant improvement to structural resilience and improvement in utility.

Magnitude of Impact	Typical Description	Coastal Processes/WFD Quality Element Typical Examples	Flood Risk Typical Examples
Moderate	Adverse: Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.	• Permanent change to a designated nature conservation site. • Medium term (6 months to 2 years) changes to beach erosion/sediment dispersion patterns. • Partial loss in productivity of a fishery. • Contribution to reduction in water body WFD classification.	• Increase flood levels by >50mm. • Increase of overtopping rates to cause damage to pavements but no collapse of the structure (sea wall) – controlled and repairable damage.
	Beneficial: Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.	• Contribution to improvement in water body WFD classification.	• Decrease in flood levels >50mm • Decrease of overtopping rates to reduce damage to pavements but no collapse of the structure (sea wall) – controlled and repairable damage.
Minor	Adverse: Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.	• Non-permanent change to a designated nature conservation site. • Short term (3 – 6 months) changes to beach erosion / baseline sediment dispersion. • Decrease in quality of non-WFD water body.	• Increase flood levels by >10mm. • Increasing overtopping rates to result in loss of utility.
	Beneficial: Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.	• Contribution to improvement in non WFD water body classification.	• Decrease in flood levels >10mm. • Decrease of overtopping rates to prevent structural failure to sea wall and assets behind but no significant increase to utility.
Negligible	Adverse: Very minor loss or detrimental alteration to one or more characteristics, features or elements.		
	Beneficial: Very minor benefit to or positive addition of one or more characteristics, features or elements.		
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.		

Source: Adapted from DMRB Volume 11 Section 3 Part 11 HA (LA109 and LA113)

Significance of Effect

Subsequent to identifying an appropriate receptor sensitivity and magnitude of impact using Table 10.1 and Table 10.2, the likely significance category and overall significance of effects risk has been assessed by using the matrix provided within Table 10.3 along with professional judgment to consider site specific factors that may be of relevance.

Table 10.3: Scale for Evaluating the Significance Category with Respect to Impacts on Coastal processes and Flood risk Receptors – Effects can be Adverse or Beneficial

Magnitude of Potential Impact	Environmental Value (Sensitivity)				
	Very high	High	Medium	Low	Negligible
Major	Very large	Large / Very Large	Moderate / Large	Slight / Moderate	Slight
Moderate	Large / Very Large	Moderate / Large	Moderate	Slight	Neutral / Slight
Minor	Moderate / Large	Slight / Moderate	Slight	Neutral / Slight	Neutral / Slight
Negligible	Slight	Slight	Neutral / Slight	Neutral / Slight	Neutral
No Change	Neutral	Neutral	Neutral	Neutral	Neutral

Source: Adapted from DMRB Volume 11 Section 2 Part 4 (LA104)

10.3.8 Effects are identified as Neutral, Slight, Moderate, Large or Very Large; adverse or beneficial.

10.3.9 For the purposes of this assessment, effects of Moderate Adverse or Beneficial and above would be considered to be significant.

Assessment Assumptions and Limitations

Assumptions

10.3.10 The baseline information used within this chapter has been summarised from a variety of desk-based sources, existing assessments and reporting available at the time of writing which have been assumed to be correct.

10.3.11 Modelling to date has been undertaken by Royal Haskoning[138] (included as ES Volume 2, Technical Appendix 10.4) establishing the baseline of the coastal processes in the area. Works have been undertaken to the west of the Scheme since this modelling was undertaken (as proposed within the modelling report). A review of the findings of the previous modelling completed has been undertaken to support the assumption that no further modelling is required.

Limitations

10.3.12 To confirm the ground conditions along the proposed Scheme, an intrusive ground investigation is proposed to be completed, however a Marine Licence is currently awaited for this investigation and therefore it had not been undertaken at the time of writing. From the desk based assessments completed, it is not considered that the results of the ground investigation would affect the findings of this Chapter, however if anything unusual is encountered (for

[138] Detailed Modelling Studies for Colwyn Bay Coastal Defence Scheme, Royal Haskoning, July 2010

example unexpected ground contamination) during the GI this chapter would be reviewed and revised accordingly as part of an ES Addendum.

10.4 Study Area

10.4.1 The study area for the assessment of coastal processes and flood risk is based on the area which the Scheme could be reasonably expected to have an effect upon:

- For coastal processes, this is considered to be the shoreline between Rhos Point to the west and Tan Penmaen Head to the east. This is owing to the coastal processes within this area being constrained by the Rhos-on-Sea Breakwater and the Tan Penmaen headland[9];
- For flooding, the study area is considered to comprise the Promenade and defended assets to the south including the NWC Railway Line and A55 Expressway; and

10.4.2 A plan of the coastal processes and flood risk study area is provided as Drawing 415437-MMD-00-XX-DR-N-1712 in Section 10.12

10.4.3 For WFD quality elements including water quality, the study area is considered to both comprise the marine waters of Colwyn Bay (as above) along with the wider waters of the North Wales Coastal Water Body.

10.5 Baseline Conditions

10.5.1 Throughout this Section, reference is made to features located in the vicinity of the Scheme. Please see Environmental Constraints Drawing 415437-MMD-00-XX-DR-N-1705 and Drawing 415437-MMD-00-XX-DR-N-1712 (Chapter 3 Scheme Description, Section 3.5) which display the location of the features discussed in this section in relation to the Scheme and current baseline mapping.

10.5.2 Previous work for phases 1a/b/c, 2a and 2b of the Colwyn Bay Waterfront Project has been carried out on behalf of CCBC to ascertain baseline conditions for the wider frontage. This included the development of a coastal strategy and project appraisal report (CEUK)[139]. These baseline conditions were then used to develop a numerical (Royal Haskoning, 2010)[138] models for the area in order to gain a thorough understanding of the hydrodynamics and coastal processes along the frontage along with the potential effect of any reconfiguration of beach control and coastal protection structures.

10.5.3 The 2010 numerical modelling report has been reviewed against current beach level information, wave and water levels. Although there has been a very slight change to beach levels this is considered to not be significant enough that the changes would be observed in a new model. The options modelled in the 2010 numerical model included an extended groyne and recharge as was constructed in the Phase 1a and also a revetment similar to that proposed in this Scheme.

Coastal Processes

10.5.4 Information on tides and tidal currents, wave climate, beach levels and erosion and overtopping has been sourced from the following (unless otherwise referenced):

- Old Colwyn Promenade Coastal Defence and Active Travel Improvements Wave Overtopping Assessment, Mott MacDonald Ltd, June 2020 (ES Volume 2, Technical Appendix 10.3); and

[139] CEUK (2006) – CEUK Colwyn Bay Coastal Defence Strategy Plan, Natural Processes and Coastal Defence Baseline Report (2006)

- Old Colwyn Promenade Coastal Defence and Active Travel Improvement, Basis of Design report, Mott MacDonald Ltd, April 2020 (ES Volume 2, Technical Appendix 2.4).

Tides and Tidal Currents

10.5.5 Tides along this coastline are semi-diurnal. The tidal range along this section of the frontage has an important influence on coastal processes. The Mean High Water Spring (MHWS) is +3.70mOD and the Highest Astronomical Tide (HAT) level is +4.68mOD. Accordingly, on HAT there is only between 0.5m and 1.5m of freeboard between the tide level and the top of the existing sea wall without considering the action of waves.

Table 10.4: Old Colwyn Tide Levels

Tide	Ordnance	Chart Datum (CD)	Ordnance Datum (mOD)
Highest Astronomical Tide	HAT	+8.78	+4.68
Mean High Water Spring	MHWS	+7.80	+3.70
Mean High Water Neap	MHWN	+6.10	+2.00
Mean Sea Level	MSL	+4.21	+0.11
Ordnance Datum		+4.10	0.00
Mean Low Water Neap	MLWN	+2.29	-1.81
Mean Low Water Spring	MLWS	+0.66	-3.44
Lowest Astronomical Tide	LAT	-0.24	-4.34

Source: Old Colwyn Promenade Coastal Defence and Active Travel Improvement, Basis of Design report, 415437-MMD-00-XX-RP-C-3100, Mott MacDonald Ltd, April 2020

10.5.6 With sea levels predicted to rise in the future due to anticipated climate change, medium estimates of predictions are that the above tide levels would be at least 0.3m higher by the middle of the century and 0.7m higher by the end of the century (UK Climate Projections User Interface, 2019).

10.5.7 Estimates of extreme water levels for Colwyn Bay including meteorological influences (storm surge), provide the following:

- Water level with an estimated 10% probability of occurrence in any year = 5.04mOD;
- Water level with an estimated 2% probability of occurrence in any year = 5.23mOD; and
- Water level with an estimated 0.5% probability of occurrence in any year = 5.39mOD.

10.5.8 Tidal currents in Liverpool Bay are generally in an easterly direction on the flood tide and westerly on the ebb tide with a residual net current from west to east. At Colwyn Bay the tidal streams are generally in a west to east direction which dictates sediment transport. The tidal currents, together with the agitation of wave action are sufficiently high to induce shear stresses which exceed the critical shear stress for initiating the movement of sand on the seabed[139].

Wave Climate

10.5.9 The wave conditions at Colwyn Bay are generally generated by local wind or as a result of longer period swell waves that have propagated into the Irish Sea from the Atlantic Ocean via St Georges Channel and Cardigan Bay to the south, or the channel between Scotland and Northern Ireland to the north. These waves come from a west- north-west direction and get refracted towards the beach parallel to the shoreline.

10.5.10 Modelling studies of the wave climate at Colwyn Bay waterfront completed by Royal Haskoning in 2010[138] showed waves were propagated from an offshore location to the project area and effects of beach fluctuations on the waves were included. The modelling identified that on a HAT tide, waves approaching the shoreline could be up to 3.0m in height for the 1 in 50 year event and approximately 2m in height for the 1 in 1 year event.

Geology

10.5.11 According to British Geological Survey (BGS) mapping[140] bedrock geology across the Scheme comprises the Elwy Formation – Silurian mudstone, siltstone and sandstone. Superficial deposits comprise a combination of Devensian till (diamicton[141]) and Devensian glaciofluvial deposits (generally sandy) along the Promenade and NWC Railway Line embankment, with marine beach deposits present in the intertidal area.

Beach Level and Erosion

10.5.12 An assessment of beach profiles by HR Wallingford in 1988 suggested that the volume of the beach in Colwyn Bay had not changed significantly in the previous 30 years. There was a general lowering of the upper beach matched by a general increase in the sediment quantities on the lower beach and is considered to be due in part to scour of the upper beach by waves reflected from the sea wall[142].

10.5.13 In February 2005, following a storm, beach levels dropped by 1m and the sea wall at the eastern end of the frontage towards Old Colwyn required further apron construction comprising of steel sheet piles and concrete infill. A further storm in March 2010 required the construction of 160m of temporary revetment along the toe of the undermined section of wall[143].

10.5.14 Historical beach level monitoring surveys dating back to 2005 provided by CCBC were reviewed at eight locations within the Scheme area. The data indicates that the beach over the last 15 years has been fairly stable and that levels have not varied significantly with time (Table 10.5). Locations 1-5b are located from west to east with 1-3b in Area 1 and 4a-5b in Area 2. The maximum monitored variation in beach level was 0.7m from July 2005-January 2019. In light of the below results, a beach drawdown value of 0.5m from the current survey data has been adopted for the design of the beach steps with possibility for the steps to be extended in the future should localised erosion occur.

Table 10.5: Historic Beach Levels

Location	July 2005 (mOD)	October 2010 (mOD)	October 2015 (mOD)	January 2019 (mOD)	Max. difference in levels (m)
1	0.5	0.4	0.5	0.6	0.2
2	0.9	0.6	0.6	0.4	0.5
3a	1.1	1.0	1.2	1.3	0.4
3b	0.9	0.9	0.9	1.0	0.1
4a	0.5	0.2	0.4	0.9	0.7
4b	0.4	0.4	0.2	0.7	0.4

[140] British Geological Survey website: https://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html, accessed June 2020

[141] Diamicton - unsorted to poorly sorted sediment containing particles ranging in size from clay to boulders, suspended in a matrix of clay, silt and sand

[142] Halcrow, 2000, North West England and North Wales Shoreline Management Plan SMP2

[143] Colwyn Bay Waterfront Project Phase 3 – Phasing Review, CCBC, August 2019

5a	-0.5	-0.6	-0.6	-0.5	0.1
5b	-0.4	-0.4	-0.6	-0.7	0.3

Source: Insert Notes or Source Source: Old Colwyn Promenade Coastal Defence and Active Travel Improvement, Basis of Design report, 415437-MMD-00-XX-RP-C-3100, Mott MacDonald Ltd, April 2020

Sediment Processes

10.5.15 The net littoral drift along the frontage is in a west to east direction, from Great Orme's Head towards the Dee Estuary, with sediment transport around Rhos Point limited to fine sand and silt-sized material offshore. Inshore the beaches in Penrhyn Bay have largely been denuded of fine material and the protrusion of Rhos Point limits the transport of material around the headland[142]. The breakwater at Rhos-on-Sea is considered to result in sediment being trapped in the lee side owing to the net drift reversal that is caused during storm events. Owing to this the frontage south of the breakwater is starved of sediment however east of the breakwater the sediment transport is in an eastern direction. The Tan Penmaen headland acts as a barrier to upper beach drift however it does allow some sediments to bypass in the lower beach[9].

10.5.16 The majority of alongshore sediment transport within Colwyn Bay is thought to take place on the lower foreshore, between low water and the -4mOD contour (HR Wallingford 1988). Observations and monitoring suggest material between low and high water is moved on/offshore by wave activity and interaction with the defences[142]. The potential sediment transport rate along the frontage (not taking into account sediment availability) was identified to be 10,000m^3/year.

10.5.17 A review of the beach volumes reported by CCBC (2006)[144] indicated that there is a general movement of sediments seawards with a drop in beach levels in front of the sea wall. This lowering of upper beach levels was identified as being matched by the general increase in sediment quantities of the lower beach. Scour from waves reflecting off the sea wall is considered, in part, to result in the loss of the upper beach.

Flood Risk

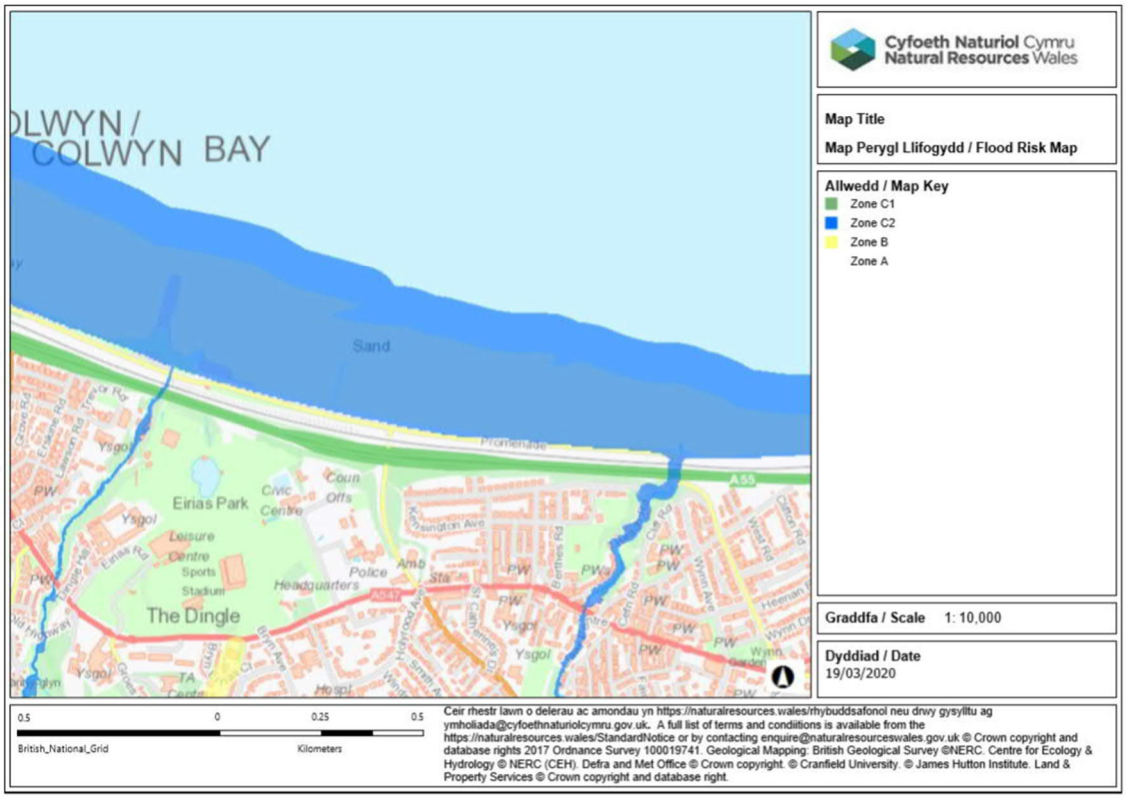
Coastal Flood Risk

10.5.18 The area of interest lies within or close to 'TAN15: Development Advice Maps' Zone C2; this is described as an area "without significant flood defence infrastructure" (Figure 10.1) . This zone is based on NRW's extreme flood outline, which is greater than or equal to a 0.1% Annual Exceedance Probability (AEP) event. However, there are known overtopping risks on the Promenade occurring during spring tides.

10.5.19 There is no formal record of road closures of the Promenade highway from Rotary Way to Beach Road. However, it has been noticed that the number of closures has increased in recent years. The Promenade is routinely closed whenever spring tides coincide with forecast northerly or north-westerly winds.

[144] Colwyn Bay Waterfront Project Plan, Natural Processes and Coastal Defence, Baseline Report, Conwy County Borough Council, 2006

Figure 10.1: Colwyn Bay Development Advice Map



Source: Welsh Government Development Advice Maps, 2020 (Contains Natural Resources Wales information © Natural Resources Wales and database right. All rights reserved.)[145]

Overtopping and Run-Up

10.5.20 As early as 1991, the Colwyn Borough Sea Defence Review[146] identified that "*Overtopping, which occurs regularly when onshore winds coincide with spring tides, results in large quantities of shingle and cobbles being thrown over the wall. The road.…is closed up to a dozen times a year for several days at a time while the shingle is cleaned back onto the beach*". Similar conditions have continued to the present day with increasing frequency and severity (see Chapter 2 Need for Scheme, Assessment of Alternatives and Basis of Design) for more information.

10.5.21 The existing sea defence at Old Colwyn is comprised of vertical and stepped battered sea walls of various crest heights between +5.47mOD and +6.13mOD with some sections protected with a revetment at the toe of the wall.

10.5.22 The impact of present-day conditions is shown in visual and recorded evidence from more recent storm events; February 2005, March 2007, March 2010, December 2013, December 2016, December 2017, February/March 2018 and January 2019. These events confirm the overtopping behaviour identified by HRW but also identify the following as taking place:

- Damage/loss of railings;

[145] Welsh Government Development Advice maps, ttps://maps.cyfoethnaturiolcymru.gov.uk, accessed July 2020

[146] Colwyn Borough Sea Defence Review – Report EX 2367, H R Wallingford, October 1991

- Damage to Promenade/highway surfacing and removal of fill behind sea wall;
- Damage to boundary wall and erosion at toe of NWC Railway Line embankment;
- Lowering of beach levels in front of the wall;
- Undermining of sea wall; and
- Removal of facing blocks to the sea wall.

These are repaired on a reactionary basis by CCBC.

10.5.23 The Mean High Water Spring Tide (MHWS) level is +3.70mOD and the predicted Highest Astronomical Tide (HAT) level is +4.68mOD (see Table 10.4 for tide levels). Accordingly, on HAT there is only between 0.5m and 1.5m of freeboard between the tide level and the top of the wall, even without considering the action of waves and sea level rise.

10.5.24 Furthermore, with the sea levels predicted to rise in the future due to anticipated climate change, by the end of the 21st century the tide is anticipated to reach approximately the crest of the current wall on each spring tide i.e. every two weeks. This means that the wall along the toe of the NWC Railway Line embankment would be impacted by waves rather than water that overtops the sea wall, as at present.

10.5.25 Overtopping results for the existing structures were modelled as summarised in the Overtopping Assessment (ES Volume 2, Technical Appendix 10.3). The overtopping assessment identified that for the preferred option the mean overtopping discharge q remaining under the limit for structures of 200 l/m/s for all cases and the maximum overtopping volume reduced under the limit of 600 l/m (pedestrians) for 1 in 1 year events.

Coastal Protection Structures

10.5.26 As described within the Colwyn Bay Waterfront 2010 ES Volume 1 (ES Volume 2, Technical Appendix 2.2), the Victorian built coastal defences have suffered from undermining, corrosion and degradation since their construction in the late 19th and early 20th centuries.

10.5.27 It is not known if the current wall section is the original wall section but the construction suggests it is likely. HR Wallingford's Colwyn Borough Sea Defence Review[147] identifies that the recurve section at the western end was added in the 1950s and that the first instance of undermining occurred in the 1930s requiring concrete toe extensions and sheet piles which are still visible today.

10.5.28 In the late 20th century, localised works were completed in an effort to extend the life of the existing sea walls with a 650m rock revetment being constructed in 1987 along the worst affected stretch and a series of low-level rock groynes which were constructed in 1990 to replace some of the timber groynes between Rhos-on-Sea and Old Colwyn to encourage beach stabilisation.

10.5.29 Following a storm in February 2005, a new section of sheet pile and concrete toe was installed to the west of the steps between Rotary Way and Beach Rd/Cliff Gardens, following reductions in beach levels of about 1m and following similar beach losses during a further storm in March 2010, rock armour was installed along the toe over approximately 150m immediately east of the steps between Rotary Way and Beach Rd/Cliff Gardens[143].

10.5.30 As part of the Phase 1b Waterfront works in 2013, the rock armour toe protection across the eastern half of the Old Colwyn frontage was reconstructed to a uniform profile comprising a

[147] Colwyn Borough Sea Defence Review, Report EX2367, HR Wallingford, October 1991

3.5m-wide crest at 4.0mOD and a 1 in 2.5 slope to seaward, utilising existing rock supplemented by imported material as necessary.

10.5.31 In the Old Colwyn area, emergency works comprising the addition of further piled and rock toes was carried out in response to rapid lowering of beach levels following severe storms.

10.5.32 From January-April 2020, the Splashpoint Project was completed which involved the construction of a 30m deep rock revetment against the sea wall at the location identified as being at highest risk – the easternmost section of the Promenade (where a revetment was previously currently absent) known as 'Splashpoint'. The revetment was designed to reduce the energy from storm waves reaching the Promenade, providing passive resistance against the existing wall to significantly reduce the risk of its failure.

10.5.33 Routine maintenance of existing structures is currently being undertaken by CCBC on a reactionary basis to extend structure life.

Fluvial Flood Risk

10.5.34 There are three fluvial watercourses which discharge to the beach to the east of Porth Eirias, two of which are located within the red line boundary:

- The Nant-y-Groes (classified as a Main River by NRW flood mapping) is present to the immediate west of the Scheme area, discharging to the beach via a culvert that passes beneath Porth Eirias at approximate NGR 285760, 378946. The Nant-y-Groes is classified as a Main River by NRW flood mapping[148];
- A small watercourse, Llwyd, (classified as a Main River by NRW flood mapping although in reality is a small overflow from the lake at Eirias Park) is culverted and is understood to discharge to the beach at approximate NGR 285877, 378888 within the Scheme area to the east of Porth Eirias. The culvert flows beneath a sports centre and recreational ground before discharging to the beach; and
- The Nant-y-Fynnon (Ordinary Watercourse) passes through Old Colwyn, flowing in an artificial channel down Beach Road and beneath the A55 Expressway before being culverted beneath the NWC Railway Line and outfalling directly onto the beach at Splashpoint at approximate NGR 287008, 378709.

10.5.35 This Scheme focuses on the impact of overtopping on the frontage. The diversion of the existing outfalls along the beach within the Scheme would allow the rivers to flow as they do at present and therefore not result in an increase in fluvial flooding.

Surface Water Flood Risk

10.5.36 NRW online mapping[148] shows that there is some surface water flood risk in the area of interest. However, the majority of these surface water sources are culverted under the Promenade before discharging to the beach. In general, surface water runoff from the Promenade and highway area flows into outfalls and directly to the foreshore and into the sea.

Water Framework Directive Elements

10.5.37 A Water Framework Directive Assessment has been completed for the Scheme and is included as ES Volume 2, Technical Appendix 10.1.

[148] NRW flood risk online mapping: https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en, accessed 2020

Catchment Description

10.5.38 Old Colwyn is located within the Western Wales River Basin District[149]. The hydrological catchment surrounding Old Colwyn is primarily urban, namely the town of Colwyn Bay. The upper reaches of the catchment are predominantly agricultural, in particular grazing land and forestry, with isolated dwellings. The Nant y Fynnon, Llwyd and Nant-y-Groes rivers drain from the upper catchment, picking up surface water outfalls in Colwyn Bay, before discharging directly onto the beach[150].

WFD Screened In Waterbodies

10.5.39 The WFD Assessment screened in a single water body – the North Wales Coastal Water body WFD Water body ID GB641011650000. Its current overall status is Moderate (ecological: Moderate and chemical: Fail) . It is classed as a Highly Modified Water Body (HMWB) due to coastal protection modifications of the shoreline and has overall, ecological and chemical objectives of 'Good' by 2021 as summarised in Table 10.6

Table 10.6: Baseline WFD Status of North Wales Coastal Water Body

WFD Water Body	North Wales
2018 Cycle 2 Interim Classification	
Water body ID	GB641011650000
River Basin District name	Western Wales
Water body type	Coastal
Water body total area (ha)	148.28km^2
Highly modified water body (HMWB) and use	Yes (for coastal protection)
Overall water body status (2018 interim)	Moderate
Ecological status	Moderate (phytoplankton blooms)
Chemical status	Fail
Invertebrates	Good
Phytoplankton	Moderate (blooms)
Dissolved Inorganic Nitrogen	Good
Dissolved Oxygen	High
Annex 8 chemicals, priority hazardous substances, priority substances and other pollutants	High (with exception of mercury – Moderate)
Water body Objectives and Measures (2017)	
Failing WFD elements	Dissolved inorganic nitrogen, mercury
WFD overall objective	Good by 2021
WFD chemical objective	Good by 2021
WFD ecological objective	Good by 2021

Source: Water Watch Wales Map Gallery (2020)[151]

[149] Western Wales River Basin Management Plan: https://naturalresources.wales/media/674895/ww-rbmp.pdf, accessed June 2020

[150] NRW Bathing Water data: https://environment.data.gov.uk/wales/bathing-waters/profiles/profile.html?site=ukl1301-40425, accessed June 2020

[151] Water Watch Wales website: https://waterwatchwales.naturalresourceswales.gov.uk/en/, accessed June 2020

Shellfish Waters

10.5.40 There are no Shellfish Waters within the Scheme area or within 2km of the red line boundary[152].

10.5.41 The closest Shellfish Waters are:

- Rhos-on-Sea 2.0km to the north-west; and
- Llanddulas 2.6km to the east.

10.5.42 The distance of these waters from the Scheme boundary means that they are not considered to be a receptor.

Bathing Waters

10.5.43 There are two Bathing Water Quality monitoring points in the wider Colwyn Bay area; to the west of Porth Eirias (approximate NGR 285566, 379291, approximately 500m north-west of the red line boundary) and further west at Rhos-on-Sea (NGR 284634,380141, around 1.8km north-west), although there is no specific monitoring point within the Scheme area[150].

10.5.44 In 2019 the results of sampling and analysis of water quality at Porth Eirias (along with the sampling point at Rhos-on-Sea) against the revised Bathing Water Directive by NRW resulted in an Excellent classification. Water quality at designated bathing water sites in Wales is assessed by NRW from May to September including testing the numbers of Intestinal enterococci and Escherichia coli present.

10.5.45 Streams are typically affected by sewage or industrial run off from further upstream in the catchment. The Nant-y-Ffynnon and Nant-y-Groes both drain directly onto the bathing beach. Reduced water quality may persist in the rivers for some time after rainfall has occurred. There is also the potential for reduced water quality in the adjacent area where the rivers enter the sea.

10.5.46 According to NRW "*there are no sewage treatment works that discharge directly into Colwyn Bay bathing waters. A major improvement Scheme was completed by Welsh Water for Conwy, Deganwy, Llandudno and Colwyn Bay in 1999. The sewage from the immediate catchment of the Llandudno, Conwy, Deganwy and Colwyn Bay areas is now pumped to the Ganol Wastewater Treatment Works, at Llandudno Junction*".

10.5.47 Within the catchment there are a number of storm and surface water outfalls that discharge to the rivers and streams. After periods of rainfall these discharges could have an adverse effect on bathing water quality.

Designated Sites

10.5.48 One WFD designated site was identified for consideration within the WFD Assessment – the Liverpool Bay/ Bae Lerpwl SPA, a 252,757 ha site[152]. The SPA is located immediately parallel to the north of the works extent. It is designated a SPA as it supports several wintering bird species (see Chapter **Error! Reference source not found.** Biodiversity for more information).

WFD Sensitive Habitats

10.5.49 There are several 'WFD sensitive habitats' located within the Scheme area (see Chapter 8 Biodiversity for more information).

[152] Multi Agency Geographic Information for the Countryside (MAGIC) Website: https://magic.defra.gov.uk/, accessed June 2020

10.5.50 Lower sensitivity habitats (medium to high resistance to, and recovery rate from, human pressures) include:

- Subtidal soft sediment;
- Intertidal soft sediment; and
- Gravel and cobbles.

10.5.51 Higher Sensitivity Habitats (these have a low resistance to, and recovery rate from human pressures) include:

- Blue Mussel (*Mytilus edulis*) beds: Small area to the east of Splashpoint. The mussel bed within the survey area broadly meets the description for the Section 7 priority habitat 'Blue mussel beds on sediment', in that Blue Mussel beds are present within the sand substrate. However, Blue Mussel beds that are classified as a priority habitat are valued as having a role in coastal sediment dynamics, acting as a food source for overwintering waders and providing an enhanced area of biodiversity and associated biota (typically associated with a range of organisms including fucoids, barnacles, isopods and other fauna). The mussel bed within the survey area is small and in poor condition (fragments and empty shells present on Site), whilst no evidence of any diverse assemblage of associated organisms was recorded during the surveys undertaken. In addition, *Mytilus edulis* are species common to the Welsh coastline. On this basis, the habitats on Site are considered to be poor examples of this priority habitat type (a value of local has been assigned to reflect this in Chapter 8 Biodiversity).
- Honeycomb Worm (*Sabellaria alveolata*) reef patches along three groyne structures. These intermittent sections of *Sabellaria alveolata* reef have been analysed by marine ecologists who consider that some of the sections of reef structures on site are in a poor condition and are possibly dying/dead. It has been noted by members of the project team that over the course of the site visits undertaken, the areas of reef may be in decline and despite this species being ephemeral (short-lasting) in nature, this is likely due to the exposed nature of the site and the poor condition of the patches of reef and lack of supporting biota The exposed nature of the site can be seen through the distribution of the *Sabellaria alveolata* which appears to preferentially grow on the eastern side of the groyne structures (lee side of prevailing wind direction). The *Sabellaria alveolata* present on Site is therefore not considered to be a high-quality example of this priority habitat. Annex 1 reefs are a common habitat type within the region and on this basis, the *Sabellaria alveolata* habitat present on Site has been valued at local level in Chapter 8 Biodiversity.

Phytoplankton

10.5.52 According to NRW, blooms of the algae Phaeocystis do occur along this coastline during warm and calm weather in May and June. This typically produces a cream or brown coloured scum along the water's edge but is otherwise harmless (scoping report 2020).

10.5.53 The North Wales Coastal Water body has 'Moderate' status for phytoplankton.

Baseline Receptor Summary

10.5.54 As part of the WFD Assessment Stage 2 (ES Volume 2, Technical Appendix 10.1), an exercise was completed to scope receptors in or out to Stage 3 (detailed assessment), as summarised in Table 10.7.

Table 10.7: WFD Assessment Receptor Scoping Exercise

Receptors	Consideration if Scheme Activity:	Potential Risk?	Stage 3 Assessment required?
WFD water body hydromorphology	Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status?	No. Overall status of water body is Moderate.	x
	Could significantly impact the hydromorphology of any water body (including morphological conditions and tidal patterns)?	No. Proposed scheme has potential to alter morphological conditions locally along the Old Colwyn frontage – however change in morphological conditions is not anticipated to be 'significant' in terms of water body as whole. There is currently extensive coastal protection along the frontage of the coastal water body (approximately 45km). Therefore, these works are considered to be relatively minor in the context of the entire water body, comprising approximately 2.5% of the length of frontage along the water body as a whole when considering the ~1.15km length, or approximately 0.8% when considering the 400m section without any revetment currently.	x
	Physical footprint is greater than 1% of surface area of water body or greater than 0.5km^2?	No. Scheme physical footprint within coastal area ~3.9ha which is ~0.026% of the total water body surface area.	x
	Is in a water body that is heavily modified for the same use as the activity?	Yes. Water body is heavily modified for coastal protection	✓
Priority habitats and species	Physical footprint is greater than 1% of surface area of water body or greater than 0.5km^2	No. Scheme physical footprint within coastal area ~3.9ha which is ~0.026% of the total water body surface area.	x
	Is within 500m of any higher sensitivity habitat?	Yes. A single Blue Mussel bed (*Mytilus edulis*) and intermittent patches of Honeycomb Work (*Sabellaria alveolata*), although they are sparse and poor quality examples of these habitats and are not considered to be critical to the health of the water body.	✓
	1% or more of any lower sensitivity habitat?	No. Lower sensitivity habitats in question are very common along 45km frontage of water body[153].	x

[153] NRW online mapping: https://naturalresources.wales/evidence-and-data/maps/wales-environmental-information/?lang=en, accessed June 2020

Biology - fish	Will impact on normal fish behaviour like movement, migration, spawning; species composition and abundance; or mechanical injury?	No. No physical barriers, chemical changes, habitat changes, significant changes to water quality or quantity, no changes to depth or flow and no possibilities of entrainment/impingement.	x
	Is in a transitional water body and could affect fish?	No	x
	Is outside of a transitional water body and could impact upon migratory fish?	No	x
Water quality	Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	No. Majority of works are to be undertaken at low tide on the upper shore area, minimising the potential for the generation of suspended solids; if the 3-6t revetment stone is to be delivered by barge, this would increase turbidity levels, however only intermittently during unloading, not continuously and any impact would be temporary and limited to the construction period.	x
	Is in a water body with a phytoplankton status of moderate, poor or bad	Yes (Moderate)	✓
	Is in a water body with a history of harmful algae	No	x
	Puts water quality at risk from your activity through the use, release or disturbance of chemicals	No. Chemical use or release is not anticipated. Ground investigation and associated sediment quality testing has not yet been completed, however sediments not in a historically contaminated area and there is no evidence that elevated contaminant levels would be present. An Outline Environmental Management Plan (OEMP)[154] has been produced for the Scheme. This would be updated to a Construction EMP when a Contractor is appointed.	x
Protected areas	Within 2km of any WFD protected area	Yes. Scheme is immediately adjacent to a SPA and within a Bathing Water area.	✓
Invasive and non-native species (INNS)	Introduce or spread INNS (including materials or equipment that have come from, had use in or travelled from other water	No. Introduction of alien species is not seen as a significant risk. Measures to prevent the import of INNS are included in the Biosecurity Risk Assessment	x

[154] Old Colwyn Coastal Defence and Active Travel Scheme, Outline Environmental Management Plan, 417437-MMD-00-XX-RP-N-1728, Mott MacDonald Ltd, July 2020

	bodies; or activities that help spread INNS).	(ES Volume 2, Technical Appendix 8.6).

Source: WFD Assessment 2020 (ES Volume 2, Technical Appendix 10.1)

10.5.55 From the baseline data previously summarised, and the information within Table 10.7, the receptors within the baseline with the potential to be affected by the Scheme have been summarised within Table 10.8.

Table 10.8: Sensitivity of Identified Receptors

Receptor	Details	Sensitivity	Reasoning
Coastal Processes			
Coastal hydromorphology	Local coastal processes between Rho-on-Sea and Tan Penmaen Headland.	Low	Coastal processes changes are within the Colwyn Bay beach frontage
Flood Risk			
Promenade, active travel routes and Highway	Pedestrian Promenade used by pedestrians as well as forming part of national cycle route 5	Medium/ High	Essential infrastructure
Assets within Promenade and behind including A55 Expressway and NWC Railway Line	Utilities that are under the road and Promenade Main railway line running through north Wales from Crewe Main road running into north Wales with both regional and national importance	Very high	Essential infrastructure
Water Framework Directive Quality Elements			
WFD water body hydromorphology	Water body is heavily modified for same use as proposed Scheme activity	High	Changes to water body hydromorphology may impact upon WFD water body status
Bathing Waters	Colwyn Bay Bathing Water classified as excellent	High	UK designated Bathing Water
Special Protection Area	Liverpool Bay SPA is located immediately north of the redline boundary	Very High	European designated site
WFD Sensitive Habitats	Lower sensitivity habitats: Subtidal soft sediment, intertidal soft sediment and gravel/cobbles.	Low	Medium/ high resistance and medium/ high recovery rate from human pressures

Receptor	Details	Sensitivity	Reasoning
WFD Sensitive Habitats	Higher sensitivity habitats: Blue mussel beds, patches of Honeycomb Worm reef.	Technically High (however ecologists have advised due to poor condition should be reduced to Low)	Low resistance and low recovery rate from human pressures –
WFD Phytoplankton status	Current status is moderate	High	Changes to phytoplankton status may impact upon WFD water body status

Source: Mott MacDonald 2020

10.6 Consultation

10.6.1 Within the scoping response (ES Volume 2, technical Appendix 1.4) a number of comments were made, where these comments have been addressed within this ES is detailed within Chapter 5 Consultation, Table 5.1.

10.6.2 The Scheme WFD Assessment and Flood Consequence Assessment (FCA) have been included as ES Volume 2, Technical Appendices 10.1 and 10.2 respectively as requested in the Scoping comments. The Water Overtopping Assessment is included as Technical Appendix 10.3.

10.6.3 The scoping response from NRW also identified the constraints of utilising previous scheme modelling as a baseline. A copy of the modelling study report for Colwyn Bay produced by Royal Haskoning is included as ES Volume 2, Technical Appendix 10.4.

10.6.4 A meeting was held on 15th July 2020 with NRW to discuss if there was a requirement for further modelling of the Scheme (meeting minutes included as ES Volume 2, Technical Appendix 5.2). During this meeting it was advised that additional modelling was unlikely to show a change in the results from the 2010 numerical modelling[138] owing to both no updates on input data being available and the modelling already including similar structures as built and proposed. A plan to identify the sediment transport pathways and wave direction has been produced and is included in Section 10.12.

10.6.5 Consultation within the Scheme area has also previously been completed for the Splashpoint Project (now completed) in terms of planning permission and the NRW Marine Licence. There is also consultation ongoing for the ground investigation Marine Licence for this Scheme.

10.7 Potential Impacts (pre Secondary Mitigation)

10.7.1 In this section, the predicted impacts on coastal processes and flood risk as a result of the construction and operation of the Scheme are considered and assessed in terms of their significance.

Primary (Embedded) Mitigation

10.7.2 A number of primary mitigation and enhancement measures have been incorporated into the Scheme proposals, in terms of working methodology and Scheme design. These are outlined below. Unless otherwise stated, these primary mitigation measures have been assessed as part of the Scheme proposals in the 'pre-mitigation' effects. The primary mitigation for this Scheme includes:

- The majority of works associated with the installation of the coastal aspects of the Scheme would be undertaken at exposed low tides (with the exception of revetment delivery by barge) therefore minimising the generation of suspended solids within the water column;
- The Scheme has been designed to reduce the overtopping along the frontage to acceptable levels taking climate change into account;
- The Scheme would be constructed in phases, minimising any temporary increased risks arising from the removal of existing revetment material for re-use within the Scheme where suitable; and
- Throughout the construction and operational phases, best practice guidance in reference to pollution prevention would be followed; CIRIA (Construction Industry Research and Information Associated) (2015).

10.7.3 Whilst it is anticipated that best practice measures would be implemented as standard practice under a CEMP, the specific safeguards included in the CEMP have been tailored to the Scheme. To reflect that this document may be subject to change, the CEMP is considered as secondary rather than primary (embedded) mitigation and the below assessment of effects is prior to implementation of the CEMP.

Construction Impacts

Coastal Processes

Coastal Hydromorphology

10.7.4 The construction of the revetment would require excavation of beach material and underlying sediments to provide a solid foundation. During the construction phase, machinery would need to track along the foreshore to excavate existing material and to place new materials. This could result in the loosening of beach material, making it more available for transporting along the frontage. This could result in material being mobilised into the water column and transported along the frontage. However, the majority of works are to be undertaken at low water, reducing the potential for resuspension.

10.7.5 Material from the excavation would be evenly distributed along the foreshore following the construction of a section of revetment that was excavated. This would allow the material to remain in the system and maintain the sediment balance.

10.7.6 The construction phase may lead to short term adverse impacts on sediment transport through the temporary placement of rock used for revetment construction in the intertidal zone prior to re-location to its final location within the new revetment structure. It is assumed that revetment rock would be stockpiled immediately seaward of its eventual location within the revetment. This temporary storage of materials may affect current localised sediment transport patterns, leading to settling-out of materials in the vicinity of the stockpiled materials and the reduction in sediment transported along the frontage. It is considered that once the stockpiles have been removed the beach would return to its current state.

Flood Risk

Promenade, buried utilities, A55 Expressway and NWC Railway Line

10.7.7 Local reconfiguration of the existing defences prior to construction of the Scheme may result in an increased risk of flooding and increased erosion rates along the frontage. It is assumed at this stage the existing frontage would not be altered in one go but in phases thus decreasing the overtopping risk. Further information on flood risk is included within the FCA located in ES Volume 2, Technical Appendix 10.2.

10.7.8 Within the construction of the Scheme stockpiles of rock for the revetment would be stored on the beach. These stockpiles could reduce the wave energy impacting on the existing wall.

Other WFD Quality Elements

10.7.9 **WFD Water Body Hydromorphology**

10.7.10 See Paragraphs 10.7.4 to 10.7.6. These effects are only anticipated to be local in scale.

Bathing Waters

10.7.11 The Scheme is located within a Bathing Water area, which is sensitive to changes in water quality and a Bathing Water quality monitoring point is located to the immediate west of the red line boundary at Porth Eirias. The revetment construction works would be completed at low tide, meaning that there would be limited potential for the generation of suspended sediments in relation to this activity.

10.7.12 The Scheme would not increase within the water body:

- Concentrations of pollution from sewage (specifically Intestinal enterococci and Escherichia coli as monitored by NRW throughout the Bathing Water season);
- Quantities or concentrations of water draining from populated areas;
- Concentration of domestic sewage; and
- Animals on beaches (during construction access to the beach would be prohibited for the general public including dog owners) which would result in a decrease in dog faeces deposition throughout construction within the Scheme area.

10.7.13 If the rock revetment is delivered by barge with revetment deposited into shallow water at high tide there would be a localised increase in turbidity at the time of delivery. However, this would be temporary, intermittent and of short duration. Additionally, the long shore drift in this area would result in the movement of sediments to the east, away from Old Colwyn (towards sites to the east which are reliant on sediment replenishment from the west).

Phytoplankton

10.7.14 The Scheme would not result in an increase in the amount of organic material being deposited into the water body and is not anticipated to result in any impact upon phytoplankton.

Priority Habitats and Species and Protected Areas

10.7.15 The assessment of impacts relating to priority habitats and species and protected areas along with any necessary mitigation is covered within Chapter 8 Biodiversity and is therefore not considered further in this chapter.

Operation

10.7.16 The operational impacts of the Scheme on coastal processes and flood risk would occur throughout the planned life of the defence structures. The purpose of the Scheme is to provide

a flood defence and erosion protection function and therefore would have an impact of physical aspects to the coastal environment, although they are essentially inert structures.

10.7.17 There would also be ongoing maintenance activities throughout the life of the coastal defence improvement works which may have an impact on physical elements of the coastal environment.

Coastal Processes

Coastal Hydrogeomorphology

10.7.18 It is likely that there would be some accumulation of sediment material at the toe of the new revetment, as has been recorded along the revetment currently in place along the Colwyn Bay frontage. The modelling that was previously undertaken the Colwyn Bay Phase Waterfront Project[138] (of which this Scheme is equivalent to Phase 3 of) indicated that with control structures in place erosion of the wider beach area still occurred in the long term. Although this scenario has not been modelled; it can be assumed that the wider beach would continue to erode in the longer term. Taking the 15 year monitoring of beach levels into account (see Table 10.5), the Scheme has been designed to include a beach lowering of 0.5m to account for any longer term sediment movement at the toe of the structure.

10.7.19 The revetment in front of the existing sea wall may result in the alteration of waves incident at the sea wall. This would provide a less reflective surface and as such would be expected to reduce scour and thus reduce further erosion and lowering of the beach along the frontage.

Flood Risk

Promenade, buried utilities, A55 Expressway and NWC Railway Line

10.7.20 The Scheme would increase the height of the defences along the frontage to a consistent height of +7.0mOD along the Promenade with a revetment crest at +7.5mOD reducing the flood risk potential to the frontage. These levels have been calculated from the Overtopping Assessment (see ES Volume 2, Technical Appendix 10.3 for more details) with a suitable allowance for climate change.

10.7.21 Future increases in sea level and storminess due to climate change effects would mean that over time the coastal defence structures would provide less protection to the shoreline, however structures have been designed such that they can be adapted in the future in response to changing conditions where necessary.

WFD Quality Elements

WFD Water Body Hydromorphology

10.7.22 This water body is currently heavily modified due to ‘coastal protection’, which is also the purpose of the proposed works as supported by the Shoreline Management Plan policy to ‘Hold the Line’. A total of ~1.15km of rock revetment would be constructed along the coastline, which provides an impact pathway to coastal morphology. However, all bar the 400m immediately west of Splashpoint is already defenced by smaller scale revetment which is to be replaced with the proposed larger-scale revetment.

10.7.23 Extension of rock revetments would affect coastal morphology but only in the locality of the Scheme. There is currently extensive coastal protection along the frontage of the coastal water body (approximately 45km). Therefore, these works are considered to be relatively minor in the context of the entire water body, comprising approximately 2.5% of the length of frontage along the water body as a whole. Of the ~1.15km length within this Scheme ~750m already has a

small scale revetment which is to be upgraded, the remaining 400m without any revetment currently comprises only 0.8% of the water body frontage length. It is worth noting that the 400m length comprises a sea wall with modified toe rather than virgin coastline.

10.7.24 Therefore effects on the wider North Wales Coastal Water Body are anticipated to be negligible with respect to changes to hydromorphology changes to a heavily modified water body.

Other Quality Elements

10.7.25 Following construction and once the coastal area has re-equilibrated with the presence of the new revetment, effects on other WFD quality elements are anticipated to be negligible. In the long run, the Scheme would greatly reduce the potential for a major pollution event relating to storm damage of the Welsh Water sewerage infrastructure present within the Promenade. The Scheme would also remove the requirement for the frequent reactive emergency maintenance required by CCBC on an annual basis following storm damage.

10.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures

10.8.1 The Scheme has been designed, as far as possible, to minimise effects on coastal processes and flood risk. Appropriate mitigation measures have been identified based on review of guidance provided in section 10.2 and using professional judgement.

Construction

Coastal Processes

10.8.2 In general, with the exception of minor ecological enhancement works to the groynes, the majority of construction plant movements would be within a primary working area 20m to 30m from the toe of the revetment (50m to 60m from the sea wall). The exception to this would be if revetment stone is to be delivered by barge. Deliveries would be made at high tide and deposited as close to the working area as possible. Following the appointment of a Contractor, and the selection of a delivery method for the revetment rock (barge or road), the CEMP would be updated to outline the routes where the construction vehicles can travel to minimise the area of beach affected. These routes would be finalised in agreement with CCBC and NRW, but as a minimum would exclude the Blue Mussel bed, and areas of Honeycomb Worm reef patch (see Drawing 415437-MMD-00-XX-DR-N-1711 in Chapter 4 Section 4.16), along with the avoidance of disturbing the existing rock groyne areas where Honeycomb Worm has been identified (other than for ecological enhancement works – placement of ecological armouring units). A site walkover by a marine ecologist 6-8 weeks prior to works commencing would be completed to make any necessary changes to plant movement routes and proposed stockpiling areas. Where material is disturbed localised reinstatement of the beach would be undertaken.

10.8.3 Stockpile locations would be agreed in advance with CCBC and NRW once a Contractor has been appointed (to be recorded in the CEMP) and the revetment rock delivery method has been selected. During construction, to reduce short term negative impact on hydrodynamics and the sediment transport regime, materials, such as rock armour used for revetment construction, should be stored as high up the beach as practicable. Where this is not possible, the size of the stockpile should be assessed to ensure that changes to the current flows are not creating areas of scour. Monitoring of the beaches around the stockpile should be undertaken and the beach levels reinstated should beach lowering be recorded. A Contractor-led beach inspection scheme would be required, to be agreed in advance with CCBC and NRW and detailed in the CEMP. Stockpiles would only be temporary and would not be permitted to remain beyond the end of the construction phase in question.

10.8.4 Any barge delivery of revetment is proposed to be undertaken in the months of least storm activity which wold reduce the impact on sediment and water quality in relation to plant movements on the lower beach area.

10.8.5 Excavation of waste materials would be kept to the minimum required in order to allow a solid founding for new structures without the removal and disturbance of excess materials. This would minimise displacement of removed sediments onto the foreshore that might be dispersed leading to an increase in suspended sediments.

10.8.6 If transhipment of revetment rock is considered necessary, the Contractor would produce a Transhipment Management Plan in consultation with CCBC, NRW and other local stakeholders prior to construction. It is proposed that this plan would include the identification of the transhipment locations offshore and a bathymetric survey of the area prior to works commencing. The plan could also include shipping corridors to the frontage, along with bathymetric surveys of these areas. The methodology for transferring rocks between barges would also be included to minimise the loss of rocks overboard. A plan for recovering any lost rocks off the seabed should also be included should this be required by NRW.

Flood Risk

10.8.7 The contractor would be required to develop and implement a robust Construction Flood Risk Management Plan prior to commencement of the construction phase.

10.8.8 To reduce the potential increase in flood risk and increased erosion during the temporary removal of defences, works should be scheduled as far as is practicable for lower tides and reduced storm periods (i.e. outside the winter period). Alternatively, enforced temporary closures of the Promenade may be required during the works. If damage to the Promenade and existing sea wall occurs temporary works to shore-up the structures should be undertaken to prevent failure.

WFD Quality Elements

10.8.9 A detailed CEMP would be produced detailing the practical and necessary measures required during construction to prevent the pollution of the surrounding environment.

10.8.10 The Biosecurity Risk Assessment (ES Volume 2, Technical Appendix 8.6) covers the measures required to safely manage the import of materials from other sites into the intertidal area.

10.8.11 Sediment samples taken during the ground investigation would determine sediment quality and whether contaminants are likely to be released during construction (currently considered to be unlikely). Should contamination be identified, an appropriate risk assessment would be completed to ascertain any additional mitigation measures considered necessary.

Operation

Coastal Processes

10.8.12 Regular beach monitoring would be undertaken along this section of the frontage and a beach monitoring regime would need to continue throughout the life of the coastal defence works to record how the beach is evolving in front of the new rock revetment, enabling any remedial action to be planned if required. Should the beach level drop below 0.5m CCBC would be required to undertake localised beach recycling and if it should rise by over 1m, localised beach management may be required to ensure ecological enhancement and outfalls remain operational.

Flood Risk

10.8.13 Rock structures proposed would require minimal maintenance. Inspections would be carried out to recognise any movement or potential failure of the structures (see Chapter 3 Scheme Description, Section 3.4 for details).

10.8.14 The revetment construction would allow for repair and reconfiguration if required in response to changes in physical conditions.

10.8.15 Extension and improvement to the existing outfalls would be in place to ensure they remain free flowing. The design of the construction works has considered their effective draining and ongoing maintenance during the lifetime of the Scheme as it is recognised that they could potentially have a negative impact on flood risk and water quality if they become blocked.

10.8.16 During the occurrence of particular events (in general spring/highest tides coinciding with onshore winds or storm events) CCBC would monitor conditions as they do currently and potentially close the Promenade when overtopping levels may exceed safe limits for pedestrians/vehicles (the number of these occasions are anticipated to fall significantly following Scheme completion). The process for closing the Promenade follows the methodology provided in current CCBC management arrangements as outlined in Paragraph 2.2.13 in Chapter 2 Need for Scheme, Assessment of Alternatives and Basis of Design. CCBC would be required to produce an operational Flood Management Plan.

WFD Quality Elements

10.8.17 Existing outfalls would need to be accessed and maintained by their owners/operators.

10.8.18 Chemicals used for cleaning of the beach access points (stairs and slipways) must be specified to be non-hazardous to ensure that there is no adverse impact on the sediment and water quality.

Enhancement

10.8.19 Ecological enhancement of the coastal structures is proposed and this has been assessed within Chapter 8 Biodiversity.

10.9 Assessment of Likely Significant Effects

10.9.1 The assessment of likely significant effects has been undertaken following the methodology described in Section 10.3.

10.9.2 Table 10.9 summarises the Scheme assessment of construction and operational effects, detailing the potential effect identified and appropriate mitigation measure for a particular receptor. The receptor sensitivity and magnitude of impact has been estimated followed by the identification of the significance category after mitigation and enhancement measures have been taken into account.

Table 10.9: Assessment of Likely Significant Effects

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 10.8)	Action (by Contractor/ Designer)	Receptor Sensitivity	Magnitude (with mitigation)	Residual Significance Category (with mitigation)
Coastal Processes						
Construction						
Coastal Hydromorphology	Scour of the stockpiles and toe of structures. Movement of existing material away from the Scheme. Potential for rock armour to be lost overboard (should barge delivery of revetment be required).	Primary working area to be 50-60m from sea wall. Lower beach only to be accessed for deliveries by barge and groyne enhancements. Move rock stockpiles as soon as practicable and locate as high up the beach as possible. Stockpiles to be short-term only. Contractor led inspection scheme, review the size of the stockpiles and if scour effects are being recorded reduce size. Localised beach reinstatement if required. Minimise sediment stockpiles and potential for suspended sediments. Work to be undertaken at low tide and outside stormy periods. Keep excavations to a minimum. Transhipment Management Plan required if revetment to be delivered by barge.	Contractor	Low	Moderate	**Direct, Temporary, Slight Adverse (Not Significant)**
Operation						
Coastal Hydromorphology	Scour of the tie in of Scheme Lowering/rising of beach levels	CCBC to monitor the end of the Scheme structures (see Chapter 3 Scheme Description, Section 3.4).	CCBC	Low	Moderate	**Direct, Permanent Slight Adverse (Not Significant)**

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 10.8)	Action (by Contractor/ Designer)	Receptor Sensitivity	Magnitude (with mitigation)	Residual Significance Category (with mitigation)
	Changes in sediment transport patterns	CCBC to monitor beach level and recycle material in front of structure if beach drops by 0.5m or undertake beach management if it rises by 1m.				
Flood Risk						
Construction						
Promenade, active travel routes and Highway	Increased flood risk and damage to the Promenade.	Revetment construction to be completed in phases. Flood Risk Management Plan to be completed by the Contractor.	Contractor	High	Negligible adverse	**Indirect, Temporary, Slight Adverse (Significant)**
Assets within Promenade and behind including A55 Expressway and NWC Railway Line Buried Utilities	Increased flood risk and damage to the Promenade potentially exposing the utilities, damage to A55 and railway	Working in stormy weather to be avoided where possible or where spring/annual high tides are predicted. Sections of frontage to be closed as necessary for safety. Temporary works to prevent failure of the existing structures.	Contractor	Very High	Negligible adverse	**Indirect, Temporary, Slight Adverse (Not Significant)**
Operation						
Promenade, active travel routes and Highway	Decreased flood risk and damage to the Promenade	Regular inspection of defence structures (see Chapter 3 Scheme Description, Section 3.4). Ongoing beach monitoring and beach recycling if required to prevent failure of the rock revetment. Maintenance of outfalls.	CCBC	High	Major beneficial	**Indirect, Permanent, Large / Very Large Beneficial (Significant)**
Assets within Promenade and behind including A55 Expressway	Decreased flood risk and damage to the Promenade		CCBC	Very High	Major beneficial	**Indirect, Permanent, Very Large Beneficial (Significant)**

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 10.8)	Action (by Contractor/ Designer)	Receptor Sensitivity	Magnitude (with mitigation)	Residual Significance Category (with mitigation)
and NWC Railway Line Buried Utilities		Potential closure of Promenade for extreme storm events. Design allows for repair and reconfiguration of coastal defences as required. Flood Management Plan required.				
Water Framework Directive Elements						
Construction						
WFD Water Body Hydromorphology	Scour of the stockpiles and toe of structures. Movement of existing material away from the Scheme. Potential for rock armour to be lost overboard.	Primary working area to be 50-60m from sea wall. Lower beach only to be accessed for deliveries by barge and groyne enhancements. Move rock stockpiles as soon as practicable and locate as high up the beach as possible. Stockpiles to be short-term only. Contractor led inspection scheme, review the size of the stockpiles and if scour effects are being recorded reduce size. Localised beach reinstatement if required. Minimise sediment stockpiles and potential for suspended sediments. Work to be undertaken at low tide and outside stormy periods. Keep excavations to a minimum. Transhipment Management Plan required if revetment to be delivered by barge.	Contractor	High	Negligible adverse	**Direct, Temporary, Slight Adverse (Not Significant)**

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 10.8)	Action (by Contractor/ Designer)	Receptor Sensitivity	Magnitude (with mitigation)	Residual Significance Category (with mitigation)
Bathing waters	Increased turbidity as a result of intertidal area plant movements and from revetment delivery (if delivery is to be via barge)	The revetment construction works would be completed at low tide, meaning that there would be limited potential for the generation of suspended sediments in relation to this activity. All necessary pollution prevention measures would be detailed in the Contractor-produced CEMP during the construction phase to minimise potential adverse impacts on water quality.	Contractor	High	Negligible adverse	**Indirect, Temporary, Slight Adverse (Not Significant)**
Phytoplankton	No anticipated impact upon phytoplankton	Application of measures in biosecurity risk assessment (ES Volume 2, technical Appendix 8.6).	Contractor	High	No change	**Neutral (Not Significant)**
Operation						
WFD Water Body Hydromorphology	Development of heavily modified water body for same purpose.	CCBC to monitor the end of the Scheme structures (see Chapter 3 Scheme Description, Section 3.4). CCBC to monitor beach level and recycle material in front of structure if beach drops by 0.5m or undertake beach management if it rises by 1m.	CCBC	High	Negligible adverse	**Indirect, Permanent, Slight Adverse,** **(Not Significant)**
Bathing Waters	Reduction in risk to Bathing Waters in the long term from severe pollution event.	The Scheme would protect the Promenade and vastly reduce the risks of severe damage during an extreme storm event, which could rupture Welsh Water sewerage services beneath the Promenade and result	N/A	High	Minor beneficial (given likely short lived nature of pollution event)	**Indirect, Permanent Slight Beneficial, (Not Significant)**

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 10.8)	Action (by Contractor/ Designer)	Receptor Sensitivity	Magnitude (with mitigation)	Residual Significance Category (with mitigation)
Phytoplankton	Reduction in risk to phytoplankton status of water body in the long term from severe pollution event.	in a major release of raw sewage directly onto the intertidal area.	N/A	High	Minor beneficial (given likely short lived nature of pollution event)	**Indirect, Permanent Slight Beneficial, (Not Significant)**

Source: Mott MacDonald Ltd, 2020

Likely Residual Significant Effects Recorded (Post-Mitigation)

Construction

10.9.3 No significant residual effects are anticipated during construction with a maximum effect category of **Slight Adverse**.

Operation

10.9.4 During Scheme operation, there are considered to be **Large/Very Large Beneficial** (significant) effects relating to flood risk. This is owing to the improvements that the Scheme would make to the sea defences for stability and also the reduction of overtopping to pedestrians and Promenade users.

10.10 Requirements for Tertiary Mitigation/Monitoring

10.10.1 During the construction of the Scheme, monitoring of the beach levels and the impacts of localised scour would need to be undertaken by the Contractor, in addition, monitoring of the tides and any storm events would also be necessary. A management plan for a response to storms would be included in the Contractors Flood Risk Management Plan.

10.10.2 Following the construction ongoing monitoring of the beach levels should be undertaken, and the results reviewed against historic and as-built information. This would allow any erosion or accumulation to be assessed to determine if action is required. This action could include beach recycling to prevent the failure of the rock revetment should the beach fall by 0.5m or localised beach management should levels rise by 1.0m.

10.11 Conclusions

10.11.1 During the construction of the Scheme there are likely to be small-scale impacts to the coastal processes along this frontage that result from the stockpiling of rocks and the movement of vehicles along the beach. Mitigation for these impacts has been included in the CEMP to reduce the loss of beach material. With the proposed mitigation the construction stage effects of the Scheme are considered to be temporary **Slight Adverse** (not significant). Following the construction of the Scheme it is anticipated that there would be a permanent **Slight Beneficial** (not significant) impact to the coastal processes owing to a reduction in scour at the toe of the revetment.

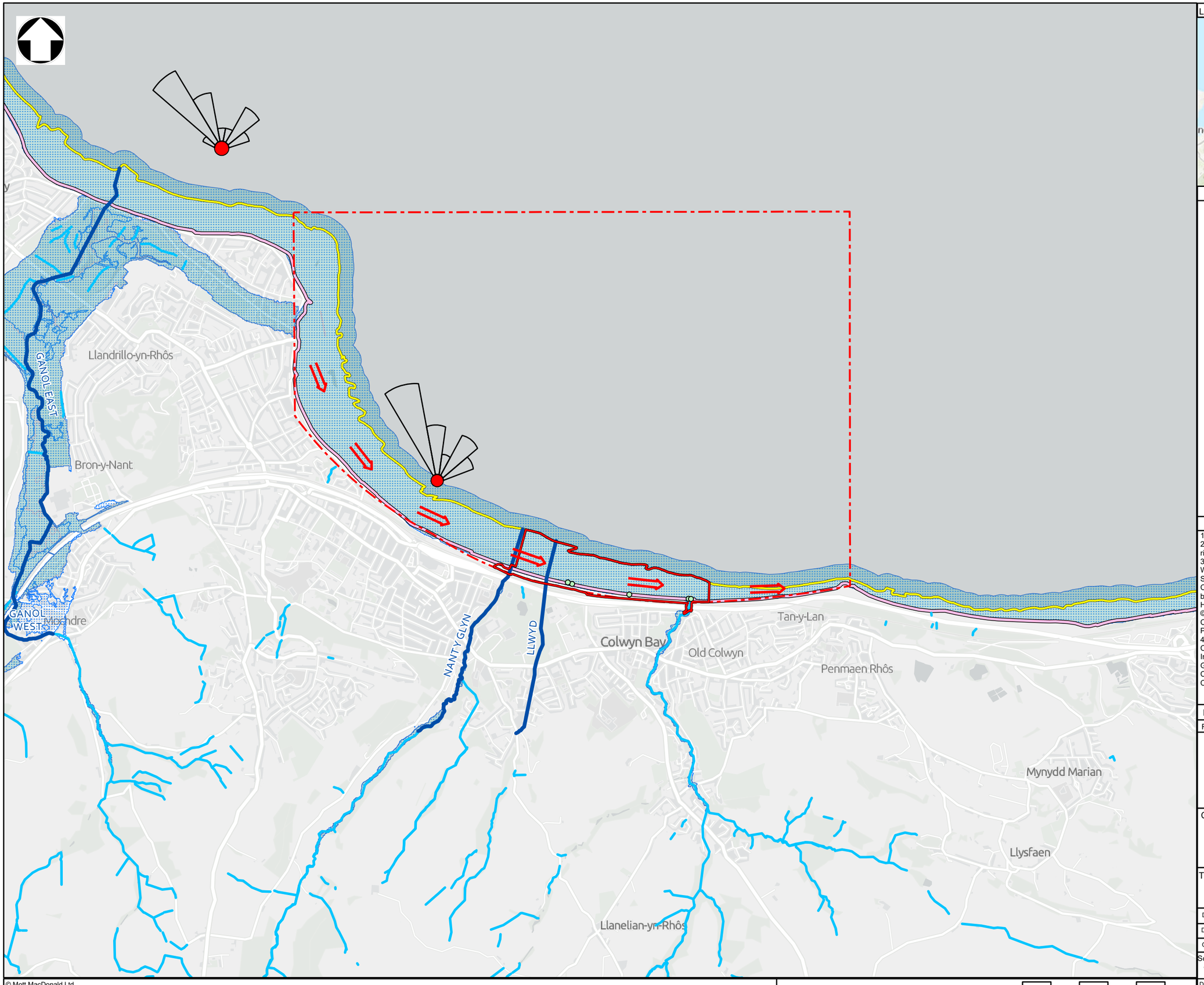
10.11.2 The Promenade is currently at risk of coastal flooding with frequent overtopping events occurring. During the construction of the Scheme there could be an increased risk of flooding along the frontage assessed as temporary **Slight Adverse** (not significant). To reduce this impact mitigation has been proposed in the CEMP to ensure phasing of the works is undertaken and a Flood Risk Management Plan is in place. Once operational, the Scheme would have a permanent **Large/Very Large Beneficial** effect (significant) in reducing the current overtopping risk along the frontage and providing structural stability to the coastal defences in the longer term.

10.11.3 A WFD Assessment has been completed for the Scheme, identifying the potential for effects on the North Wales Coastal Water Body. When taking into account the mitigation measures both from the design stage and those proposed during construction including adherence to the Scheme CEMP, no deterioration of the water body quality elements is anticipated. Construction effects have been classed as temporary and **Slight Adverse** (not significant) while operational effects are anticipated to be permanent **Slight Beneficial** (not significant).

10.12 Drawings

10.12.1 Key drawings in support of this Chapter are included here and comprise the following:

- 415437-MMD-00-XX-DR-N-1712 Coastal and Flood Risk Study Area.



Location Map

Key to Symbols

- Scheme extent
- Coastal and flood risk study area
- Existing outfalls
- Main rivers
- Minor watercourses
- Mean low water mark
- Mean high water mark
- Flood zone 3
- Flood zone 2
- Net sediment movement
- Wave direction frequency

Notes

1. For information only, not for construction.
2. Contains Ordnance Survey data © Crown copyright and database rights 2019 Ordnance Survey. All rights reserved.
3. Contains Natural Resources Wales information © Natural Resources Wales and Database Right. All rights Reserved. Contains Ordnance Survey Data. Ordnance Survey Licence number 100019741. Crown Copyright and Database Right. Some features of this information are based on digital spatial data licensed from the Centre for Ecology & Hydrology © NERC (CEH). Defra, Met Office and DARD Rivers Agency © Crown copyright. © Cranfield University. © James Hutton Institute. Contains OS data © Crown copyright and database right 2015. Land & Property Services © Crown copyright and database right.
4. Contains OS data © Crown Copyright and database right 2020 Contains data from OS Zoomstack, Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	23/07/20	MH	For information	NS	CW

MOTT MACDONALD
Mott MacDonald House
5 Woodland Road West
Colwyn Bay
LL29 7DH
T +44 (0)2920 467800
W www.mottmac.com

Client

Conwy County Borough Council

Title Old Colwyn Coastal Defence and Active Travel Scheme
Coastal and Flood Risk Study Area

Designed	N Spofforth	NS	Eng. Check	N Spofforth	NS
Drawn	S Anstice	SA	Coordination	N Spofforth	NS
GIS Check	G O'Donovan	GO	Approved	C Williams	CW

Scale at A3	Status	Rev	Security
1:25,000	INF	P1	STD

Drawing Number
415437-MMD-00-XX-DR-N-1712

0 200 400 600 800 1000 Meters

C:\Users\ANS90589\Mott MacDonald\410895 - Colwyn Bay Waterfront Phase 2b - GIS\MXD\GIS_410895_MMD_EnvironmentalConstraintsDrawings_260620\GIS_410895_MMD_SedTransport_\GIS_410895_MMD_SedTransport_.aprx

10.13 List of Documents Included in ES Volume 2: Technical Appendix 10

- Appendix 10.1: WFD Assessment;
- Appendix 10.2: Flood Consequence Assessment;
- Appendix 10.3: Wave Overtopping Assessment; and
- Appendix 10.4: Detailed Modelling Study (Colwyn Bay Waterfront Project)

11 Landscape

11.1 Introduction

11.1.1 This Landscape and Visual Impact Assessment (LVIA) describes and evaluates the potential effects of the Scheme on the landscape and visual amenity of Colwyn Bay and its surroundings.

11.1.2 The LVIA is supported by the use of viewpoints to inform the effects at key locations, however the assessment of effects is not limited to these locations.

11.2 Legislative and Policy Framework

11.2.1 The principal legislative and planning context in relation to the assessment of the environmental effects of the Scheme on landscape and visual amenity is discussed below.

National Policy

Planning Policy Wales Edition 10 (December 2018)

11.2.2 Planning Policy Wales (PPW) details the land use planning policies for Wales and is supported by Technical Advice Notes (TAN).

11.2.3 Chapter 6: Distinctive and Natural Places – Recognising the Special Characteristics of Places has a sub-section on Landscape, and notes in paragraph 6.3.3 that: *"All the landscapes of Wales are valued for their intrinsic contribution to a sense of place, and local authorities should protect and enhance their special characteristics, whilst paying due regard to the social, economic, environmental and cultural benefits they provide, and to their role in creating valued places. Considering landscape at the outset of formulating strategies and polices in development plans and when proposing development is key to sustaining and enhancing their special qualities, and delivering the maximum well-being benefits for present and future generations as well as helping to deliver an effective and integrated approach to natural resource management over the long term".*

11.2.4 Amongst other things, this means *"ensuring the opportunities landscapes provide for tourism, outdoor recreation, local employment, renewable energy and physical and mental health and well-being are taken into account and multiple well-being benefits for people and communities secured".*

11.2.5 Paragraph 6.5.6 states that planning authorities should "*establish what the coast means for them and develop, or apply, specific policies through their development plans which reflect the characteristics of their coastlines*", and Chapter 3: Strategic and Spatial Choices states in paragraph 3.8, *"good design can help to ensure high environmental quality. Landscape and green infrastructure considerations are an integral part of the design process. Integrating green infrastructure is not limited to focusing on landscape and ecology, rather, consideration should be given to all features of the natural environment and how these function together to contribute toward the quality of places".*

Technical Advice Note 14: Coastal Planning (1988)

11.2.6 In Section 8, TAN14 states that "*planning considerations would vary depending on the nature of the coastline, but there are a number of specific issues in relation to the coastal zone that the planning system should address*", it then continues to note that this includes "*any potential*

visual impact from both land and sea". It also explains that *"for land-use planning purposes the seaward limit of the coastal zone is generally mean low water mark, but between high and low water mark the planning system usually needs to operate in tandem with a range of sectoral controls over coastal and marine development".*

Welsh National Marine Plan (November 2019)

11.2.7 This Welsh National Marine Plan (WNMP) is the first marine plan for Wales and represents the start of the process of shaping Welsh inshore and offshore marine waters to support economic, social, cultural and environmental objectives. It sets out how proposals would be considered by decision makers for the sustainable development of the marine area. The Plan vision would be delivered through the Plan's objectives including Objective 5: "*Recognising the significant value of coastal tourism and recreation to the Welsh economy and well-being and ensure such activity and potential for future growth are appropriately safeguarded".*

11.2.8 Paragraph 495 states that "*key attractions include Wales' beaches, wildlife, coastal landscape and seascape, distinctive towns and villages and unique culture and heritage. They include National Parks, Areas of Outstanding Natural Beauty (AONBs) and the 870-mile long Wales Coast Path, the only one of its kind anywhere in the world to span the nation's entire coastline. Much of the tourism and recreation activity occurring in the Plan area takes place on or near-shore, typically within three nautical miles of the coast".*

11.2.9 Policy SOC 07: Seascapes, requires proposals to "*demonstrate how potential impacts on seascapes have been taken into consideration at an early stage and should, in order of preference:*

a. Avoid adverse impacts on seascapes; and/or

b. Minimise impacts where they cannot be avoided; and/or

c. Mitigate impacts where they cannot be minimised.

11.2.10 *If significant adverse impacts cannot be adequately addressed, proposals should present a clear and convincing justification for proceeding. Opportunities to enhance seascapes are encouraged".*

11.2.11 In the context of the plan, landscapes within coastal and marine areas are known as seascapes and include "*landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other*".

Local Policy

Conwy County Borough Council Local Development Plan 2007-2022 (adopted October 2013)

11.2.12 Policies relevant to landscape and visual impact assessment in the Local Plan include:

- Strategic Policy NTE/1 The Natural Environment (g): "*Protecting the coastal zone within the natural environment*"; and
- Strategic Policy NTE/3 Biodiversity (c): "*New development should aim to conserve and, where possible, enhance biodiversity through creating, enhancing and managing wildlife habitats and natural landscapes including connectivity*."

11.3 Study Area

11.3.1 In the absence of a Zone of Theoretical Visibility (ZTV) for the Scheme, the study area has been defined from a desk based study using online mapping and aerial imagery tools. The visual

envelope is defined as an area 150m to the south of the red line boundary due to the raised landform of the A55 Expressway, and 1km north of the redline boundary. It extends approximately 2.8km to Rhos-on-Sea in the west and 1km to the Rainbow bridge over the A55 Expressway in the east

11.3.2 The site consists of approximately 1.15km of linear shoreline area and adjacent infrastructure in between Porth Eirias car park in the west and Splashpoint in the east. It includes the easternmost section of the Promenade at Old Colwyn. The NWC Railway Line runs on a well vegetated embankment to the south of the site, beyond which lies the A55 Expressway. The embankment limits north-south connectivity, with limited crossing points over or under the NWC Railway Line and dual carriageway for motorised and non-motorised users. The embankment along with the A55 Expressway and associated vegetated verges provide a visual barrier to views from the seafront to Eirias Park, a 20ha public park and leisure facility, and the residential areas of Colwyn Bay and Old Colwyn town which lie on elevated land to the south. The North Wales Coast Path long distance footpath and Sustrans National Cycle Route 5 follow the coastline along the Prom.

As the coast curves to the west the headland of Rhos-on-Sea is visible to the west against the skyline.

11.4 Assessment Methodology

Introduction

11.4.1 The methodology used for assessing landscape and visual effects is based on the third edition of the Guidelines for Landscape and Visual Impact Assessment (GLVIA 3)[155]. The assessment identifies the residual effects likely to arise from the development, taking into account mitigation measures and changes over time. The significance of effects was assessed by considering the sensitivity of the receptor and the predicted magnitude of change in relation to the baseline conditions. The methodology described within GLVIA 3 results in a slightly different method of calculating significance of effect to many of the other chapters within this report.

11.4.2 The sensitivity of the landscape was evaluated by considering the existing value of the landscape and its susceptibility to the type of change arising from the proposed development. There can be a complex relationship between the value attached to the landscape and its susceptibility to change, especially if the change is within or close to a designated landscape. A designated landscape such as an AONB is likely to have a high susceptibility to change but, depending on the type of development, it might accommodate the change without detrimental effect on its key characteristics. In this case its susceptibility to change could be medium or even low.

11.4.3 The LVIA completed identifies, predicts, and evaluates the potential landscape and visual effects likely to result from the proposed development during construction only. The operational phase was scoped out of this assessment within the Scoping Report as it concluded that landscape effects were likely to be minor and therefore non-significant, for the following reasons:

- The character of the landscape would remain comparable to the baseline with no significant changes to land use and slight benefits to connectivity for motorised and non-motorised users;

[155] Guidelines for Landscape and Visual Assessment 3rd Edition (EIMA and Landscape Institute 2013)

- For the majority of visual receptors, elements within the view including road and rail infrastructure, Promenade, beach and the sea, would be comparable to the baseline; and
- Although the rock revetment and increased height of the Promenade would increase its prominence within views from the beach, there is great opportunity for any adverse visual effects to be minimised through careful design and integration of the Scheme into the existing landscape and seascape.

11.4.4 Similarly, the character of the landscape would remain comparable to the baseline with no significant changes to land use.

11.4.5 During the development of the operational design from concept to tender and finally detailed design, a process of iterative design and assessment was used to avoid and reduce adverse effects due to the operation of the proposed development. BCA Landscape were involved throughout this process to oversee the integration of engineering and landscape design.

Landscape

Sensitivity of Landscape Receptors

11.4.6 The sensitivity (value) of receptors has been determined according to the descriptions provided within Table 11.1

Table 11.1: Landscape Sensitivity

Sensitivity	Landscape Value and Susceptibility to Change
High	Designated landscape (such as AONB). Landscape of high scenic quality with a distinctive combination of features, elements and characteristics, outstanding views and a strong sense of place. A scarce or fragile landscape with cultural, historic or ecological elements which make a major contribution to landscape character. No or very few landscape detractors. Has components which are difficult to replace (such as mature trees). A tranquil landscape in good condition, largely intact, with an unspoilt character. A high susceptibility to change due to the type of development proposed. No or very limited potential for substitution or replacement
Medium	Landscape locally designated (such as conservation area, regional park) or locally valued (for its recreational facilities and footpath networks for instance). Some scenic quality and a moderate sense of place. A landscape with some distinctive features, elements and characteristics. Some cultural, historic or ecological elements which contribute to landscape character. Some high use areas, but overall medium tranquillity. Few landscape detractors. A landscape in moderate condition, with some unspoilt characteristics and a moderate susceptibility to change due to the type of development proposed. Some potential for substitution or replacement.
Low	Undesignated landscape, not valued for its scenic quality, with a disparate combination of features, elements and characteristics and a weak sense of place. Mainly common features and few or no cultural, historic or ecological elements that contribute to landscape character. Many landscape detractors. A landscape of low tranquillity, in poor condition and a low susceptibility to change due to the type of development proposed. Good potential for substitution or replacement.

Source: Based on GLVIA 3 (LI and IEMA, 2013)

Magnitude of Landscape Impact

11.4.7 The magnitude of change to landscape character (as outlined in Table 11.2) was determined by considering:

- The nature of an impact - whether the introduction of a proposed development would be of benefit or detriment to the existing landscape character;
- The scale of the change - extent of the loss of landscape elements, the degree to which aesthetic features or perceptual aspects of the landscape are altered (by the removal of hedgerows or introduction of new structures for example) and whether a key characteristic of the landscape is altered;
- The geographical extent of the area affected; and
- The duration of the change and its reversibility.

Table 11.2: Magnitude of Change to Landscape Character

Magnitude	Typical Description
High	Total loss or substantial alteration to key elements/features/characteristics of the LCA and/or its setting. Addition of new elements which conflict with key characteristics of the existing landscape. Changes that alter a substantial proportion the more LCA. Introduction of long-term and/or irreversible changes to an LCA or its setting.
Medium	Partial loss or alteration to key elements/features/characteristics of the LCA and/or its setting. Addition of new elements or features that are prominent in the landscape but which do not necessarily conflict with key characteristics of the existing landscape. Changes that alter part of an LCA or its immediate setting. Introduction of medium to long term and/or irreversible changes to part of an LCA or its setting.
Low	Slight loss or alteration to one or more key characteristics of the LCA and/or its setting. Addition of new elements or features that are largely characteristic of the existing LCA and/or its setting. Introduction of short to medium term changes to the LCA and/or irreversible changes to a small proportion of the LCA.
Negligible	No change to, or barely perceptible loss or alteration to key characteristics of the LCA and its setting. Addition of new elements or features that are characteristic of the existing LCA and/or its setting. Changes experienced close to the proposed development site at a very localised level.

Based on GLVIA 3 (LI and IEMA, 2013)

Visual

11.4.8 The sensitivity of visual receptors was evaluated by considering the value attached to specific views and the susceptibility of a visual receptor to changes to views and visual amenity. The value attached to a view could derive from a planning designation or an association with a heritage asset. The susceptibility to change depends on the occupation or activity of the receptor and the extent to which their attention is focused on the view and visual amenity.

Sensitivity of Visual Receptors

11.4.9 The sensitivity (value) of receptors has been determined according to the descriptions provided within Table 11.3.

Table 11.3: Level of View Value

View Value	Criteria for Assessing View Value
High	A view identified as of value on an Ordnance Survey map, tourist map or guidebook, or one recorded in art or literature of national significance. A view where the composition was a fundamental aspect of the design or function of a heritage asset and is an integral part of the setting of a heritage asset. A view with cultural associations, including landscapes known historically for their picturesque and landscape beauty, those which became subjects for paintings of the English

View Value	Criteria for Assessing View Value
	landscape tradition, and views which have otherwise become historically cherished and protected
Medium - High	A view identified as of value in a local guidebook. A view where existing adverse elements do not form a clearly apparent part of the view or composition of the view. A view that may be recorded in art or literature of regional or local significance. A view where a heritage asset makes a partial contribution to the view. A view where the composition was an important aspect of the design or function of a heritage asset and forms part of the setting of a heritage asset. A view that may be identified in character area appraisals.
Medium	A view where existing adverse elements may form a noticeable part in the composition of the view. A typical and/or representative view. A view where the composition was a peripheral aspect of the design or function of a heritage asset.
Medium - Low	A view where existing adverse elements form a very noticeable part in the composition of the view.
Low	An undistinguished or unremarkable view and / or a view where existing adverse element form a clearly apparent or dominant part of the view / composition of the view.

Based on GLVIA 3 (LI and IEMA, 2013)

11.4.10 The overall sensitivity of the receptor (based on combining the view value and the receptor's susceptibility) can be high, medium or low as summarised in Table 11.4.

Table 11.4: Level of View Value

Level of Susceptibility	Receptor
High	Occupiers of residential properties orientated towards the development. Walkers and visitors to heritage assets whose attention is focused on a landscape of recognised high quality. Designated or protected views. Views from a recognised high-quality landscape such as a National Park or an AONB.
Medium	People travelling along scenic roads through the landscape. Walkers and visitors to heritage assets whose attention is focused on a landscape of moderate quality. People walking along residential streets. Occupiers of residential properties with oblique views of the development.
Low	People at work and in educational institutions. People engaged in formal sports activities. People walking through urban areas (for example commuters). People on main roads or railways whose attention is not focused on the landscape (such as commuters).

Based on GLVIA 3 (LI and IEMA, 2013)

Magnitude of Impact

11.4.11 The magnitude of change to landscape character (Table 11.5) was determined by considering:

- The nature of an impact by judging whether the introduction of a proposed development would be of benefit or detriment to the existing view. The impact of a proposed development can be adverse or beneficial;

- The context of the existing view (e.g. whether it is across a natural landscape or an industrial site);
- The extent to which the view has been altered due to the loss/ addition of features and the proportion of the view the development would occupy;
- The distance of the visual receptor from the development and the angle/ position of view;
- The duration of the effect and its reversibility.
- The size and scale of the effect; and
- The geographical extent of the changes to the view.

Table 11.5: Magnitude of Change to Views

Magnitude	Typical Description
High	Total loss or substantial alteration to key characteristics of the view. Addition of new features or components that are continuously highly visible across the majority of the view and incongruous with the existing view. Substantial changes in close proximity to the visual receptor and within the direct frame of view. Introduction of long term or permanent change uncharacteristic of the view.
Medium	Noticeable change or alteration to one or more key characteristics of the view Addition of new features or components that may be continuously highly visible across much of the view but are largely characteristic of the existing view. Changes a relatively short distance from the receptor, but viewed as one of a series of components in the middle ground of the view. Substantial change partially filtered by intervening vegetation and/or built form, or viewed obliquely. Introduction of medium to long term change uncharacteristic of the view and/or permanent changes largely characteristic of the existing view or affecting a small proportion of the view.
Low	Slight loss or alteration to one or more characteristics of the view Addition of new features or landscape components that may be continuously or intermittently visible in part of the view, but are largely characteristic of the existing view from a receptor. Changes within the background of the view, viewed as one of a series of components in the wider panoramic view from a receptor. Change largely filtered by intervening vegetation and/or built form, or viewed Obliquely. Introduction of short to medium term change uncharacteristic of the view and/or long term/permanent changes in a small proportion of the view.
Negligible	No change to, or barely perceptible loss or alteration in the view. Addition of new features or landscape components that are largely inconspicuous and characteristic of the existing view. Changes within the background of the view, viewed as an inconspicuous element within the wider panorama. Change almost entirely obscured by intervening vegetation and/or built form. Short term change affecting a small proportion of the view.

Based on GLVIA 3 (LI and IEMA, 2013)

Significance of Effect

11.4.12 Effects may be adverse or beneficial. Major and moderate effects are considered significant.

11.4.13 Professional judgement was used to determine the overall level of significance of effects on landscape and visual receptors in weighing the sensitivity of the receptors against the magnitude of change. The evaluation of the significance of effects was based on the criteria set out in Table 11.6 and Table 11.7, and the matrix Table 11.8.

Table 11.6: Significance of Effects on Landscape Character

Significance of Effects	Criteria
Major beneficial	A clear improvement or enhancement of existing character. Restoration of characteristic features previously wholly or largely lost through inappropriate management or previous development.
Moderate beneficial	A noticeable improvement or enhancement of existing character. Restoration of valued characteristic features previously largely lost through inappropriate management or previous development.
Minor beneficial	A small improvement or enhancement of existing character. Restoration of valued characteristic features previously partly lost through inappropriate management or previous development.
Negligible	Maintenance of the existing character, sense of place and/or local distinctiveness of the landscape.
Minor adverse	A small deterioration in the existing character due to the loss of characteristic features and or the introduction of uncharacteristic features which detract from the sense of place or local distinctiveness. Effects may relate to a small proportion of the character area.
Moderate adverse	A noticeable deterioration in the existing character due to the loss of characteristic features or the introduction of uncharacteristic features or elements which detract from the sense of place or local distinctiveness. Effects may relate to a medium proportion of the character area.
Major adverse	A clear deterioration in the existing character due to the loss of key characteristic features or the introduction of uncharacteristic features or elements which detract from the sense of place or local distinctiveness. Effects may relate to all or a large proportion of the character area.

Based on GLVIA 3 (LI and IEMA, 2013)

Table 11.7: Significance of Effects on Visual Receptors

Significance of effects	Criteria
Major beneficial	A substantial improvement, affecting a large extent of the view.
Moderate beneficial	A noticeable improvement, affecting part of the view.
Minor beneficial	A small improvement, affecting a small extent of the view.
Negligible	No discernible deterioration or improvement in the existing view.
Minor adverse	A small deterioration, affecting a small extent of the view.
Moderate adverse	A noticeable deterioration, affecting part of the view.
Major adverse	A substantial deterioration, affecting a large extent of the view.

Based on GLVIA 3 (LI and IEMA, 2013)

11.4.14 Effects are identified as neutral, slight, moderate, large or very large; adverse or beneficial.

Table 11.8: Significance of Effects Matrix

Magnitude	Sensitivity		
	High	**Medium**	**Low**
High	Major	Major/moderate	Moderate/minor
Medium	Major/moderate	Moderate	Moderate/minor
Low	Moderate/minor	Minor	Minor/negligible
Negligible	Minor/negligible	Minor/negligible	Negligible

Based on GLVIA 3 (LI and IEMA, 2013)

11.4.15 For the purposes of this assessment, effects of **Moderate Adverse** or **Moderate Beneficial** and above would be considered to be significant.

Assessment Assumptions and Limitations

11.4.16 During the surveys there were some areas (private land, commercial premises and residential properties) which were inaccessible. In these instances, professional judgement was used to approximate the likely views from these locations.

11.4.17 At the time of writing, Covid-19 travel restrictions had been imposed by the Welsh Government limiting travel to a maximum of 5 miles from a person's domicile. A national restriction on leaving properties had also been in effect prior to this. Therefore, viewpoint photographs were taken by a local, experienced environmental consultant with on-site guidance provided remotely by the landscape team.

11.4.18 The baseline information used within this chapter has been summarised from a variety of desk-based sources available at the time of writing which have been assumed to be correct and complete (as referenced).

11.5 Baseline Conditions

11.5.1 The assessment of baseline conditions provides the reference point against which the extent and significance of predicted landscape and visual effects were assessed. The landscape character of the study area and the nature of existing views were established through desk-based research, field survey and consultation with CCBC.

11.5.2 The following key sources of information have been used; OS mapping, aerial photography and published documents on the CCBC website. In accordance with the guidance in GLVIA 3, existing Landscape Character Assessments, Marine Character Assessments and the CCBC Local Development plan 2007-2022, were used to inform the LVIA.

11.5.3 A series of Environmental Constraints Drawings including features pertinent to landscape can be found in Chapter 3 Scheme Description, Section 3.5.

Landscape

Landscape Baseline

11.5.4 The findings of the desk study were reviewed to identify national and local Landscape Character Areas (LCA). These are broadly homogeneous units of distinct features and elements.

Landscape Designations

There are several designations within the vicinity to the Scheme or the local area which are of note. These are:

- Snowdonia National Park; approximately 8km west and south of the Scheme;
- Much of the Creuddyn peninsula is designated as a Special Area of Conservation (SAC), Site of Special Scientific Interest (SSSI), and Heritage Coast;
- Areas within Colwyn Bay (predominantly town centre) and Rhos-on-Sea (village centre and sea front) are designated as Conservation Areas; and
- Listed Buildings within Colwyn Bay.

National Character Areas Assessments

The study area lies within National Landscape Character Area 08 (NLCA08)[156]: North Wales Coast. The key characteristics of relevance to the study area are:

- Seaside resort towns – urban development and arterial road and railway routes along the coast, constricted in places by topography and rising hills. Much 19th century development with more recent suburban development; and
- A generally man-made coastal edge – Promenades, sea walls, groynes, rock armour and other forms of protecting the coastal edge run along the majority of the coastline.

Marine Character Areas

The study area also lies within Marine Character Area 02 (MAC02)[157] Colwyn Bay and Rhyl Flats. The key characteristics of relevance to the study area are:

- Constantly shifting sand banks with changing depths; hazards marked by numerous buoys, lights and fog horns;
- Developed coastline with many seaside resort towns, notably Llandudno (and pier), Colwyn Bay (and former pier location), Rhyl and Prestatyn, the latter having many caravan and chalet parks on their fringe. The coast serves as a traditional holiday destination;
- Recreational activity includes water sports such as jet skiing and speed boating;
- North Wales Coast Path and a popular cycleway run the length of the coastline. Collectively the A55 Expressway, A548 and NWC Railway Line follow close to the coastline; and
- Both Colwyn Bay and Rhyl are popular shore and boat angling areas. Rhyl includes the main harbour along this stretch of coast.

The Colwyn Bay Waterfront Local Landscape Character Area (LCA)

11.5.5 The waterfront is characterised by the long Promenade and seascape views. Some stretches of the Promenade have been re-configured as part of Phases 1 & 2 of the Colwyn Bay Waterfront Project. The A55 Expressway and NWC Railway Line embankment forms a physical barrier between Colwyn Bay town centre and the waterfront. There are broad, sweeping views across the length of Colwyn Bay which encompass Rhos-on-Sea to the west with views of the Bryn Pydew Hills behind. There is a gentle rise in topography from the beach to the existing Promenade and road level before meeting the base of the embankment. On the southern side of the embankment the topography rises steeply up a series of hills bordering the south of the town. There are several Listed Buildings located to the south of the application site at approximately a 200m distance. The church spire of the St John the Baptist Church, at 200m distance, is not visible from the site.

[156] Natural Resources Wales; 2015; https://cdn.naturalresources.wales/media/682560/nlca08-north-wales-coast-description.pdf?mode=pad&rnd=131550577050000000

[157] Natural Resources Wales: 2015; https://cdn.naturalresources.wales/media/674480/mca-02-colwyn-bay-and-rhyl-flats-final.pdf?mode=pad&rnd=131502219930000000

11.5.6 There are no land-based conservation areas in direct vicinity of the Scheme, However Liverpool Bay SPA, extends to 180m from the sea wall of Old Colwyn at its closest point. Significant recreation takes place in both the Scheme area owing to its location on the waterfront. Both local residents and visitors to the site engage in a range of water-based recreation activities. Within the surrounding area there are number of informal footpaths and a national cycle route passing directly through the Scheme area.

11.5.7 Within the Scheme area, the scenic quality is high and there is a sense of openness at present, due to the expansive and unhindered views across Colwyn Bay. Although scenic quality is high, the landscape of the site is not rare nationally or within the region; and it does not represent a high-quality example of a coastal resort landscape, which is largely due to the presence of the A55 Expressway and the NWC Railway Line.

11.5.8 There is the sound of distant traffic from the nearby A55 Expressway and NWC Railway Line line, as well as more immediate traffic on the Promenade highway, which reduces tranquillity within the area.

11.5.9 The landscape condition of the site is slightly disparate, with areas of modern coastal redevelopment alongside areas of old less-maintained areas. Parts of the Promenade in the site area have been storm damaged. Overall, the condition of the landscape within the study area has been assessed as being medium.

11.5.10 No evidence of artistic or literary associations with the application sites or study area has been noted as part of this assessment

11.5.11 In summary, the scenic quality of Colwyn Bay is locally and nationally valued but is not rare and is not a high-quality example of its type. Tranquillity and the landscape condition of site area are both medium. The local landscape character has been assessed as having **medium** sensitivity to change.

Visual Amenity

Visual Baseline

11.5.12 The baseline study identifies the people in the area and important, designated or protected views potentially affected by the development. Viewpoints were selected to represent the various visual receptor types in the study area including residential, recreational, educational, transport and active sports. Viewpoints were also selected to represent specific views valued for their scenic quality or cultural associations or to demonstrate a specific issue.

11.5.13 Views within the Scheme study area would be wide ranging and relatively unobstructed across the Colwyn Bay area. To some extent they would be constrained by the NWC Railway Line embankment south of the Scheme, immediately in front of the A55 Expressway. As the existing Promenade offers relatively unhindered access to pedestrians along its length, along with areas for cyclists and car parking, the Scheme would be readily visible along its length.

11.5.14 Visual receptors and their existing views are described in Table 11.9 and photographs representing views from these receptors (where accessible) are included in ES Volume 2, Technical Appendix 11.1.

Table 11.9: Identified Visual Receptors (see Drawing 415437-MMD-00-XX-DR-N-1704 in Chapter 3 Scheme Description, Section 3.5)

	Receptor	Details
1	Transitory users of the Promenade looking east	Open expanse of the Promenade allows for sweeping unhindered views across the Scheme and the surrounding area of Old Colwyn to Splashpoint in the distance.
2	Permanent residents on Penmaen Bod Elias looking west	Rear gardens to the properties are largely free from screening by mature trees or bushes. Promenade can be only be directly seen by residents from the rear of properties. Clear and open views of works are available from properties.
3	Transitory users of designated bridleway 52 looking north-east	The footpath and Dingle road occupy the foreground. A chain link fence forms the boundary. The A55 Expressway flyover and NWC Railway Line bridge are prominent in the view looking north. Where the bridleway meets the Promenade highway, the foreground is occupied by a large road junction. On the opposite side of the road, a low wall of Porth Eirias car park is prominent.
4	Cyclists on Wales National Cycle Route 5	Open expanse of the Promenade allows for sweeping unhindered views across the Scheme and the surrounding area whole of Colwyn Bay to Rhos-on-Sea in the distance.
5	Pedestrians on Rainbow footbridge looking west	Foreground dominated by A55 Expressway leading to peninsula in middle ground. Distant but unfiltered views of the bay at an elevated position.
6	Permanent residents on Rhos Promenade looking east	Foreground is occupied by Promenade Road and Rhos-on-Sea beach, with rock armour sea wall behind. Distant but unfiltered views of the extent of Colwyn Bay.
7	Recreational users of Colwyn Bay (sailing. Fishing)	Views from the sea wall encompass the entirety of the Scheme and its locations in the surrounds of Colwyn Bay. Rhos-on-Sea visible in the distance.
8	Train users on NWC Railway Line	Transitory views from the trainline would encompass the entirety of the Scheme and its locations in the surrounds of Colwyn Bay, increasing as trains near the station.
9	Car users on Promenade highway looking East	Transitory views from the road would encompass the entirety of the Scheme and its locations in the surrounds of Colwyn Bay with Rhos-on-Sea in the distance.
10	Users of and visitors to Porth Eirias building looking east	Foreground is occupied by sea wall, car park and Promenade to the east. Views from outside area and roof platform look directly across the Scheme area in close proximity.

Source: Mott MacDonald 2020

11.6 Consultation

11.6.1 No response relevant to landscape was received in the Scoping Response (ES Volume 2, Technical Appendix 1.4).

11.6.2 Scheme-wide consultation details are provided in Chapter 5. No additional consultation specific to landscape has been required.

11.7 Potential Impacts (Pre-Secondary mitigation)

The most apparent changes to character and views during construction would result from the temporary presence along the Promenade and intertidal zone of construction plant, along with the removal of existing elements such as concrete surfacing, construction of sea defences including rock revetments, the raising of the Promenade and the construction of a new fishing platform at Splashpoint. Should rock revetment delivery by sea be necessary, the temporary

presence of offshore barges would also be required. The construction works would be clearly apparent in areas close to and overlooking the Scheme.

Primary (Embedded) Mitigation

11.7.1 During the development of the operational design from concept to tender and finally detailed design, a process of iterative design and assessment was used to avoid and reduce adverse effects due to the operation of the proposed development. BCA Landscape were involved throughout this process to oversee the careful integration of engineering and landscape design.

Construction

11.7.2 The construction of the Scheme is anticipated to start in Spring 2021 and be completed by the end of 2022. Construction impacts may be short-term, long term, temporary or permanent in nature. Construction information for the project is provided in Chapter 4.

11.7.3 The potential landscape and visual impacts during construction include:

- Presence of offshore delivery vessel, barge and tug in sensitive views and/or as detrimental elements within the landscape;
- Presence of construction traffic, construction plant and equipment in sensitive views and/or as detrimental elements within the landscape;
- Excavation and change in the landform, which may screen views or change the quality of views;
- The presence of construction compounds and temporary security fencing in sensitive views and/or as detrimental elements within the landscape;
- Closure or diversion of public rights of way, which results in the temporary loss of sensitive views;
- Construction activity, leading to elevated noise and movement, which results in a temporary reduction in tranquillity; and
- Presence of floodlighting for work during hours of darkness, which affects the quality of sensitive views.

Operation

11.7.4 Due to the current condition of the Promenade (including multiple repaired storm damaged areas) and the improvements to access and public realm being offered by the proposed works, it is not anticipated that the completed works would result in a significant, adverse change to the existing landscape character or visual amenity of the area. Therefore, the assessment of operational impacts upon landscape character and visual amenity have been scoped out of this LVIA as detailed within the Scoping Report (ES Volume 2, Technical Appendix 1.3).

11.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures

11.8.1 It is not anticipated that the completed works would result in significant operational impacts upon the landscape character or visual amenity of the area. Therefore, only the mitigation of landscape or visual effects resulting from construction activities have been included in this section.

Mitigation (Construction)

11.8.2 Construction would be undertaken using industry best practice and in line with the measures set out in the Scheme CEMP, to reduce adverse effects on landscape and visual amenity. The

following mitigation measures are proposed to mitigate any significant adverse construction effects identified in this assessment:

- Lighting during construction would be designed to minimise light pollution during the hours of darkness. Lighting would be directional to prevent light spill and designed to reduce skyglow;
- Site fencing around the construction sites would be well maintained throughout the construction period;
- Cycleways would be diverted to allow access where possible;
- Footpaths would be diverted to allow access where possible;
- During offloading of materials, the affected beach area would be off limits to recreational users of the beach and water. Users would be encouraged to use other stretches of the coastline.
- All areas of land within the Scheme red line boundary that have been temporarily occupied during the construction phase (areas not to be re-developed) would be re-instated to pre-construction condition.

11.8.3 These measures have been taken into account in the assessment of construction effects.

11.9 Assessment of Likely Significant Effects

11.9.1 The assessment of likely significant effects has been undertaken following the methodology described in Section 11.4

Landscape Effects in Construction

11.9.2 The Colwyn Bay Waterfront LCA has high recreational value and scenic quality and both values would be temporarily affected during the construction of the proposed works. The closure or diversion of public rights of way and roads, and the introduction of site fencing/hoarding, construction plant and equipment would temporarily, adversely affect the scenic quality of the area (by reducing the open character of the area) and the ability to enjoy the Promenade and other recreational facilities. These effects would be a direct consequence of the construction works.

11.9.3 If the delivery of revetment stone is selected to be by sea, the presence of a delivery vessel, barge and tug with associated plant to offload materials and transport them up the beach during construction would temporarily, adversely affect the tranquillity of the local landscape, which is already affected by noise from the A55 Expressway and the NWC Railway Line. This effect would be a direct consequence of the construction works, construction traffic and construction activity,

11.9.4 The landscape condition of the existing site has been assessed as being of medium value and the construction works would see much of the Promenade being demolished and replaced. This would temporarily, adversely affect the overall condition of the local landscape character.

11.9.5 In summary, the construction activities would result in a temporary, partial loss or alteration to key elements/features/characteristics of the Colwyn Bay Waterfront LCA. This would result in a medium magnitude of change and direct **Moderate Adverse** effect on the local landscape character during construction.

Visual Effects in Construction

11.9.6 Visual effects in construction are summarised within Table 11.10. The impact on each visual receptor has been assigned a sensitivity and magnitude allowing a residual effect to be calculated (taking into account primary and secondary mitigation).

Table 11.10: Assessment of Visual Effects in Construction

Visual Receptor	Summary of Impacts	Receptor Sensitivity	Magnitude	Residual Effect Significance Category (with mitigation)
1 Transitory users of the Promenade looking east	The Promenade would be temporarily closed or diverted during construction, which would result in a noticeable change or alteration to one or more key characteristics of the view.	Medium sensitivity	Medium	**Direct, Temporary, Moderate Adverse (Significant)**
2 Permanent residents on Penman Bod Elias looking west	Residents would have distant, but unfiltered views of the works. The wide expansive sea views would still be available, but the works would result in a slight deterioration of these views.	Low sensitivity	Medium	**Direct, Temporary, Minor Adverse, (Not Significant)**
3 Users of designated bridleway 52 looking north	Residents, pedestrians and visitors to the Porth Eirias would have clear unfiltered views of the Promenade raising and revetment work at the Dingle Road – Promenade highway junction. Prior to this there would be no views of the Scheme as it is obscured by the A55 Expressway and steep sides of the path. The proposed construction activities would result in a slight loss or alteration to one or more characteristics of the view.	Low sensitivity	Low	**Direct, Temporary, Minor Adverse, (Not Significant)**
4 Cyclists on Wales National cycle route 5	The Promenade cycleway would be temporarily closed or diverted during construction, which would result in a noticeable change or alteration to one or more key characteristics of the view.	Medium sensitivity	Medium	**Direct, Temporary, Moderate Adverse (Significant)**
5 Pedestrians on Rainbow footbridge looking West	Pedestrians would have some clear and some filtered views of the Promenade raising and revetment work. There would be a small deterioration affecting a small proportion of the view.	Low sensitivity	Low	**Direct, Temporary, Minor Adverse, (Not Significant)**
6 Residents on Rhos Promenade looking east	For residents along Rhos Promenade, construction elements and activity would be visible in the distance across a proportion of the view. There would be a small deterioration affecting a small proportion of the view.	Medium sensitivity	Low	**Direct, Temporary, Minor Adverse, (Not Significant)**
7 Recreational users of Colwyn	The area surrounding the works would be temporarily prohibited or closed during construction and offloading of rock revetment from offshore barges (should this delivery method be selected). This	Medium sensitivity	Medium	**Direct, Temporary, Moderate Adverse (Significant)**

Visual Receptor	Summary of Impacts	Receptor Sensitivity	Magnitude	Residual Effect Significance Category (with mitigation)
Bay (sailing. fishing)	would result in a noticeable change or alteration to one or more key characteristics of the view.			
8 Train users on NWC Railway Line	Rail passengers would have filtered views of the Promenade raising and revetment work, becoming clearer as trains approaches the station. The works would introduce uncharacteristic features into the existing views of the river corridor and there would be a slight deterioration in the view.	Low sensitivity	Low	**Direct, Temporary, Minor Adverse, (Not Significant)**
9 Car users on Promenade highway	Road users would have filtered views of the Promenade raising and revetment work. The works would introduce uncharacteristic features into the existing views of the seafront; however this would be limited by temporary road closures and diversions during construction. There would be a slight deterioration in the view.	Low sensitivity	Low	**Direct, Temporary, Minor Adverse, (Not Significant)**
10 Users of Porth Eirias	Users of the restaurant and facilities would be in close proximity to the site works and potentially a plant compound sited in part of the building's car park. This would result in a noticeable change or alteration to one or more key characteristics of the view.	Medium sensitivity	Medium	**Direct, Temporary, Moderate Adverse (Significant)**

Source: Mott MacDonald Ltd, 2020

Likely Residual Significant Effects Recorded (Post-Mitigation)

Construction

11.9.8 Following implementation of the incorporated mitigation measures, there would be residual temporary significant direct effects on landscape and visual amenity for the following receptors:

- The Colwyn Bay Waterfront LCA;
- Users of the Promenade looking east;
- Cyclists on Wales National Cycle Route 5;
- Recreational users of Colwyn Bay/Old Colwyn; and
- Users of Porth Eirias.

11.10 Requirements for Tertiary Mitigation/Monitoring

11.10.1 The significant construction landscape and visual effects anticipated in this report would require further mitigation and monitoring, summarised as follows:

- The Contractor would adopt sensitive policies towards reducing visual impact as far as possible. Wherever possible viewing platforms would be provided so that members of the public can safely view the ongoing work;
- Areas where works are complete would be reopened to the public as soon as safely possible;
- Complaints from residents would be collated by the Contractor and wherever possible mitigation undertaken to reduce that impact; and
- Where planned activities are anticipated to cause a visual disturbance, the Council would be informed in advance to allow notification of the proposed works to be disseminated.

11.11 Conclusion

11.11.1 In conclusion, the Colwyn Bay Waterfront LCA has been assessed as having high scenic value, medium recreational value and is in medium condition. Once completed, the proposed general improvements to the site area would likely improve the recreation value and the overall condition of the LCA and would likely not significantly, adversely affect the scenic quality of the LCA. Similarly, visual receptors are likely to see improvements to the condition and quality of views across the site area. It is not anticipated that, once completed, the new works would result in significant adverse effects on the landscape character or visual amenity.

11.11.2 During construction however, the Colwyn Bay Waterfront LCA would be temporarily, significantly affected (**Moderate Adverse**) due to a general reduction in scenic quality, landscape condition and overall tranquillity. In terms of visual amenity, users of the Promenade, cyclists on the Wales National Cycle Route 5 and recreational water users of Colwyn Bay; would all be temporarily, significantly directly affected by the construction activities. This would largely be as a result of footpaths and cycle-paths being closed or diverted, site compounds screening views and the presence of construction traffic and activities reducing the quality of views.

11.12 Drawings

11.12.1 There are no key drawings accompanying this chapter, however the Heritage and Landscape Environmental Constraints Drawing 415437-MMD-00-XX-DR-N-1704 (including viewpoint photograph locations) can be found in Chapter 3 Scheme Description, Section 3.5.

11.13 List of Documents Included in ES Volume 2: Technical Appendix 11

- Appendix 11.1: Representative Viewpoint Photographs.

12 Materials

12.1 Introduction

12.1.1 This chapter presents an assessment of the material resource use effects arising from the construction of the Scheme, relating to the provision and use of material resources, including primary, secondary, recycled and manufactured materials. This chapter includes an assessment of potential impacts, the significance of effects, the requirements for mitigation and the residual effects.

12.1.2 The assessment has been undertaken in accordance with the Design Manual for Roads and Bridges (DMRB), LA110 'Sustainability and Environment Appraisal - Material Assets and Waste'[158].

12.1.3 The EIA Scoping Report (ES Volume 2, Technical Appendix 1.3) highlighted the potential for significant effects on material resources during the construction phase. The operational phase of the Scheme has been scoped out of further assessment, as it is anticipated that there would be minimal requirement for material resources. Therefore, no operational stage assessment has been undertaken within this Chapter.

12.2 Legislative and Policy Framework

12.2.1 The principal legislative and planning context in relation to the assessment of the environmental effects of the Scheme on Materials is discussed below.

European Legislation

12.2.2 The overarching European Directives that are applicable to the assessment of material resource use and waste generation are set out below. Whilst it is acknowledged that the UK has left the EU it should be noted that existing legislation which transposes these Directives remains in force.

Waste Framework Directive (2008/98/EC)[159]

12.2.3 The Waste Framework Directive (WaFD) sets the basic concepts and definitions related to waste management, such as definitions of waste, recycling and recovery. It defines when waste ceases to be waste and becomes a secondary raw material (so called end-of-waste criteria), and how to distinguish between waste and by-products. The WaFD lays down some basic waste management principles: it requires that waste be managed without endangering human health and harming the environment, and in particular, without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest.

12.2.4 The WaFD sets out a five-step waste hierarchy as to how waste should be managed as an important requirement which applies to anyone who produces or manages waste. The waste hierarchy requires that waste is dealt with in the following order of priority:

- Prevention;

[158] Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 13 LA110 'Sustainability and Environment Appraisal - Material Assets and Waste. Available online at: https://www.standardsforhighways.co.uk/dmrb/search?volume=11&section=3

[159] Waste Framework Directive (2008/98/EC). Available online at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0098.

- Preparing for re-use;
- Recycling;
- Other recovery (for example energy recovery); and
- Disposal, only as a last resort.

12.2.5 The following considerations must be taken into account:

- Environmental protection principles of precaution and sustainability;
- Proximity principle for treatment and disposal of waste to be as close to its source as possible;
- Technical feasibility and economic viability;
- Protection of resources; and,
- The overall environmental, human health, economic and social impacts.

12.2.6 The WaFD stipulates the requirement for Member States to re-use, recycle or recover 70% of non-hazardous construction and demolition waste by 2020.

Landfill Directive (1999/31/EC)[160]

12.2.7 The Landfill Directive aims to prevent, or reduce as far as possible, negative effects on the environment from the landfilling of waste and was implemented by Member States in 2001.

Hazardous Waste Directive (91/689/EEC)[161]

12.2.8 This Directive lays down strict controls and requirements for controlling hazardous wastes. Hazardous waste is any waste with hazardous properties that may make it harmful to human health and the environment and is defined by the European Waste Catalogue.

National Legislation

Environment (Wales) Act[162]

12.2.9 Part 1: sustainable management of natural resources includes three key features that aim to ensure that sustainable management of natural resources would be a core consideration in decision-making. Part 1 provides the mechanism for managing Wales' natural resources to help tackle the challenges faced and is focused on the opportunities efficient use of resources provide.

12.2.10 The Natural Resources Policy[163] supports this Act to demonstrate the Welsh priorities on the management of its natural resources.

Well-being of Future Generations (Wales) Act 2015[164]

12.2.11 The Act strengthens existing governance arrangements for improving the well-being of the population of Wales to ensure that present needs are met without compromising the ability of future generations to meet their own needs. It includes the objective for Wales' natural

[160] Landfill Directive (1999/31/EC). Available online at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31999L0031.

[161] Hazardous Waste (England and Wales) Regulations 2005. Available online at: https://www.legislation.gov.uk/uksi/2005/894/contents/made.

[162] Environment (Wales) Act 2016. Available online at: http://www.legislation.gov.uk/anaw/2016/3/contents/enacted.

[163] Welsh Government Natural Resources Policy available online https://gov.wales/natural-resources-policy

[164] Well-being of Future Generations (Wales) Act 2015. Available online at: http://www.legislation.gov.uk/anaw/2015/2/contents/enacted.

resources, such as aggregates and other such materials, to be managed and used to enhance the long-term wellbeing of the country's population.

The Environmental Protection Act 1990[165]

12.2.12 The Environmental Protection Act (EPA) defines the fundamental structure and authority for waste management and control of emissions to the environment. It outlines:

- The definition of controlled waste;
- The requirements of the duty of care with respect to waste and transfer of waste; and
- Waste collection and waste disposal authorities and their roles.

12.2.13 Waste management issues are considered under Part II of the EPA. Controlled waste includes commercial, industrial (including agricultural waste from 2006) and household waste. Under the Act, the deposition of waste to land without a licence or breaching licence is an offence. The Act is also designed to prevent environmental pollution or harm to human health by prohibiting treatment, storage and disposal of controlled wastes without a licence or in breach of a licence.

12.2.14 Under Section 45, Waste Collection Authorities have a general duty to collect commercial waste within their area where requested and can levy a charge for such services.

12.2.15 Under Section 46 in respect of residential waste, the Local Authority may require:

- Waste of certain types to be stored separately so that it can be recycled;
- Occupiers of dwellings to provide bins of a specified type for storage of wastes;
- Additional bins to be provided for separate storage of recyclable waste; and
- Locations of bins for emptying.

12.2.16 Section 47 states that Local Authorities may require the same provisions in Section 46, but in respect of commercial and industrial wastes.

The Waste (England and Wales) Regulations 2011 (SI 2011/988)[166]

12.2.17 The Waste (England and Wales) Regulations 2011 implements parts of the revised WaFD, particularly the principles of the waste hierarchy. These regulations require businesses to confirm that they have applied the waste management hierarchy when transferring waste and include a declaration on their waste transfer note or consignment note.

Environmental Permitting (England and Wales) Regulations 2016 (SI 2016/1154)[167]

12.2.18 The Environmental Permitting (England and Wales) Regulations 2016 introduce a streamlined system of environmental permitting for certain installations, waste operations and mobile plant. They transpose provisions of fifteen EU Directives which impose obligations requiring delivery through permits or which are capable of being delivered through permits.

12.2.19 Activities under these regimes would be covered by a single form of environmental permit governed by one set of regulations. This provides a system for environmental permits and exemptions for industrial activities, mobile plant, waste operations, mining waste operations, water discharge activities, groundwater activities and radioactive substances. It also sets out the

[165] Environmental Protection Act 1990. Available online at: https://www.legislation.gov.uk/ukpga/1990/43, accessed June 2020

[166] The Waste (England and Wales) Regulations 2011. Available online at: http://www.legislation.gov.uk/uksi/2011/988/contents/made, , accessed June 2020

[167] Environmental Permitting (England and Wales) Regulations 2016. Available online at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made, accessed June 2020

powers, functions and duties of the regulators. Notably, the requirements of the Landfill Directive (1999/31/EC) (Ref 1.2) are applied under these regulations.

Controlled Waste (England and Wales) Regulations 2012 (SI 2012/811)[168]

12.2.20 The Controlled Waste (England and Wales) Regulations 2012 came into force in April 2012, replacing the Controlled Waste Regulations 1992. They define household, industrial and commercial waste for environmental permitting purposes. The Regulations replaced Schedule 1 of the 1992 regulations with an updated schedule defining household waste, still by reference to its origin, but introducing some exceptions.

12.2.21 The regulations also specify that waste from construction or demolition works, including preparatory works should be "treated as household waste for the purposes of section 34(2) and (2A) of the [EPA 1990] only (disapplication of section 34(1) and duty on the occupier of domestic property to transfer household waste only to an authorised person or for authorised transport purposes)".

National Policy

Planning Policy Wales[169]

12.2.22 National planning policy in Wales is set out in Planning Policy Wales (PPW), Technical Advice Notes (TANs), circulars and policy clarifications which translates the Welsh Government's commitment to sustainable development into the planning system. The main focus of the policy is planning of future waste management facilities. PPW sets out the land use planning policies of the Welsh Government and it is supplemented by a series of Technical Advice Notes, including TAN 21: Waste (2014).

12.2.23 The Welsh Minerals Plan is found in Chapter 14 of the PPW document. This policy covers the short and long-term future use and safeguarding of mineral deposits. The key principles of the Minerals Plan are to provide an adequate supply of minerals to meet society's needs in the present and in the future whilst limiting the environmental and human impact and conserve non-renewable resources for future generations through efficient use. The Plan states that useful minerals are not to be wasted and must be used efficiently for an appropriate purpose, therefore minerals should not be exploited for lower grade purposes. The reuse and recycling of on-site materials for developments is to be encouraged to reduce depletion of non-renewable resources.

Towards Zero Waste – One Wales: One Planet[170]

12.2.24 Towards Zero Waste is the overarching national waste strategy describing the long-term framework for resource efficiency and waste management to 2050. It is supported by sector plans that implement the principles, policies, and targets of the Welsh Government. The waste strategy emphasizes the aim for Wales to achieve 'zero waste 'by 2050, that all waste would be diverted from landfill and would be reused, recycled, composted or anaerobically digested. To work towards this aim the following key steps are encouraged to be undertaken by all sectors:

- Prevent waste;

[168] Controlled Waste (England and Wales) Regulations 2012. Available online at: www.legislation.gov.uk/uksi/2012/811/contents/made, accessed June 2020

[169] Welsh Government (2018), Planning Policy Wales. Edition 10. Available online at: https://gov.wales/sites/default/files/publications/2019-02/planning-policy-wales-edition-10.pdf, accessed June 2020

[170] Welsh Assembly Government (2010). Towards Zero Waste – One Wales: One Planet. Available online at: https://gov.wales/sites/default/files/publications/2019-05/towards-zero-waste-our-waste-strategy.pdf, accessed June 2020

- Efficient resource management;
- Minimise residual waste;
- Eliminate the use of landfill as far as possible; and
- Tackle legacy wastes

Construction and Demolition Sector Plan[171]

12.2.25 The Construction and Demolition Sector Plan supports 'Towards Zero Waste', the waste strategy for Wales, and is the primary waste strategy document regarding the construction and demolition sector in Wales. It includes delivery actions to ensure the Welsh Government meets their own commitments and targets. The plan identifies wood, plastic, metal, insulation and gypsum products and hazardous waste as priority materials which the sector should seek to reduce. In addition, the sector has set a target to reduce C&D waste arisings by at least 1.4% every year to 2050 (based on the 2006/2007 baseline).

Waste Prevention Programme for Wales[172]

12.2.26 The Waste Prevention Programme for Wales supports 'Towards Zero Waste' by describing the outcomes, policies, targets and work programme to address waste prevention in Wales. The programme is a requirement of the WaFD and sets a number of objectives to advise people and organisations on reducing waste. It is also to be followed alongside the Construction and Demolition Sector Plan.

12.2.27 The programme focuses on the following key stages in the life cycle of construction projects:

- Design of buildings and construction projects;
- Design of construction products;
- Damage to construction products in transit;
- Over-ordering by builders;
- Use of surplus products generated on site; and
- Demolition and refurbishment of buildings.

Minerals Technical Advice Note (MTAN) Wales 1: Aggregates[173]

12.2.28 The document is based on land-based development only and includes advice on providing mineral resources to meet demands, protecting areas of importance, reducing impacts from aggregate production and improving efficiency of use and recycling of aggregates. It should be read in conjunction with Minerals Planning Policy Wales, found in Chapter 14 of the Planning Policy Wales document.

12.2.29 It also features information on the projected future demands and the future supply of aggregate materials in Wales. The document also provides guidance on delivering the policy for aggregate extraction set by mineral planning authorities and the aggregate industry.

---

[171] Welsh Government (2011), Towards Zero Waste - One Wales One Planet. Draft Construction and Demolition Sector Plan. Sustainability Appraisal. Available online at: https://gov.wales/sites/default/files/consultations/2018-01/111118constructiondemolitionappraisalen.pdf, accessed June 2020

[172] Welsh Government (2013), Towards Zero Waste - One Wales One Planet. The Waste Prevention Programme for Wales. Available online at: https://gov.wales/sites/default/files/publications/2019-05/the-waste-prevention-programme-for-wales.pdf, accessed June 2020

[173] Welsh Government (2004), Minerals technical advice note (MTAN) Wales 1: aggregates [online] available at https://gov.wales/minerals-technical-advice-note-mtan-wales-1-aggregates, accessed June 2020

Natural Resources Policy[174]

12.2.30 The policy is required by the Environment (Wales) Act and demonstrates the opportunities and challenges Wales faces with regards to their natural resources use and demand. It explains their approach to deliver on international and national commitments regarding sustainability of natural resources.

12.2.31 The policy features three key priorities to tackle identified challenges and taking advantage of opportunities, including 'increasing renewable energy and resource efficiency' to support a more resource-efficient economy. With regards to materials, the adverse impacts on Wales' material assets need to be reduced through sustainable extraction of minerals and the use of recycled aggregates.

12.2.32 The circular economy for construction is highlighted as an approach to reduce the use of materials and generation of waste in construction. Consideration of the impacts throughout the lifecycle of buildings and products is advised and waste prevention should be increased as well as reuse, recycling and recovery being promoted.

Regional Policy

Regional Technical Statements for the North Wales and South Wales Regional Aggregate Working Parties, Second Review 2019[175]

12.2.33 Under the MTAN 1, Regional Technical Statements (RTS) are required to be developed for the areas covered by both the South Wales and North Wales Regional Aggregates Working Parties (RAWPs). The RTS provide the supporting detail which allows for the implementation of national policy and are required to be reviewed every five years. They provide recommendations which guide the future levels of provision for aggregates required within each region, taking into consideration the latest available information relating to supply and demand.

Local Policy

Conwy Local Development Plan 2007-2022 Adopted October 2013[176]

12.2.34 The Conwy Local Development Plan (LDP) provides the legal framework for the development and use of land within the County Borough (excluding that part covered by the Snowdonia National Park Authority), setting out policies and proposals for this purpose.

12.2.35 The document includes the following relevant policies:

- Policy MWS/1 – Minerals and Waste: To ensure that there is sufficient provision of mineral resources and waste management facilities, while safeguarding the natural and built environment. This includes the safeguarding of hard rock and sand and gravel resources.
- Policy MWS/2 – Minerals: The policy states that sufficient hard rock supply has been identified from three existing quarries to satisfy the Plan Area's regional supply of hard rock.

[174] Welsh Government (2017), Natural Resources Policy. Available online at: https://gov.wales/sites/default/files/publications/2019-06/natural-resources-policy.pdf, accessed June 2020

[175] Prepared, on behalf of the Welsh Government and the North Wales and South Wales Regional Aggregate Working Parties by Cuesta Consulting Limited (2019) - Regional Technical Statements for the North Wales and South Wales Regional Aggregate Working Parties – 2nd Review. Consultation Draft. Available online at: http://www.swrawp-wales.org.uk/Html/RTS%202nd%20Review%20-%20Main%20Document%20-%20CONSULTATION%20version%20(English).pdf, accessed June 2020

[176] CCBC (2013) Conwy Local Development Plan 2007-2022 Adopted October 2013 [online] available at http://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Adopted-Local-Development-Plan-LDP/Assets-written-proposals-maps/Conwy-Local-Development-Plan-2007-2022.pdf, accessed June 2020

Applications for future extraction of aggregate minerals would only be permitted where there is a need to maintain stocks of permitted reserves.

- Policy MWS/3 – Safeguarding Hard Rock and Sand and Gravel Resources: The policy outlines the resources and related facilities included within the Safeguarded Hard Rock and Sand and Gravel designation. It states that planning permission would not be granted for any development within the designation that could impact the long-term viability of working those resources, unless:
  - It can be shown that the need for the development outweighs the need to protect the resource;
  - The impact is shown to not be significant; or
  - The mineral resources are extracted prior to development.
- Policy MWS/4 – Quarry Buffer Zones: Buffer zones would be designated around permitted reserves to protect amenity and ensure that mineral operations are not unduly constrained by other land users.

Replacement Local Development Plan 2018-2033

12.2.36 A Replacement Local Development Plan (RLDP) covering the period 2018-2033 is currently in development. CCBC is required to review the LDP every four years, therefore a full review involving several preparation stages commenced in October 2017. CCBC is currently at stage 5, having produced the Preferred Strategy[177], which outlines the RLDP's vision, issues and objectives, preferred level of growth and preferred spatial strategy until 2033, and includes the identification of strategic sites and strategic policies.

12.2.37 Strategic Policy 33 (Minerals) of the Preferred Strategy emphasizes the need to sustainably manage mineral resources and safeguard the natural and built environment by:

- Ensuring adequate provision of permitted aggregate reserves to satisfy local and regional supply needs;
- Allocating areas for future extraction of hard rock reserves and providing protection against unnecessary sterilisation of resources;
- Encouraging the re-use and recycling of suitable materials as an alternative to primary won aggregates;
- Creating buffer zones around quarries to protect mineral resources against inappropriate development;
- Safeguarding hard rock and sand and gravel reserves; and
- Ensuring that restoration of mineral workings is undertaken at the earliest opportunity.

Replacement Local Development Plan 2018-2033 – Background Paper 37: Minerals[178]

12.2.38 This background paper has been produced to inform the development of the RLDP 2018-2033, providing information on sites available for mineral extraction within the County Borough. The paper reviews the evidence base and policy approach upon which the LDP was developed and provides additional evidence where appropriate.

[177] CCBC (2019), Replacement Local Development Plan 2018-2033 – Preferred Strategy. Available online at: https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Replacement-LDP/Stage-5-Preferred-Strategy/assets/documents/Preferred-Strategy-web.pdf, accessed June 2020

[178] CCBC (2019), Replacement Local Development Plan 2018-2033 – Background Paper 37: Minerals. Available online at: https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Replacement-LDP/Stage-4-Development-of-Evidence-Base/assets/documents-MineralsWaste/BP37-Minerals.pdf, accessed June 2020

Replacement Local Development Plan 2018-2033 – Topic Paper 10: Minerals and Waste[179]

12.2.39 A series of topic papers have also been prepared to support the RDLP 2018-2033, to identify the key issues that the Plan would need to address and inform the policy approach. Topic Paper 10 outlines the key recent changes to waste and minerals policy and legislation, establishing the current position and the evidence required early on in the RDLP process.

Conwy Annual Monitoring Report 2019[180]

12.2.40 The CCBC Annual Monitoring Report 2019 provides information on aggregate sites including permitted aggregate landbank reserves and relevant aggregate planning permissions within the region.

Other Policy and Guidance

Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 13 LA110 'Sustainability and Environment Appraisal – Material Assets and Waste[181]

12.2.41 This document sets out the requirements for assessing and reporting the effects on material assets and waste from the delivery of motorway and all-purpose trunk road projects.

Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (2009)[182]

12.2.42 This code of practice provides relevant advice on the use of soil in construction projects.

Contaminated Land Applications in Real Environments (CL:AIRE)

12.2.43 CL:AIRE is an independent, non-profit organisation that aims to encourage the sustainable remediation of contaminated land and groundwater throughout the UK, for effective social and economic use. This is achieved by increasing awareness and confidence in practical, sustainable remedial solutions.

Site Waste Management Plans

12.2.44 A site waste management plan (SWMP) would be prepared and would include details of the amount and types of waste that would be produced on site and how it would then be reduced, re-used and disposed of, by whom and where. The appointed Contractor would develop the Outline SWMP adopt the waste hierarchy for the disposal management of waste in line with the Outline SWMP.

12.3 Study Area

12.3.1 The assessment uses two geographically different study areas to examine the use of material resources. The first study area is based on the area of the completed works within the boundary

[179] CCBC (2019), Replacement Local Development Plan 2018-2033 – Top Paper 10: Minerals and Waste. Available online at: file:///C:/Users/sym76577/OneDrive%20-%20Mott%20MacDonald/Projects/My%20projects/Colwyn%20Bay/Topic-Paper-10-Minerals-and-Waste.pdf, accessed June 2020

[180] CCBC (2019), Replacement Local Development Plan 2018-2033 – Annual Monitoring Report 2019. Available online at: https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Adopted-Local-Development-Plan-LDP/Assets-Annual-monitoring-report/Annual-Monitoring-Report-2019.pdf, accessed June 2020

[181] Highways England (2019) Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 13 LA 110 Sustainability and environment. Appraisal. Material assets and waste (formerly IAN 153/11) [online] available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/LA%20110%20Material%20assets%20and%20waste-web.pdf, accessed June 2020

[182] DEFRA (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites [online] available at https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites accessed June 2020

of the Scheme, as this constitutes the area within which construction materials would be consumed (used, reused and recycled).

12.3.2 The second study area needs to be sufficient to identify feasible sources and availability of construction materials required for the works. For this Scheme, this second study area encompasses the County of Conwy within the North Wales region and may include international sources of revetment rock.

12.4 Assessment Methodology

Introduction

12.4.1 The assessment for material resource use has been developed using professional judgement and information primarily derived from the DMRB LA110[158], which provides more focused guidance for assessing the significance of potential effects resulting from material resource.

12.4.2 The assessment would consider the following:

- Types and quantities of materials required for the Scheme, where known;
- Details of the source or origin of materials, site-won materials to replace virgin materials, materials from secondary or recycled sources, or virgin or non-renewable sources, if known;
- The cut and fill balance;
- The impacts that would arise from the issues identified in relation to materials; and
- Identification of mitigation measures based on identified impacts.

12.4.3 The assessment of effects on material resources would encompass effects arising during site preparation, demolition and construction activities up until the point when the Scheme becomes operational.

12.4.4 The outcome has been used to aid the development of appropriate mitigation measures in order to avoid or reduce potential adverse effects.

Significance of Effects

12.4.5 The approach to determining the significance of the potential effects that may arise from the use of material resources has been developed using professional judgement and information primarily derived from the DMRB guidance.

12.4.6 Materials required for the construction of the Scheme are likely to be procured from a range of different sources (which are unknown at this stage), all of which would have their own specific environmental effects, which may or may not have been subject to an environmental assessment. Therefore, there are no obvious environmental receptors or resources for materials identified as there are for other topic areas. Consequently, assessing the significance of the use and consumption of materials based on the value or sensitivity of a resource or receptor and the magnitude of an identified effect is precluded.

12.4.7 The DMRB does not feature guidance on assessing beneficial effects, therefore, the HS2 London to West Midlands EIA Scope and Methodology Report[183] definition and professional judgement has been used to ensure positive outcomes are addressed. In the absence of published guidance, it is through professional judgment that the beneficial effects are not

[183] Arup/URS (2012), HS2 London to West Midlands EIA Scope and Methodology Report. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/260116/HS2_London_to_West_Midlands_EIA_Scope_Methodology_Report_revised_0.pdf, accessed June 2020

segregated as substantial, moderate and minor. This approach has been used for other linear schemes, including HS2.

12.4.8 The amended categories for the significance of effects is provided in Table 12.1 and the level of significance in Table 12.2 (stated as significant or not significant). For both these tables "Region" means the authority comprising the second study area. "Primary materials" describes materials that are from a non-renewable source. "Peat resource" relates to existing or potential peat extraction sites.

12.4.9 Adverse effects are identified as neutral, slight, moderate or large. For the purposes of this assessment, effects of **Moderate** (Adverse or Beneficial) and above would be considered to be significant.

Table 12.1: Significance Categories and Descriptions for Material Assets

Effect	Description
Beneficial*	Project achieves 100% overall material recovery / recycling (by weight) of non-hazardous C&D waste to substitute use of primary materials; and Aggregates required to be imported to site comprise 100% re-used / recycled content.
Neutral/ Negligible**	Project achieves >99% overall material recovery / recycling (by weight) of non-hazardous C&D waste to substitute use of primary materials; and Aggregates required to be imported to site comprise >99% re-used / recycled content.
Slight Adverse**	Project achieves 70-99% overall material recovery / recycling (by weight) of non-hazardous C&D waste to substitute use of primary materials; and Aggregates required to be imported to site comprise re-used/recycled content in line with the relevant regional percentage target.
Moderate Adverse**	Project achieves less than 70% overall material recovery / recycling (by weight) of non-hazardous C&D waste to substitute use of primary materials; and Aggregates required to be imported to site comprise re-used/recycled content below the relevant regional percentage target.
Large Adverse**	Project achieves <70% overall material recovery / recycling (by weight) of non-hazardous C&D waste to substitute use of primary materials; and Aggregates required to be imported to site comprise <1% re-used / recycled content; and Project sterilises ⩾1 mineral safeguarding site and/or peat resource.

Source: DMRB (2019)[158]; and Arup/URS (2012). *Arup/URS **DMRB significance criteria definition.

Table 12.2: Significance Criteria for Material Assets

Effect	Description
Not Significant	Category description met for Neutral/Negligible and Slight Adverse effect
Significant (one or more criteria met)	Category description met for Beneficial, Moderate Adverse Large Adverse or Very Large Adverse effect

Source: DMRB (2019)[158]

12.4.10 The potential effects that may arise from the use of material resources for the construction of the rock revetment is based on professional judgement. The criteria are set out in Table 12.3.

Table 12.3: Significance Categories and Descriptions for Material Assets

Effect	Description
Neutral	No reduction or alteration in the availability of material assets at a regional scale (relating to the material resources the Scheme has used).

Effect	Description
Slight Adverse	Requires ⩽50% of primary materials to be sourced nationally (with other primary materials sources at a lower geographical scale). Comprises re-used or recycled aggregate (alternative materials) above the higher of the relevant regional or national percentage target.
Moderate Adverse	>50% of primary materials to be sourced nationally (with other primary materials sourced at a lower geographic scale). Comprises re-used or recycled aggregate (alternative materials) below the lower of the relevant regional or national percentage target.
Large Adverse	>50% of primary materials to be sourced internationally. Comprises no re-used or recycled aggregate (alternative materials).

Assessment Assumptions and Limitations

12.4.11 An indicative bill of material quantities has been produced that lists the materials required for the Scheme and the anticipated excavation material arisings, but due to their commercially sensitive nature, these cannot be presented in this chapter.

12.4.12 The following assumptions are made:

- This assessment does not consider the environmental effects associated with the extraction of raw materials used for the manufacture of products (which may occur outside of the UK). These stages of the products' or materials' lifecycles are outside of the scope of the assessment, due to the range of unknown variables associated with the processes involved;
- All of the excavated material arisings on-site, including from the existing Promenade, footway and rock revetment, are expected to be re-used within the Scheme area;
- It is acknowledged that the use of material resources would be likely to generate adverse environmental effects, predominantly through transportation (both to and from site), from detrimental impacts to air quality and increased local noise levels. However, these effects are more logically dealt with in other chapters of the ES and have, therefore, not been included within the scope of this assessment;
- While the Scheme extends approximately 40m into a CCBC safeguarded sand and gravel area[189], given its location on a public beach and area of amenity, it has been assumed that commercial extraction of sands and gravels would never be permitted at this location;
- This assessment does not consider the effects of contaminated land dealt with in other chapters, namely Chapter 15 Other Environmental Disciplines, where necessary; and
- The procurement route for the materials required for the construction of the Scheme is unknown at this stage. It has been assumed that not all materials would be available to be sourced regionally, and that the majority would be sourced nationally or elsewhere in the UK, or even internationally in the case of rock revetment.

12.5 Baseline Conditions

12.5.1 Information on the demand for key construction materials, within the second study area has been used to provide the baseline for material resources. In addition, information for the UK has also been provided as a national comparison. This information has been determined through a desk-study using a number of readily available resources, in particular from the Minerals

Products Association, International Steel Statistics Bureau, British Geological Survey, NRW and CCBC[184].

12.5.2 Table 12.4 outlines the total aggregate supply in Great Britain in 2017 (and 2018 for steel) and Table 12.5 outlines the 2018 production of minerals in Wales and available mineral workings.

Table 12.4: Total Aggregate Supply in Great Britain

Mineral	Tonnage (millions)
Aggregates, of which:	
• Crushed rock	114.5
• Sand and gravel	61.8
Total Primary	**176.3**
Recycled aggregates, of which:	
• Construction, demolition and excavation waste (incl. railway ballasts)	58.5
• Asphalt planings	6.1
Total recycled sources	**64.6**
Secondary sources, of which	
• China and ball clay waste	2.5
• Colliery spoil	0
• Furnace bottom ash	0.1
• Incinerator bottom ash	1.8
• Fly ash	0.2
• Iron and steel slag	0.9
• Slate waste	0.6
• Clay and shale	0.8
• Chalk	0.5
Total secondary sources	**7.4**
Total aggregate	**248.2**
Steel	**7.3**

Source: Minerals Products Association (2019)[185] and International Steel Statistic Bureau (2018)[186]

Table 12.5: Wales Production of Minerals in 2018

Mineral	Wales Production in Tonnes	Number of Mineral Workings in Wales
Igneous rock Limestone and dolomite Sandstone	12,711,000 (excluding building stone)	50
Sand and gravel	1,517,000	18

Source: BGS[187]

[184] Where information is not available for Wales, the UK has been used to provide the national comparison.

[185] Minerals Products Association (2019), The Contribution of Recycled and Secondary Materials to Total Aggregates Supply in Great Britain. Available online at: https://mineralproducts.org/documents/Contribution_of_Recycled_and_Secondary_Materials_to_Total_Aggs_Supply_in_GB.pdf., accessed June 2020

[186] International Steel Statistics Bureau (2018), Steel Demand. Available online at: http://issb.co.uk/news/news/uk.html, accessed June 2020

[187] British Geological Society (2019) United Kingdom Minerals Yearbook 2019. Available online at: https://www.bgs.ac.uk/mineralsuk/statistics/UKStatistics.html, accessed June 2020

12.5.3 At a regional level, Table 12.6 outlines the aggregate sales and reserves in Conwy and North Wales. It is outlined in the Welsh Government and North Wales and South Wales Regional Aggregate Working Parties Regional Technical Statement[175] that Flintshire's carboniferous limestone quarries and the regions in the north-east of Wales are major sources for crushed rock.

12.5.4 Conwy (reported with Snowdonia National Park Authority (NPA) for confidentiality reasons) produced an average of 955,000 tonnes per year of crushed rock in a 10-year period up to 2016 with 62.5 million tonnes in permitted reserves in 2016.

Table 12.6: Aggregate Sales and Reserves in North Wales and Conwy

Aggregate	North Wales Sales (2014)	Conwy (Aberconwy & Colwyn) Sales (2014)	Conwy (with Snowdonia NPA) Reserve	Conwy (with Snowdonia NPA) Land-bank (years)
Sand and gravel	0.927 million tonnes	0 tonnes	0 tonnes	0
Crushed rock	4.17 million tonnes	0.74 million tonnes	62.5 million tonnes	52.1

Source: British Geological Survey[188], Welsh Government and the North Wales and South Wales Regional Aggregate Working Parties[175]

12.5.5 The Regional Technical Statement[175] does not quantify the recycled aggregates from industrial and commercial development and redevelopment.

12.5.6 The RDLP: Preferred Strategy[177], under Strategic Policy 33 (Minerals), expresses that areas of hard rock and sand and gravel have been identified requiring protection (safeguarding) to ensure these resources remain available throughout 2018-2033. The corner of an area of safeguarded sand and gravel reserves extends approximately 40m into the Scheme boundary from the east and is adjacent to the western boundary, and a safeguarded hard rock reserve is located adjacent to the eastern boundary[189].

12.6 Consultation

12.6.1 No consultation additional to the scoping exercise specific to materials has been undertaken.

12.7 Potential Impacts (Pre-Secondary mitigation)

Primary (Embedded) Mitigation

12.7.1 A number of primary mitigation and enhancement measures have been incorporated into the Scheme proposals, in terms of working methodology and Scheme design. These are outlined below. Unless otherwise stated, these primary mitigation measures have been assessed as part of the Scheme proposals in the "pre-mitigation" effects. The primary mitigation for this Scheme includes the following:

- A Materials Management Plan (MMP) would be compiled by the Contractor, if required, as part of the Construction Environmental Management Plan (CEMP), if required. It would

[188] British Geological Society (2014) Collation of the results of the 2014 Aggregate Minerals survey for England and Wales. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/563423/Aggregate_Minerals_Survey_England___Wales_2014.pdf.

[189] CCBC (n.d.) Map: Adopted LDP. Available online at: http://conwy.opus3.co.uk/ldf/maps/Adopted%20LDP#x=286368.23958809&y=378647.50677331&scale=10000&1223.

identify ways to re-use site-won or excavated materials within the construction of the Scheme, provided they meet the requirements of the CL:AIRE Code of Practice (CoP)[190];

- A site waste management plan would also be developed by the Contractor as part of the CEMP. It would contain specific information on how material with the potential to become waste is reused or managed on- or off-site during the construction of the proposed Scheme. The SWMP is a key part of the CEMP and would be a live document based on construction operations as they occur; and
- The MMP and SWMP would show how efficient use of material resources and reduction of waste arisings would be achieved, and how the potential impacts identified in this chapter would be reduced or mitigated.

Construction

12.7.2 In accordance with the DMRB, the construction phase considers site preparation, demolition and site construction.

12.7.3 Material resources include raw materials such as aggregate and minerals from primary, secondary and recycled sources, and manufactured construction products. Manufactured construction products can include the materials required for the construction of the Promenade and road surfaces, and pre-cast elements for the construction of structures such as signage, barriers, lighting and fencing.

12.7.4 The Scheme is likely to require large quantities of material resources for the construction of the coastal defence and associated structures. This would, therefore, have permanent direct adverse effects on the environment, specifically through the depletion of non-renewable resources, and the subsequent impact on the national demand for materials.

12.7.5 A high proportion of material resources are likely to be imported to site, although substantial volumes of some materials may also originate on site, such as excavated sub-strata and rock armour, forming the existing rock revetment.

12.7.6 NRW has advised against beach sediment being used as construction infill as this would deplete the local sediment budget and leave a negative legacy for sediment available for beach building in times of increased sea level rise. NRW states that locking the sediment within the Scheme would create a deficit of marine sand to the environment and interrupt sediment downdrift to the east.

12.7.7 Material procurement would be determined by the selected Contractor.

12.7.8 Where possible, recycled aggregates would be used within the Scheme and existing material resources sourced locally would be used where possible. Care would need to be taken to not remove resources from the safeguarded reserves area designated in the LDP.

12.7.9 Three key local quarries identified from which to source material are Llanddulas, Penmaenmawr and Halkyn. The project would require a supply for approximately 18 months. Currently, however, there is no available quarry capacity to supply the rock required for the revetment locally, due to increased demand for this material during 2021-22, and it would, therefore, need to be transported from elsewhere. It is currently proposed that this rock is supplied from a quarry in Norway and brought to the site by barge. There is the potential for material considered as waste rather than primary material to be delivered from this quarry, but this has yet to be confirmed.

[190] CL:AIRE Definition of Waste Development Industry Code of Practice

12.7.10 The receptors likely to be subject to impacts as a result of material resource use include quarries and other sources of minerals, and other finite raw material resources. The potential impacts associated with the use of material resources on these receptors include:

- The availability of material resources and the subsequent impact on the demand for materials.
- The depletion of non-renewable resources.

12.7.11 Further details on specific activities that have the potential to generate significant effects from the use of materials is summarised in Table 12.7 below.

Table 12.7: Summary of Activities and Effects for Material Resource Use

Activity	Material Use and Potential to Generate Significant Effects
Site remediation, preparation, and earthworks	Potential direct effects associated with the import and use of primary aggregates or fill material, which may result in the depletion of non-renewable resources.
Demolition	Demolition activities are unlikely to require the use of any materials.
Site construction	The type of materials that are required includes but is not limited to: • Steel; • Aggregate; • Cement; • Concrete; • Bitumen; • Rock • Wood; and • Plastic. Import and use of primary aggregates and material would result in the depletion of non-renewable resources.

Source: Mott MacDonald 2020

12.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures

Mitigation

12.8.1 Mitigation measures that would be implemented on-site to ensure efficient use of material resources, and to reduce the potential impacts identified in Section 12.7 are as follows:

- Materials would be delivered on an ‘as required’ basis to avoid damage or contamination and limit the generation of waste;
- Where site-won material is not available or suitable for re-use; secondary or recycled materials would be procured where available and practicable;
- All suitable excavated material would be re-used in the construction of the Scheme and in landscaping features to reduce the requirement to import materials for construction and reducing the need to remove surplus materials from site;
- Excavating activities would be confined to the minimum areas required for the works to minimise the quantity of contaminated material removed;
- Temporary stockpiling of fill materials prior to incorporation in the Scheme would be avoided where possible, to ensure double handling and damage is minimised and therefore avoidance of waste. However, where required, materials would be stockpiled in accordance with best practice and managed appropriately to limit the likelihood of damage or contamination;

- Locally sourced materials and suppliers would be identified and used, where practicable, to reduce fuel requirements and cost of delivery, for example sand along the coast where permitted. This also reduces greenhouse gas emissions resulting from transportation;
- Pre-cast elements would be used, where practicable, to ensure efficient use of materials and avoid the generation of waste arisings from off-cuts;
- Collaborating with nearby projects to provide and use surplus material, where suitable;
- The waste hierarchy would be implemented throughout the construction to minimise disposal and maximise re-use and recycling of site-won material. Opportunities for re-use and recycling include (but are not limited to):
  - Re-using excavated soils on-site in the landscaping features of the Scheme;
  - Chipping green waste on-site for use in the landscaping for the Scheme;
  - Composting of green waste;
  - Recycling of inert material by crushing, blending and subsequent re-use, as an aggregate;
  - Re-using waste on other nearby schemes, subject to permitting requirements and suitability of the material; and
  - Re-using waste for uses with clear benefits to the environment, for example in the remodelling of agricultural land or in the restoration of nearby quarries or other excavation sites.
- Facilities e.g. site compounds and skips would be provided on-site to separate out waste, for example for recycling.

12.8.2 A Design for Resource Efficiency (D4RE) workshop was held in 4 March 2020 with the design team. The aim of the workshop was to identify opportunities to improve resource efficiency during the design of the Scheme. This has ensured ensure cost savings are maximised by identifying opportunities to reduce, reuse or recycle waste materials, identify material optimisation, improve resource efficiency and ensure the Scheme is designed for deconstruction and flexibility.

12.8.3 The Resource Management Opportunities Register (ES Volume 2, Technical Appendix 9.2) provides the details of identified opportunities from the D4RE workshop. The register utilises the D4RE Tool which assists designers, through the workshop format (based on a stepped approach of identify, evaluate, capture and implement), to develop mitigation measures for resource use and waste management.

12.8.4 Changes in the proposed Scheme design, where possible, to enable resource efficiency and reduction in waste include:

- Reducing the number of headland structures to one from three in Area 1, to incorporate steps and disabled access;
- Targeted remediation of voids rather than the whole extent of the highway;
- Potential for import of rock revetment by barge to avoid road transport;
- Re-use of existing rock armour within Old Colwyn area within the Scheme (behind revetment or elsewhere);
- Use of recycled steel for rebar;
- Building in climate resilience into the new structure design to allow raising in future and prevent additional resource usage;
- Designing in resilience to account for beach fluctuations in future in terms of toe levels/step landings;

- Use of recycled cement replacement;
- Soft landscaping and improvement of biodiversity with re-wilding/wildflower planting resulting in a reduction in future maintenance requirements;
- During quarry/armourstone extraction, potentially use of by-product as underlayers, fill, aggregate or roadstone;
- Selection of rock versus pre-cast armour materials for optimal cost and performance;
- Optimisation of vertical crest level;
- Use of pre-cast concrete elements on Promenade to ensure quality, reduce waste and minimise site operations;
- Reducing number of fishing platforms down to one main platform at the Splashpoint end of the Scheme;
- Ensuring the revetment's slopes are as steep as feasible to minimise the volume of material required;
- Incorporating electric vehicle charging points;
- Sourcing slate waste as fill to use for raising levels;
- Use of enhanced rock in revetment and passive enhancement through appropriate placing to reduce requirement for alternatives;
- In Area 1, raising the level of the Promenade but not that of the road also;
- Re-use of the existing wave return wall within the Scheme design;
- Reuse of fill from other sites for raising of the Promenade or behind the revetment;
- Re-use of existing materials e.g. lighting, parking meters, ramp, benches;
- Recycling existing blacktop for use within the Scheme (cold recycling if coal tar is present);
- Predominant use of bolted and clamped handrails for ease of replacement in the future; and
- Keeping existing asphalt in place when raising up the road and Promenade levels to minimise the quantity of fill required to be replaced.

12.8.5 The opportunities were categorised as high or low impact and easy or difficult to implement and reviewed to ensure all opportunities deemed suitable to be implemented were taken forward for further investigation. These opportunities would be passed to the Contractor to identify the resource efficiency measures already considered and implemented, throughout the detailed design.

12.8.6 Value engineering of the design would continue through the detailed design stage; this is expected to lead to further material savings.

Enhancement

12.8.7 No enhancement measures over and above the mitigation measures outlined above are proposed. Unlike other topic areas, there are no enhancement measures that can be proposed to enhance the material environment within the study area. Much of this is governed by the availability of material resources in the area, which are outside of the control of the Scheme.

12.9 Assessment of Likely Significant Effects

12.9.1 This section provides details on the assessment of likely significant effects and their significance on material resource use as a result of the Scheme, during its construction. The assessment of likely significant effects has been undertaken following the methodology described above.

12.9.2 As discussed, this assessment has not considered the environmental effects associated with the off-site extraction of raw materials used for the off-site manufacture of components and products (which may occur outside of the UK) due to the range of unknown variables associated with the processes involved.

12.9.3 An indicative bill of quantities outlining the quantities of materials required for the construction of the Scheme has been produced but this information is commercially sensitive and therefore has not been presented in this chapter.

12.9.4 The earthworks for the proposed Scheme have been balanced, as far as possible. All of the excavated material generated is currently assumed to be acceptable for re-use on-site. Fill materials required for the earthworks would be supplied, where possible, by the re-use of site-won excavated materials. However, it is identified that fill material required for the earthworks would need also to be imported, in addition to that required for construction of the rock revetment. The majority of the materials required for the construction of the Scheme comprise aggregate and concrete. A significant quantity of primary material may need to be imported for construction of the rock revetment, though the existing rock armour toe protection is anticipated to be re-used within the Scheme. There is also the potential for material considered as waste to be imported for this purpose, rather than primary material. Other construction materials would be required to be imported to site to complete the works, for example, recycled concrete for the roadworks or other aggregate-based products which would be imported to site.

12.9.5 Elements such as steel for structures and barriers, lighting columns and ducts, signs and communications infrastructure would require importing to site.

12.9.6 Table 12.8 summarises the detailed assessment of effects on material use. They identify the receptor/s likely to be impacted, the potential impacts, the level of effect and, where the effect is deemed to be significant, the tables include the mitigation proposed and the resulting residual effect for the construction phase.

Table 12.8: Assessment of Effects Summary – Construction Phase

Receptor	Potential Impacts Associated with Material Resource Use	Description of Effects	Mitigation and Enhancement Measures	Assessment of Effects	Additional Mitigation	Residual Effects
Construction						
Sources of secondary materials (recycled)	Impacts on the availability of material resources, and subsequent impacts on the demand for key construction materials.	The implementation of mitigation measures as outlined in Section 12.8 would ensure the efficient use of material resources on-site. All of the excavated material generated is anticipated to remain within the Scheme boundaries, which would assist in maintaining a high material recovery and recycling fraction. The remaining fill and other construction materials required would be imported to site and are available locally. It is expected that the Scheme would achieve less than 70% overall material recovery / recycling (by weight) of non-hazardous C&D waste to substitute use of primary materials. Aggregates required to be imported to site are expected to comprise re-used/recycled content in line with the relevant regional percentage target (see Section 12.2).	Measures set out in Section 12.8.	Effects would be Permanent, Moderate Adverse	None available	**Direct, Permanent, Moderate Adverse (Significant)**
Quarries/ finite sources of virgin materials	Depletion of non-renewable resources.	The majority of materials required for construction comprise aggregates, or aggregate-based products, which is a primary material. Primary material would need to be imported for construction of the rock revetment. Where possible, recycled aggregates would be used within the Scheme in addition to existing material resources located locally. It is anticipated that the Scheme would require a	Measures set out in Section12.8.	Effects would be Permanent, Large Adverse	None available	**Direct Permanent Large Adverse (Significant)**

Receptor	Potential Impacts Associated with Material Resource Use	Description of Effects	Mitigation and Enhancement Measures	Assessment of Effects	Additional Mitigation	Residual Effects
		supply of aggregate for approximately 18 months. Currently, however, there is no available quarry capacity to supply the rock required for the revetment locally due to increased demand for this material, and it would, therefore, need to be transported from elsewhere. It is currently proposed that this rock is supplied from a quarry in Norway and brought to the site by barge. The approach to determining the significance of the potential effects that may arise from the use of material resources for the construction of the rock revetment has been based on professional judgement. The effect category and significance of effects have in this instance been based on the proportion of materials that are required to be sourced regionally, nationally or internationally. A significant proportion of material required for the construction of the rock revetment and associated coastal defence structures would need to be imported to site. However, there is a possibility that material considered to be waste could be imported instead of primary material. Nonetheless, it is likely that materials would be sourced internationally, therefore, as a worst case it is assumed that >50% of materials would need to be sourced internationally (with other primary materials sourced at a lower geographic scale).				

Source: Mott MacDonald Ltd, 2020

Likely Residual Significant Effects Recorded (Post-Mitigation)

Construction

12.9.7 The residual effects identified are presented in Table 12.8.

12.9.8 Incorporating the mitigation measures as outlined in Section 12.8, the maximum residual effect identified is **Large Adverse**, which would result in a significant effect.

12.10 Requirements for Tertiary Mitigation/Monitoring

12.10.1 A significant effect is anticipated on the availability of material resources, since less than 70% of non-hazardous C&D waste is anticipated to be recovered or recycled. Since there is limited available capacity at suitable rock quarries in the region, there is also anticipated to be a significant effect with regards to the depletion of non-renewable resources, due to the requirement to import significant quantities of primary material from abroad for construction of the rock revetment. The latter effect may potentially be alleviated by sourcing material considered to be waste rather than primary material, however, the feasibility of such an option would only be confirmed at a later stage.

12.10.2 Material and waste audits would be undertaken throughout the construction phase. This would ensure that re-use and recycling targets are met on-site and would ensure that there is no surplus of materials. By conducting audits regularly this would give an indication of where continual improvements to waste management and minimisation of material use can be made throughout the construction phase.

12.10.3 As discussed in Section 12.7, the SWMP and CEMP should include monitoring measures to prevent the significant effects from the use of material resources and the generation of waste, where possible. The Contractor would report on the types and quantities of C&D waste taken off-site, who removed it and where to. It would also require the Contractor to report on performance against re-use and recycling targets throughout the construction phase and justify any deviations from the forecasted waste quantities, to minimise material import requirements. The MMP, if required, would also require a verification report to confirm that only the material identified suitable for use in the MMP was used and placed in accordance with the MMP.

12.11 Conclusions

12.11.1 Material resources would be required for the construction of the Scheme. The key environmental effect resulting from the use of material resources is the impact on the availability of material resources for other projects locally and in the future, subsequent impacts on the demand for key construction materials, and the depletion of non-renewable resources. The material that would be required in the largest quantities would be aggregates, primarily as raw rock material for construction of the rock revetment, but also in concrete (including pre-cast components). Steel components manufactured elsewhere in the UK would also be needed.

12.11.2 The earthworks for the Scheme have been balanced, as far as possible, in order to reduce the requirement to import fill material. All of the excavated material generated is currently assumed to be acceptable for re-use on-site. Fill materials required for the earthworks would be supplied, where possible, by the re-use of site-won excavated materials. However, it is identified that fill material required for the earthworks would need also to be imported, in addition to that required for construction of the rock revetment.

12.11.3 It is concluded that there would be:

- Direct **Significant Adverse** effects on the availability of materials resources and demand for key construction materials; and
- Direct **Significant Adverse** effects on the depletion of non-renewable material resources as a result of the construction of the Scheme. This effect is related to a worse-case scenario, whereby greater than 50% of materials would need to be sourced internationally.

12.11.4 Mitigation measures identified in Section 12.8 can greatly reduce the impacts associated with material use within the construction phase of the Scheme.

12.11.5 This assessment has confirmed that the proposed Scheme would be in accordance with the goals set in Welsh policy, as discussed in Section 12.2, to reduce construction and demolition waste by 1.4% each year, minimise adverse impacts, maximise the use of reusable or alternative materials and prioritise re-use, recycling and landfill reduction.

12.12 Drawings

12.12.1 No key drawings are provided in support of this chapter.

12.13 List of Documents Included in ES Volume 2: Technical Appendix 12

12.13.1 This chapter has no supporting technical appendices.

13 Noise and Vibration

13.1 Introduction

13.1.1 This chapter assesses the temporary impacts during the construction phase of the Scheme in terms of environmental noise in the surrounding area.

13.1.2 This noise impact assessment includes:

- Summary of the baseline noise levels representative of sensitive receptors in the vicinity of the Scheme;
- Identification of appropriate standards, guidance and planning policy;
- Identification of the appropriate criteria for the assessment of construction noise and vibration levels associated with the Scheme;
- Predicted construction noise levels from the Scheme and their impacts on sensitive receptors; and
- Recommendation of mitigation measures which would be required in order to avoid any potentially significant impacts.

13.1.3 Technical appendices are listed in Section 13.13 and can be found in the ES Volume 2, Technical Appendix 13.

13.2 Legislative and Policy Framework

13.2.1 The principal legislative and planning context in relation to the assessment of the environmental effects of the Scheme due to construction noise and vibration is discussed below.

European and National Legislation

European Noise Directive 2002/49/EC

13.2.2 The objectives of European Noise Directive (END) are:

- To determine the noise exposure of the population through noise mapping;
- To make information available on environmental noise to the public; and
- To establish action plans based on the mapping results to reduce levels where necessary and to preserve environmental noise quality where it is good.

13.2.3 The END is transposed in legislation through the Environmental Noise (Wales) Regulations 2006. The Environmental Noise (Wales) (Amendment) Regulations 2018 (“the 2018 Regulations”) amend the Environmental Noise (Wales) Regulations 2006 (“the 2006 Regulations”) so as to require the Welsh Ministers to use the assessment methods set out in Annex II to Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise (“*the Environmental Noise Directive*”), as replaced by the Annex to Commission Directive 2015/996 of 18 May 2015 establishing common noise assessment methods according to Directive 2002/49/EC of the European Parliament and of the Council, when preparing strategic noise maps under Chapters 2 and 3 of the 2006 Regulations.

Environmental Protection Act

13.2.4 The Environmental Protection Act 1990 Part 3 prescribes noise (and vibration) emitted from premises (including land) so as to be prejudicial to health or a nuisance as a statutory nuisance.

13.2.5 Local authorities are required to investigate any complaints of noise and if they are satisfied that a statutory nuisance exists, or is likely to occur, they must serve a noise abatement notice. A notice is served on the person responsible for the nuisance. It requires either the abatement of the nuisance or works to abate the nuisance to be carried out, or it prohibits or restricts the activity. Contravention of a notice without reasonable excuse is a criminal offence. Right of appeal to the Magistrates Court exists within 21 days of the service of a noise abatement notice.

13.2.6 In determining if a noise complaint amounts to a statutory nuisance the local authority can take account of various guidance documents and existing case law as no statutory noise limits exist. Demonstrating the use of best practicable means to minimise noise levels is an accepted defence against a noise abatement notice.

The Control of Pollution Act

13.2.7 The Control of Pollution Act 1974 requires that 'Best Practicable Means' (as defined in Section 72) are adopted to control construction noise on any given site. It makes reference to advice within the British Standard (BS) 5228 as comprising best practicable means.

13.2.8 Sections 60 and 61 provide the main legislation regarding demolition and construction site noise and vibration. If noise complaints are received, a Section 60 notice may be issued by the Local Authority with instructions to cease work until specific conditions to reduce noise have been adopted.

13.2.9 Section 61 provides a means for applying for prior consent to carry out noise generating activities during construction. Once prior consent has been agreed under Section 61, a Section 60 notice cannot be served provided the agreed conditions are maintained on-site.

Planning Policy Wales

13.2.10 Planning Policy Wales (PPW) was last updated in January 2018 and is currently in its 10th edition.

13.2.11 Paragraph 3.22 states the following:

"Planning authorities should develop and maintain places that support healthy, active lifestyles across all age and socio-economic groups, recognising that investment in walking and cycling infrastructure can be an effective preventative measure which reduces financial pressures on public services in the longer term. The way a development is laid out and arranged can influence people's behaviours and decisions and can provide effective mitigation against air and noise pollution. Effective planning can provide calming, tranquil surroundings as well as stimulating and sensory environments, both of these make an important contribution to successful places."

13.2.12 Paragraph 3.32 states the following:

"The planning system is wide in its social, economic environmental and cultural scope and takes an all embracing approach to sustainable development where decisions on short and long term needs and cost and benefits come together. It secures outcomes where multiple benefits (more than one ecosystem benefit) can be provided as part of plan making strategies or individual development proposals.

The key features of the Sustainable Management of Natural Resources approach to which the planning system can contribute are:

- *Ensuring resilient locational choices for infrastructure and built development, taking into account water supplies, water quality and reducing, wherever possible, air and noise pollution and environmental risks, such as those posed by flood risk, coastal change, land contamination and instability;……".*

Technical Advice Note 11

13.2.13 Planning Policy Wales is supplemented by a series of Technical Advice Notes (TANs). TAN 11: Noise *"provides guidance on how the planning system can be used to minimise the adverse impact of noise with placing unreasonable restrictions on development or adding unduly to the costs and administrative burden of business."* TAN 11 predominantly outlines how local planning authorities should establish local policies and development plans and how to give conditions to planning permissions relating to noise.

13.2.14 The following is stated with regard to noise generating development:

- *"Local planning authorities must ensure that noise generating development does not cause an unacceptable degree of disturbance."*

Local Policy

Conwy Local Development Plan 2007-2022

13.2.15 The Local Development Plan (LDP) sets out the key objectives and the spatial strategy for development in the area over the period 2007 to 2022. The LDP is used by the Council to guide and control development providing the basis by which planning applications would be determined. The following strategic policies are considered to be relevant to this chapter:

- Policy DP/1 – Sustainable Development Principles*: Paragraph 1 states "Development will only be permitted where it is demonstrated that it is consistent with the principles of sustainable development. All developments are required to:……d) take account of and address the risk of flooding and pollution in the form of noise, lighting, vibration, odour, emissions or dust in line with Policies DP/2 and DP/3 – 'Promoting Design Quality and Reducing Crime'";*
- Policy DP/*4 – Development Criteria: Paragraph 2 states "Planning permission will not be granted where the proposed development would have an unacceptable adverse impact: …..e) On environmental conditions arising from noise, lighting, vibration, odour, noxious emissions or dust" ;*
- Policy NTE/1 – The Natural Environment: *"In seeking to support the wider economic and social needs of the Plan Area, the Council will seek to regulate development so as to conserve and, where possible, enhance the Plan Area's natural environment, countryside and coastline. This will be achieved by: …..i) Preventing, reducing or remedying all forms of pollution including air, light, noise, soil and water, in line with Policy DP/6"; and*
- Policy STR/3 – Mitigating Travel Impact: Paragraph 1 states *"New developments will be required to mitigate the undesirable effects of travel such as; noise, pollution, impact on amenity and health and other environmental impacts."*

Other Policy and Guidance

British Standard 5228 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'

13.2.16 British Standard 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' provides a methodology for predicting noise levels generated by plant and equipment associated with construction operations.

13.2.17 The level of noise experienced by sensitive receptors would vary according to the following factors:

- Sound power levels of the plant;
- Periods of operation of the plant;
- Number of plant items used at the same time;
- Distances from source to receiver;
- Phasing of construction works;
- Presence of screening by barriers (in the mitigation stage); and
- Topographical features, such as ground type or heights.

13.2.18 In order to determine the potential for significant effect, 'Example method 1 - The ABC method' described within Annex E of BS 5228 Part 1 has been applied for this assessment. This approach considers the expected changes in ambient noise levels instead of the use of fixed noise limits.

13.2.19 For the purposes of assessing noise from construction activities, sound power values for equipment to be used during the construction phase have been sourced from Annex C of BS 5228 Part 1.

13.2.20 Construction noise is transient in nature. Whilst residents may accept that there would be some disturbance caused to those living nearby during the construction phase, the provisions of Sections 60 and 61 of the Control of Pollution Act 1974 offers further protection to them. Section 60 enables a local authority to serve a notice specifying its noise control requirements covering plant or machinery (which is or is not to be used), hours of working, and levels of noise then can be emitted. Section 61 relates to prior consent in which the contractor consults with the local authority and provides an application prior to construction works commencing to obtain approval for the methods to be used and the steps proposed to minimise noise resulting from the works. If the local authority considers that the application contains sufficient information and that 'best practicable means' of noise control are being implemented, and; if the works are being carried out in accordance with the application, it would not serve a notice under Section 60. 'Best practicable means' are defined in Section 72 as "*reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications*". This is important when recommending construction mitigation.

13.2.21 The ABC method' within BS 5228 states the following:

- *"Table E.1 shows an example of the threshold of potential significant effect at dwellings when the site noise level, rounded to the nearest decibel, exceeds the listed value. The table can be used as follows: for the appropriate period (night, evening/weekends or day), the ambient noise level is determined and rounded to the nearest 5dB. This is then compared with the site noise level. If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect."*

BS 5228-1 provides a table of levels (Table E.1) which are often used as an example threshold of potential significant effect at dwellings. These levels are reproduced in Table 13.1 and are dependent on the time of day.

Table 13.1: Example Threshold of Potential Significant Effect at Dwellings

Assessment category and threshold value period	Threshold value, in decibels (dB) ($L_{Aeq,T}$)		
	Category A [A)]	Category B [B)]	Category C [C)]
Daytime (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75
Evenings and weekends [D)]	55	60	65
Night-time (23:00-07:00)	45	50	55
NOTE 1: A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. NOTE 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq, T}$ noise level for the period increases by more than 3 dB due to site noise NOTE 3: Applied to residential receptors only.			
Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values. 19:00-23:00 weekdays, 13:00-23:00 Saturdays and 07:00-23:00 Sundays.			

Source: Table E.1 within BS5228-1:2009+A1:2014

British Standard 5228 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'

13.2.22 British Standard 5228-2:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration' provides guidance on the effect of vibration and the likelihood it would cause complaint and cosmetic damage to buildings.

13.2.23 Vibration, even of very low magnitude, can be perceptible to people. It is generally tolerated, at low magnitudes, if prior notification has been issued. Vibration from construction activity can affect the occupiers or the structure itself. This is usually associated with piling works when they are being carried out in close proximity to buildings.

13.2.24 The Standard gives recommendations for methods of vibration control and guidance on vibration levels in terms of Peak Particle Velocity (PPV). PPV is defined as the instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position and is expressed in millimetres per second (mm/s).

13.2.25 Similar to noise, there are a number of factors that determine the acceptability of vibration arising from construction sites (e.g. hours of work, etc).

13.2.26 BS 5228-2 states:

- *"Human beings are known to be very sensitive to vibration, the threshold of perception being typically in the PPV range of 0.14 mm/s to 0.3 mm/s. As vibrations increase above these values they can disturb, startle, cause annoyance or interfere with work activities. At higher levels they can be described as unpleasant or even painful.*

13.2.27 In addition, Table 13.2 of BS 5228-2 provides guidance on the effects of vibration levels in terms of PPV.

Table 13.2: Guidance on Effects of Vibration Levels

Vibration level	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential environments would cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

Source: Table B.1 within BS 5228-2:2009+A1:2014

Calculation of Road Traffic Noise (CRTN), Department of Transport Welsh Office and Her Majesty's Stationery Office, 1988

13.2.28 The Calculation of Road Traffic Noise (CRTN) describes the procedures for calculating noise from road traffic given as $L_{A10,18\ hour}$ between 06:00 and 24:00. This methodology is important as it is utilised alongside the Noise Insulation Regulations which is used to determine if a property qualifies for noise mitigation as a result of a new or altered road. CRTN is also important as it provides guidance appropriate to the calculation of traffic noise based on traffic flows for more general applications, such as for environmental impact assessments.

Design Manual for Roads and Bridges (DMRB), LA111 Noise and Vibration Revision 2, 2020

13.2.29 The Design Manual for Roads and Bridges (DMRB) LA111 Noise and Vibration sets out the requirement for noise and vibration assessments from road projects; it aims to apply a proportionate and consistent approach using best practice and ensuring compliance with relevant legislation.

13.2.30 The magnitude of changes in short term noise levels are defined and reproduced in Table 13.3.

Table 13.3: Magnitude of Change for Short Term in LA111 DMRB

Magnitude of Change	Short Term Noise Change (dB $L_{A10,18hr}$ or L_{night})
Major	≥5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	≤1.0

Source: Extracted from DMRB LA111 Table 3.54a

13.3 Study Area

13.3.1 The study area for the assessment of noise and vibration impacts arising during construction of the Scheme is based on the closest receptors along the construction work boundary as well as the affected traffic diversion route.

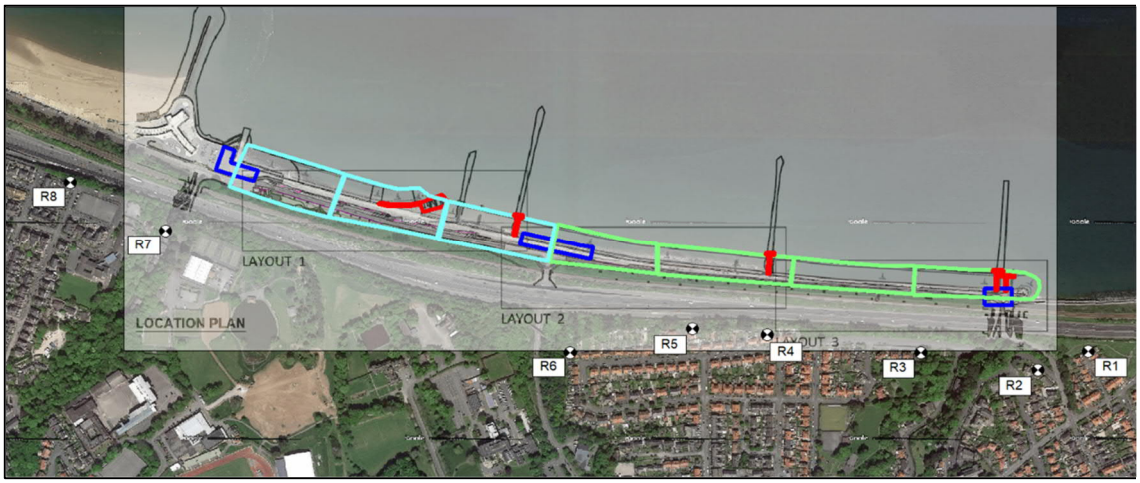
13.3.2 The location of the Scheme is along the Colwyn Bay coastline. Key settlements near the Scheme comprise Rhos-on-Sea to the west, the town of Colwyn Bay in the centre and Old Colwyn to the east. The A55 Expressway passes through the town, running parallel to and south of the NWC Railway Line. Immediate noise sensitive receptors are mostly residentials and surrounding industrial receptors are considered to have low sensitivity and due to the nature of their use are not expected to result in significant effects.

13.3.3 Representative receptors have been selected as follows:

- R1: 12 Queens Avenue;
- R2: 48 Wynn Avenue North;
- R3: 3 Min-Y-Don Drive;
- R4: 42 Min-Y-Don Drive;
- R5: 19 Beach Avenue;
- R6: 104 Min-Y-Don Drive;
- R7: 3-13 The Dingle; and
- R8: 11 Trevor Road.

13.3.4 These locations are shown in Figure 13.1

Figure 13.1: Construction Area and Representative Receptor Location Plan



Source: Mott MacDonald, 2020

Phase 1 (Construction Area 2)

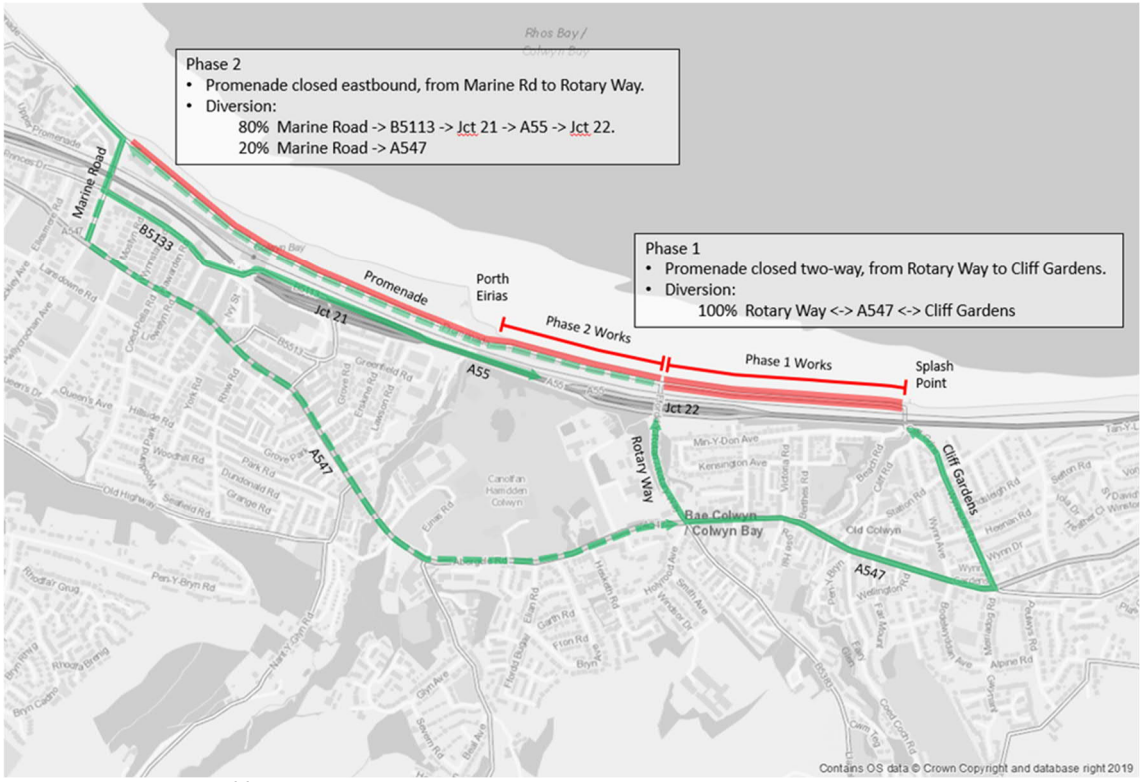
Phase 2 (Construction Area 1)

13.3.5 The road links assessed are as follows:

- West Promenade;
- Promenade;
- B5133;
- A547;
- Marine Road;
- and A55 Expressway (Junction 21-22)

13.3.6 Traffic diversion routes are shown on Figure 13.2.

Figure 13.2: Road Links Affected by Diverted Traffic



Source: Mott MacDonald, 2020

13.4 Assessment Methodology

Construction Noise and Vibration Assessment

Construction Noise Methodology

13.4.1 'Chapter 4 – Scheme Construction' provides general information in terms of phasing and general good practice for demolition and construction works on site.

13.4.2 A quantitative assessment has been carried out in accordance with the BS5228 Part 1, which provides a methodology for predicting noise levels generated by plant and equipment associated with construction operations.

Significance of Effects

13.4.3 Based on the guidance in BS5228 Part 1 'Example method 1 - The ABC method': *"A potential significant effect is indicated if the $L_{Aeq\ T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.*

If the ambient noise levels exceeds the Category C threshold values give in the table (see Table 13.1) (i.e. the ambient noise level is higher than those values,), then a potential significant effect is indicated if the total $L_{Aeq,\ T}$ noise level for the period increases by more than 3dB due to site noise."

Construction Vibration Methodology

13.4.4 Disturbance due to vibration is frequently associated with the assumption that if vibration can be felt then damage may occur. However, considerably greater levels of vibration are required to cause cosmetic or structural damage to buildings and structures.

13.4.5 Table 13.2 above reproduces Table 3.53a of BS5228 Part 2 which presents levels of vibration that correspond with different types of human response and provides a scale for description of demolition and construction vibration impacts on human receptors based on guidance contained in BS 5228 Part 2.

Significance of Effects

13.4.6 Construction vibration is considered to be significant if it has a PPV of 1.0mm/s or more, lasting for a minimum of one hour during the normal hours of working, at the nearest sensitive receptor. This is the level that would generally cause complaints in a residential area but can be tolerated. Should levels exceed this noticeably for shorter periods of time there may be complaints.

Construction Road Traffic Noise Assessment Methodology

13.4.7 The classification of potential construction road traffic noise impact from the Scheme are set out in Table 13.4.

Magnitude of Impact

13.4.8 The magnitude of impact of diverted road traffic noise is shown in Table 13.4. The categories of magnitude within DMRB LA111 have been changed in order to align the significant assessment methodology for this ES set out in Table 13.5: Summary of Significant Effect Assessment Criteria.

Table 13.4: Magnitude of Impacts due to the Change of Road Traffic

Magnitude of Change	Short Term Noise Change (dB $L_{A10,18hr}$ or L_{night})
Major	≥5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	≤0-1.0
No change	≥0

Source: Extracted from DMRB LA111 Table 3.54a

Significance of Effect

13.4.9 Table 13.5 summaries the assessment criteria for significance of effect during the construction phase. It is assumed that all receptors are residential dwellings and of high sensitivity for the purpose of this assessment.

Table 13.5: Summary of Significant Effect Assessment Criteria

	Significance of Effects		
Magnitude of Impacts	**Construction Diverted Road Traffic**	**Construction Noise**	**Construction Vibration**
Major	Large to Very Large (≥5.0 dB $L_{A10,18hr}$ or L_{night})	Large to very large (exceed threshold set out in Table 13.7)	Large to Very Large (PPV ≥ 1 mm/s)
Moderate	Moderate to Large	N/A	N/A

Significance of Effects			
Magnitude of Impacts	**Construction Diverted Road Traffic**	**Construction Noise**	**Construction Vibration**
	(3.0 to 4.9 dB $L_{A10,18hr}$ or L_{night})		
Minor	Slight to Moderate (1.0 to 2.9 dB $L_{A10,18hr}$ or L_{night})	N/A	N/A
Negligible	Slight (≤0-1.0 $L_{A10,18hr}$ or L_{night})	N/A	N/A
No change	Neutral (≥0 $L_{A10,18hr}$ or L_{night})	N/A	N/A

Source: Mott MacDonald, 2020

13.4.10 For the purposes of this assessment, significant effects are taken to be **Moderate** Adverse and above.

Assessment Assumptions and Limitations

13.4.11 There were a number of assumptions that had to be made in order to undertake the noise and vibration assessment, and these are listed as follows:

- At this stage the detailed construction programme, including the actual plant to be used, is unknown. A list of plant for each of the stages was drafted and approved by a member of the project team in order to make the predictions;
- It is currently unknown whether rock armour deliveries would be via road or barge therefore both options have been assessed and the worst case adopted;
- The construction assessments assume that there is no overlap between the phases;
- Traffic flow data for the construction road traffic noise assessments was provided by the Project Team and is assumed to be robust; and
- The baseline data was based on published data via a third-party website, Extrium, and no validation exercise has been undertaken by Mott MacDonald.

Covid-19 Pandemic

Due to the Covid-19 pandemic, baseline surveys at the vicinity of the receptors has not been completed. It was not possible to sample the noise levels representing the typical pre-Covid-19 situation due to the closures of most schools and businesses, and with most people in North Wales unable to travel to their place of work.

It was agreed with CCBC that the baseline noise levels at the receptors would be based on published data, 'Wales Noise and Air Quality Viewer' on the Extrium website[191]. The road traffic L_{day} and L_{night} noise maps have been extracted and used for this assessment. Noise maps from the rail and industrial noise sources were not available for the Colwyn Bay area so it is assumed that road traffic noise level from the A55 Expressway is the dominant noise source for the area. The validity of the baseline noise levels used must be considered within the context of their true accuracy and therefore should be considered to be indicative.

[191] http://extrium.co.uk/walesnoiseviewer.html

13.5 Baseline Conditions

Baseline Receptor Summary

13.5.1 The selected representative receptors are summarised within Table 13.6.

Table 13.6: Identified Receptors

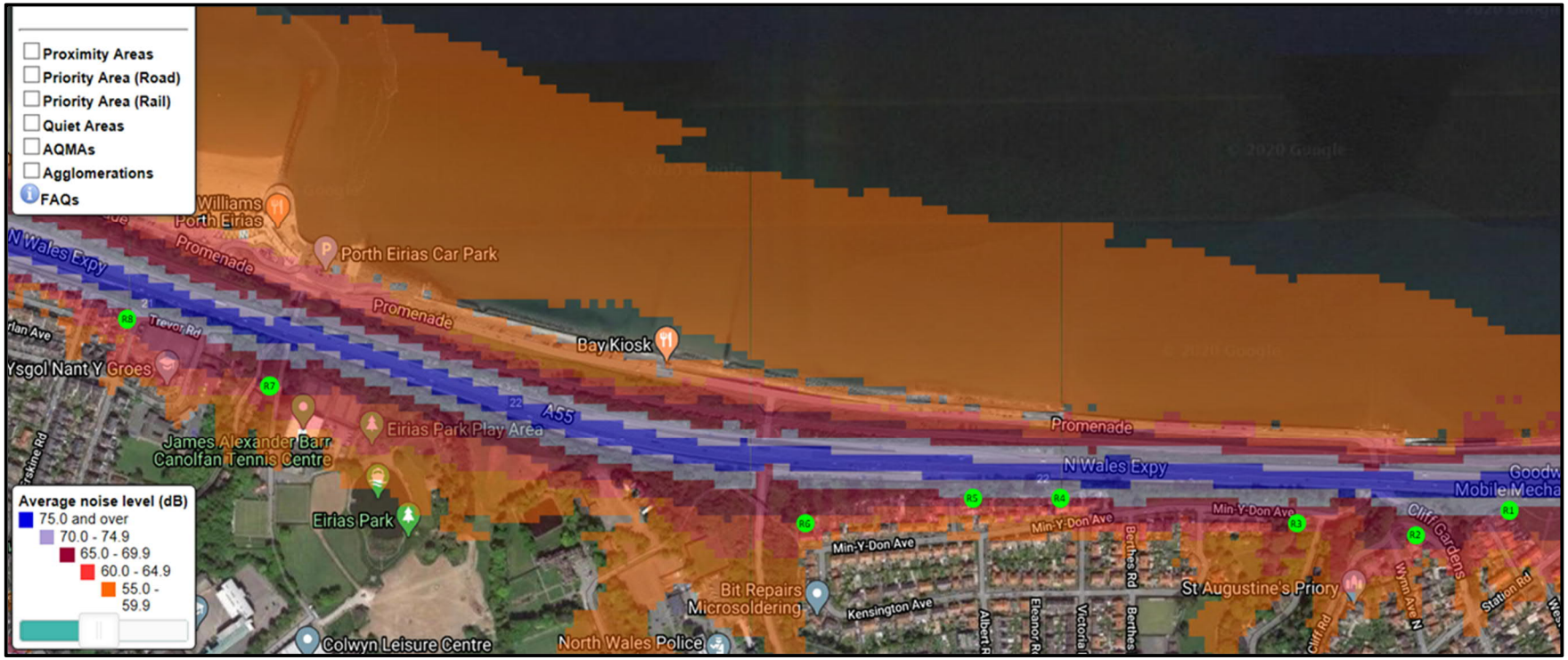
Receptor	Details	Receptor Sensitivity	Reasoning
R1	12 Queen's Avenue, residential	High	Representative residential receptor close to construction compound and proposed piling work in Construction Area 2.
R2	48 Wynn Avenue North, residential	High	Representative residential receptor close to construction compound and proposed piling work in Construction Area 2.
R3	3 Min-Y-Don Drive, residential	High	Representative residential sensitive receptor to Construction Area 2.
R4	42 Min-Y-Don Drive, residential	High	Representative residential receptor close to construction compound and proposed piling work in Construction Area 2.
R5	19 Beach Avenue, residential	High	Representative residential sensitive receptor close to Construction Area 2.
R6	104 Min-Y-Don Drive, residential	High	Representative residential receptor close to construction compound and proposed piling work for both Construction Area 1 and 2.
R7	3-13 The Dingle, residential	High	Representative residential receptor close to construction compound and piling work in Construction Area 1.
R8	11 Trevor Road, residential	High	Representative residential receptor close to construction compound in Construction Area 1.

Source: Mott MacDonald, 2020

Noise Contour Maps Extract from the Wales Noise and Air Quality Viewer

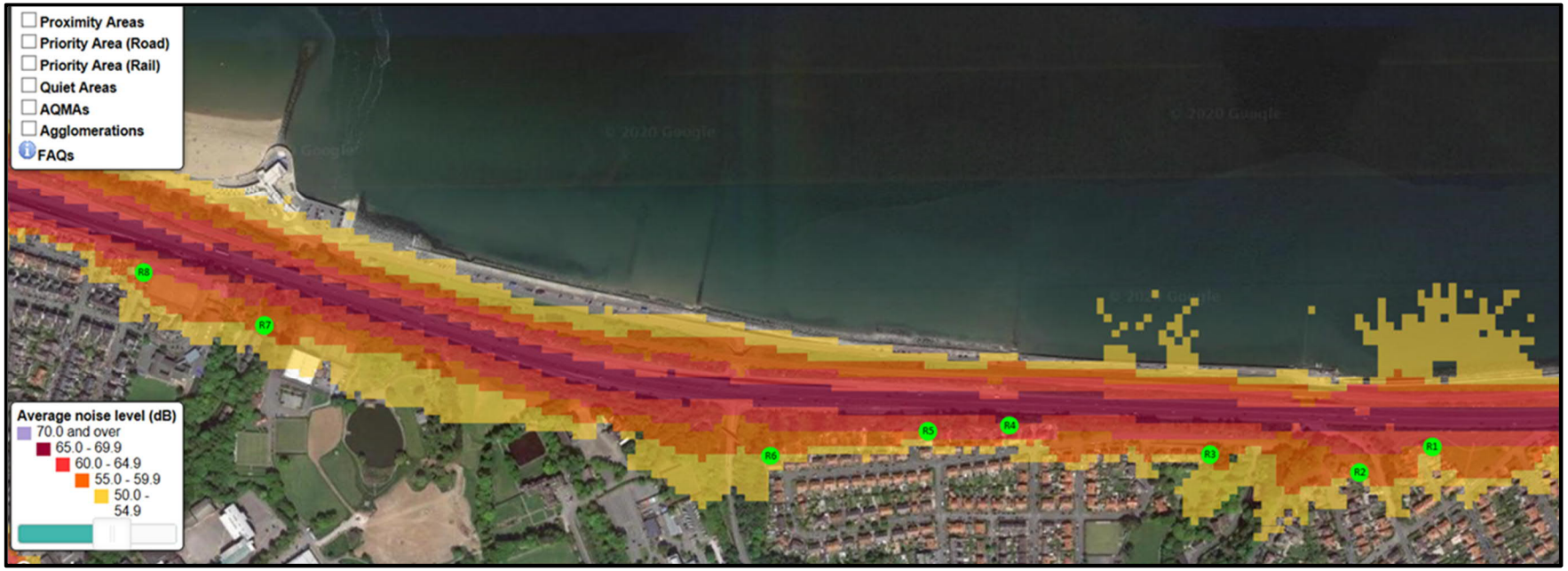
13.5.2 Figure 13.3 and Figure 13.4 show the representative receptor locations (see highlighted dots in green) as well as the L_{day} and L_{night} levels respectively in the Old Colwyn area.

Figure 13.3: L_{day} Road Traffic Noise Contours Map from the Wales Noise and Air Quality Viewer



Source: http://extrium.co.uk/walesnoiseviewer.html

Figure 13.4: L_{night} Road Traffic Noise Contours Map from the Wales Noise and Air Quality Viewer



Source: http://extrium.co.uk/walesnoiseviewer.html

Summary of Baseline Noise Levels at Representative Sensitive Receptors

13.5.3 Indicative baseline noise levels for both daytime and night-time periods have been extracted from the Wales Noise and Air Quality Viewer[192] data. The baseline noise levels, the associated ABC categories based on BS 5228 and the construction thresholds are summarised in Table 13.7 below.

13.5.4 It is noted that the higher thresholds have been used to assess the significant adverse impact in locations where their ABC category is crossed between two categories. It is reasonable to assume that the main contribution of the baseline noise levels at the representative receptors is coming from the A55 Expressway. The most exposed façades of these dwellings are facing directly onto both the A55 Expressway and the Scheme boundary. Therefore, it is considered that the most exposed façades are likely to be exposed to the higher end of the category values.

Table 13.7: Summary of Free-field Baseline Noise Levels at Representative Noise Receptors

Receptor	Baseline Noise level, $L_{Aeq,T}$ dB		ABC Category			Construction Noise Threshold, $L_{Aeq,T}$ dB		
	Day	Night	Week Day Daytime	Week Day Night	Week-end daytime	Week Day daytime	Week Day Night	Week-end Daytime
R1	70 - 74.9	65 - 69.9	C	C	C	75	55	65
R2	65 - 69.9	55 - 59.9	B/C	C	C	75	55	65
R3	60 - 64.9	55 - 59.9	A/B	C	C	70	55	65
R4	65 - 69.9	55 - 59.9	B/C	C	C	75	55	65
R5	65 - 69.9	60 - 64.5	B/C	C	C	75	55	65
R6	65 - 69.9	50 - 54.9	B/C	C	C	75	55	65
R7	65 - 69.9	55 - 59.9	B/C	C	C	75	55	65
R8	60 - 64.9	55 - 59.9	A/B	C	C	70	55	65

Source: Mott MacDonald

13.6 Consultation

13.6.1 In line with the EIA Scoping Report (ES Volume 2, Technical Appendix 1.3), the operational phase of the Scheme has been scoped out of the assessment, given the minimal anticipated direct effects on noise and vibration during the operational period. No contrary opinion was given by CCBC in their Scoping Opinion (ES Volume 2, Technical Appendix 1.4). Only the construction phase remained scoped in.

13.6.2 Consultation with the CCBC's Environmental Health Officer was undertaken by email in June 2020 concerning baseline noise data and impact assessment criteria for the Scheme. Full details of the agreed baseline survey, assessment protocol can be found in the ES Volume 2, Technical Appendix 5.1.

192 192 http://extrium.co.uk/walesnoiseviewer.html

13.7 Potential Impacts (Pre-Secondary Mitigation)

Primary (Embedded) Mitigation

13.7.1 Working hours on the Site would be agreed with the Local Planning Authority. However, it is understood that hours of work would be expected to be as detailed below:

- Monday to Friday 07:00 to 20:00 hours; and
- Saturday 08:00 to 16:00 hours (piling only 12:00 to 16:00).

13.7.2 The calculation of construction noise has accounted for the embankment of the NWC Railway Line to provide some levels of screening. It is assumed that, typically, there would be no construction activity during the night-time other than the occasional material/rock deliveries via the sea by barge if tide times necessitate night-time working.

Construction Effects

Construction Road Traffic

13.7.3 A traffic noise assessment was conducted to assess the 'magnitude of change' caused by the Scheme's construction traffic in the short-term. A comparison of the 2021 base year traffic flows and 2021 traffic flows during the construction phase in terms of 18-hour annual average weekday traffic (AAWT) was made:

13.7.4 The predicted Basic Noise Level (BNL) is the notional noise level generated by the traffic flow at 10m from the road. Whilst this is not a predicted noise level at a particular receptor, it allows the change in noise level to be assessed. This has been calculated for the scenarios in 2021 with and without additional traffic due to the Scheme. The BNL on each link without and with the Scheme and the difference between the two is shown in Table 13.8.

Table 13.8: Predicted Basic Noise Levels (BNL, dB $L_{A10,18hrs}$) in 2021 with and without the construction traffic

Road links	BNL in 2021 without construction traffic	BNL in 2021 with construction traffic	2021 without vs with construction traffic
West Promenade	66.3	66.3	0.0
Promenade	66.0	63.2	-2.9
B5133	63.7	65.8	2.1
B5133	63.6	65.7	2.1
B5133	63.9	65.9	2.0
A547	67.1	67.4	0.3
A547	68.2	68.5	0.2
A547	67.9	68.1	0.2
Marine Road	60.2	64.6	4.4
A55 (Jct 21-22)	78.7	78.9	0.2

Source: Mott MacDonald, 2020

13.7.5 Full details of the traffic flow data can be found in ES Volume 2, Technical Appendix 13.1.

13.7.6 Prior to mitigation results from Table 13.8 indicate that road traffic noise during the construction phase is predicted to result in minor adverse impact, Slight Adverse effect on residents on

B5133, Promenade, A547 and the A55. It is predicted that there would be a moderate adverse impact, Moderate Adverse effect on Marine Road prior to mitigation.

General Construction Site Work

13.7.7 An indicative list of construction plant for daytime and night-time construction work is presented in Table 13.9. The lists have been derived from Chapter 4 Scheme Construction of the ES. Reference Sound Pressure Levels (SPL) for continuous operation are presented. The level of noise emission is corrected for utilisation based on the estimated percentage of time the plant is expected to be in use over a working day.

Table 13.9: List of Noise Sources for the Construction Phase of the Scheme During the Day

Phase	Activity	Noise-emitting plant item required	BS 5228 Ref.	Qty	%on time	$L_{Aeq,10m}$ dB
Compound set up	Creation of site compound, secure site office, materials storage compound & erection of fencing to site works area	360 Excavator	C.2.25	1	75	69
		Dumper	C.1.10	1	75	85
		Hi-Ab wagon	C.4.1	1	75	81
	Generator and potable water bowser	Generator	C.4.83	2	100	65
		Potable water bowser	C.2.45	2	25	65
	Fencing	8t excavator	C.2.7	1	75	70
	Fencing	Auger attachment	C.3.16	1	75	79
	Site clearance - Removal of existing lampposts, street furniture, shelters, key clamp railings, storm gates etc.	Excavator	C.2.25	1	75	69
		Breaker/Pecker attachment	C.5.2	1	75	83
		Angle grinder	C.4.93	1	75	80
	Perforating existing Promenade and highway	SDS Drill and bits	C.2.44	1	75	77
		PC360 Excavator	C.2.25	1	75	69
		PC480 Excavator	C.6.5	1	75	86
		Dumper	C.1.10	1	75	85
		Breaker	C.5.4	1	75	86
		Compressor	C.5.5	1	75	65
		JCB Excavator with pecker	C.5.2	1	75	83
	Drainage	JCB Excavator	C.4.17	1	75	71
		8t Excavator	C.2.25	1	75	69
		20t Excavator	C.4.64	1	75	75
		16t Excavator	C.4.65	1	75	71
		8t Dumper	C.4.4	1	75	76
	Earthworks	20t Excavator	C.4.65	1	75	71

Phase	Activity	Noise-emitting plant item required	BS 5228 Ref.	Qty	%on time	$L_{Aeq,10m}$ dB
		Dozer	C.2.12	1	75	81
		9t Dumper	C.4.4	1	75	76
		Roller on back of dozer	C.2.36	1	75	81
		Roller Bomag BW 219 D-4	C.5.19	1	75	80
		Road Wagons 8 wheeled 20t	C.8.20	1	90	79
	Structures	Concrete Pumps	C.3.25	1	50	78
		Concrete Mixer Trucks	C.4.20	2	30	80
		Tracker/wheeled excavator	C.4.65	1	75	71
		Large (75t) Mobile Cranes	C.4.39	1	75	71
		Vibrating pokers	C.4.33	2	50	78
		Powered hand tools (SDS drills and drivers)	C.2.44	2	75	77
		Generators for poker vibrator	C.4.78	2	75	66
		Vibro hammer	C.12.50	1	25	85
	Revetment	D6D Bulldozer	C.6.28	1	35	85
		PC360 Excavator	C.2.25	1	45	69
		PC480 Excavator	C.6.5	3	60	86
		8 wheel tippers	C.2.30	2	35	79
		30t Volvo dump truck	C.8.16	4	35	81
	Materials delivery	Revetment: 32t delivery truck (if by road for 3-6t)	C.4.53	2	75	77
	Materials delivery	44t delivery truck (other deliveries)	C.10.18	2	75	83
	Pavement foundation construction	Roller Bomag BW 219 D-4	C.5.19	1	75	80
		Road planing equipment	C.5.7	1	75	82
		Road Wagons 8 wheeled 20t	C.8.20	3	75	79
	Pavement	Roller Bomag 120	C.2.39	1	75	74
		Road planning equipment	C.5.7	1	75	82

Phase	Activity	Noise-emitting plant item required	BS 5228 Ref.	Qty	%on time	$L_{Aeq,10m}$ dB
		Roller Bomag BW 24	C.5.19	1	75	80
		Chipper for asphalt, machine to spread tack coats.	D.6.45	1	75	83
		Concrete cutting tools	C.4.71	1	75	85
		Telehandler	C.2.35	1	75	71
		JCB 2cx with hydraulic breaker	C.2.25	1	75	69
		Truck	C.8.15	3	75	79
		Paver	C.5.32	1	75	84
	Signs and lines	3t Excavator	C.4.67	1	75	74
		Hi-ab	C.4.43	1	75	70
		12t white lining truck	C.5.7	1	75	82
	VRS and lighting	3t Excavator	C.4.67	1	75	74
		Hi-ab	C.4.43	1	75	70
Piling works	Access build-out - approx. 285m of piling	Ancillary piling equipment - Cleaning welds on piles	D.5.48	1	45	88
		Ancillary piling equipment - Shaping top of bored pile for fitting concrete cap	D.5.49	1	45	86
		Piling crane 50t	C.3.29	1	45	70
		Service crane 50t	C.4.46	1	45	67
		Piling hammer (movax vibratory installation steel piles)	C.3.8	1	45	88
	Perpendicular steps (x3) - approx. 60m of piling	Ancillary piling equipment - Cleaning welds on piles	D.5.48	1	45	88
		Ancillary piling equipment - Shaping top of bored pile for fitting concrete cap	D.5.49	1	45	86
		Piling crane 50t	C.3.29	1	45	70
		Service crane 50t	C.4.46	1	45	67

Phase	Activity	Noise-emitting plant item required	BS 5228 Ref.	Qty	%on time	$L_{Aeq,10m}$ dB
		Piling hammer (movax vibratory installation steel piles)	C.3.8	1	45	88
	Fishing platform - 14 piles required for the platform	Ancillary piling equipment - Cleaning welds on piles	D.5.48	1	45	88
		Ancillary piling equipment - Shaping top of bored pile for fitting concrete cap	D.5.49	1	45	86
		Piling crane 50t	C.3.29	1	45	70
		Service crane 50t	C.4.46	1	45	67
		Piling hammer (movax vibratory installation steel piles)	C.3.8	1	45	88
Outfalls and culvert works	Outfalls and culvert works	Ancillary piling equipment - Cleaning welds on piles	D.5.48	1	45	88
		Ancillary piling equipment - Shaping top of bored pile for fitting concrete cap	D.5.49	1	45	86
		Piling crane 50t	C.3.29	1	45	70
		Service crane 50t	C.4.46	1	45	67
		Piling hammer (movax vibratory installation steel piles)	C.3.8	1	45	88
Occasional night-time work	Night-time material (i.e. rock) delivery Step 1: vessel mooring and material transfer from vessel to barge and tugboat to shore	Revetment: 6000t delivery vessel (moored offshore at approximately 1 km, would travel to site then anchor)	C.7.2	1	2	87
		Revetment: Loading 1500t Transhipment Barge - rock transfer	C.9.11	1	5	93
	Night-time material (i.e. rock) delivery Step 2: material transfer from barge to shore	Revetment: Tug to manoeuvre barge	[193]See foot note	1	5	84
		On barge: PC360 Excavator/dozer	C.2.25	1	5	69

[193] Improvement Dredging for Lamma Power Station Navigation Channel, EIA Report. Chapter 7- Noise Impact Assessment, 2017, see link: https://www.epd.gov.hk/eia/register/report/eiareport/eia_2512017/html/EIA%20pdf.htm

Phase	Activity	Noise-emitting plant item required	BS 5228 Ref.	Qty	%on time	$L_{Aeq,10m}$ dB
		Revetment: 1,500t Barge (non-powered) unloading to beach	C.9.12	1	5	85

Source: Mott MacDonald, 2020

The source of noise is assumed to be evenly distributed along the construction work area boundaries closest/facing onto the noise sensitive receptors represent the worse-case scenario.

During certain stages of the construction phase, it is expected that some work would have to be carried out outside of normal working hours however this would be kept to a minimum. Results in Table 13.10 to Table 13.17 show predicted construction noise levels at representative noise sensitive receptors due to the Scheme.

Table 13.10: Construction Noise Levels at Receptor R1 due to the Scheme

Activities	Construction tasks	Construction Phase 1		Construction Phase 2	
		Daytime threshold = 75 dB L_{Aeq} Night-time threshold = 55 dB L_{Aeq}			
		Distance (m)	**Predicted construction noise level L_{Aeq} (dB)**	**Distance (m)**	**Predicted construction noise level L_{Aeq} (dB)**
Compound set up	Creation of site compound, secure site office, materials storage compound & erection of fencing to site works area	140	58	790	42
	Generator and potable water bowser	140	42	790	25
	Fencing	140	42	790	25
	Fencing	140	51	790	34
Construction phase	Site Clearance - Removal of existing lampposts, street furniture, shelters, key clamp railings, storm gates etc.	120	58	860	39
	Perforating existing Promenade and highway	120	65	860	46
	Drainage	120	54	860	34
	Earthworks	120	60	860	41
	Structures	120	60	860	41
	Revetment	120	65	860	46
	Materials delivery	120	53	860	34
	Materials delivery	120	59	860	40
	Pavement foundation construction	120	60	860	41
	Pavement	120	65	860	45
	Signs and lines	120	56	860	37
	VRS and lighting	120	49	860	30
Piling works	Access build-out - approx. 285m of piling	1,040	42	1,040	42
	Perpendicular steps (x3) - approx. 60m of piling	170	60	170	60
	Fishing platform - 14 piles required for the platform	160	61	160	61
Outfalls and culvert works	Outfalls and culvert works	160	61	160	61
Occasional night-time material/rock deliveries	Material delivery step 1: Vessel to barge and tugboat	1,095	34	1,095	34
	Material delivery step 2: Barge/tugboat to shore	95	52	95	52

Source: Mott MacDonald, 2020

Table 13.11: Construction Noise Levels at Receptor R2 due to the Scheme

Activities	Construction tasks	Construction Phase 1		Construction Phase 2	
		Threshold = 75 dB L_{Aeq} Night-time threshold = 55 dB L_{Aeq}			
		Distance (m)	Predicted construction noise level L_{Aeq} (dB)	Distance (m)	Predicted construction noise level L_{Aeq} (dB)
Compound set up	Creation of site compound, secure site office, materials storage compound & erection of fencing to site works area	125	60	725	42
	Generator and potable water bowser	125	43	725	26
	Fencing	125	43	725	26
	Fencing	125	52	725	35
Construction phase	Site clearance - Removal of existing lampposts, street furniture, shelters, key clamp railings, storm gates etc.	115	59	785	40
	Perforating existing Promenade and highway	115	65	785	46
	Drainage	115	54	785	35
	Earthworks	115	61	785	42
	Structures	115	60	785	42
	Revetment	115	65	785	47
	Materials delivery	115	54	785	35
	Materials delivery	115	60	785	41
	Pavement foundation construction	115	61	785	42
	Pavement	115	65	785	46
	Signs and lines	115	57	785	38
	VRS and lighting	115	49	785	31
Piling works	Access build-out - approx. 285m of piling	965	43	965	43
	Perpendicular steps (x3) - approx. 60m of piling	285	55	285	55
	Fishing platform - 14 piles required for the platform	135	62	135	62
Outfalls and culvert works	Outfalls and culvert works	135	62	135	62
Occasional night-time material/rock deliveries	Material delivery step 1: Vessel to barge and tugboat	1,110	33	1,110	33
	Material delivery step 2: Barge/tugboat to shore	110	50	110	50

Source: Mott MacDonald, 2020

Table 13.12: Construction Noise Levels at Receptor R3 due to the Scheme

Activities	Construction tasks	Construction Phase 1		Construction Phase 2	
		Threshold = 70 dB L_{Aeq}			
		Distance (m)	Predicted construction noise level L_{Aeq} (dB)	Distance (m)	Predicted construction noise level L_{Aeq} (dB)
Compound set up	Creation of site compound, secure site office, materials storage compound & erection of fencing to site works area	125	60	540	45
	Generator and potable water bowser	125	43	540	29
	Fencing	125	43	540	29
	Fencing	125	52	540	38
Construction phase	Site clearance - Removal of existing lampposts, street furniture, shelters, key clamp railings, storm gates etc.	95	61	605	43
	Perforating existing Promenade and highway.	95	67	605	49
	Drainage	95	56	605	38
	Earthworks	95	63	605	45
	Structures	95	62	605	44
	Revetment	95	67	605	49
	Materials delivery	95	56	605	38
	Materials delivery	95	62	605	44
	Pavement foundation construction	95	63	605	45
	Pavement	95	67	605	49
	Signs and lines	95	59	605	41
	VRS and lighting	95	51	605	33
Piling works	Access build-out - approx. 285m of piling	790	45	790	45
	Perpendicular steps (x3) - approx. 60m of piling	150	61	150	61
	Fishing platform - 14 piles required for the platform	160	61	160	61
Outfalls and culvert works	Outfalls and culvert works	160	61	160	61
Occasional night-time material/rock deliveries	Material delivery step 1: Vessel to barge and tugboat	1,095	34	1,095	34
	Material delivery step 2: Barge/tugboat to shore	95	52	95	52

Source: Mott MacDonald, 2020

Table 13.13: Construction Noise Levels at Receptor R4 due to the Scheme

Activities	Construction tasks	Construction Phase 1		Construction Phase 2	
		Threshold = 75 dB L_{Aeq}			
		Distance (m)	**Predicted construction noise level L_{Aeq} (dB)**	**Distance (m)**	**Predicted construction noise level L_{Aeq} (dB)**
Compound set up	Creation of site compound, secure site office, materials storage compound & erection of fencing to site works area	305	51	335	50
	Generator and potable water bowser	305	35	335	34
	Fencing	305	34	335	33
	Fencing	305	43	335	42
Construction phase	Site clearance - Removal of existing lampposts, street furniture, shelters, key clamp railings, storm gates etc.	80	62	400	47
	Perforating existing Promenade and highway	80	69	400	53
	Drainage	80	58	400	42
	Earthworks	80	64	400	49
	Structures	80	64	400	48
	Revetment	80	69	400	53
	Materials delivery	80	57	400	42
	Materials delivery	80	63	400	48
	Pavement foundation construction	80	64	400	49
	Pavement	80	69	400	53
	Signs and lines	80	60	400	45
	VRS and lighting	80	53	400	37
Piling works	Access build-out - approx. 285m of piling	550	49	550	49
	Perpendicular steps (x3) - approx. 60m of piling	95	66	95	66
	Fishing platform - 14 piles required for the platform	380	52	340	53
Outfalls and culvert works	Outfalls and culvert works	380	52	340	53
Occasional night-time material/rock deliveries	Material delivery step 1: Vessel to barge and tugboat	1,090	34	1,090	34
	Material delivery step 2: Barge/tugboat to shore	90	52	90	52

Source: Mott MacDonald, 2020

Table 13.14: Construction Noise Levels at Receptor R5 due to the Scheme

Activities	Construction tasks	Construction Phase 1		Construction Phase 2	
		Threshold = 75 dB L_{Aeq}			
		Distance (m)	Predicted construction noise level L_{Aeq} (dB)	Distance (m)	Predicted construction noise level L_{Aeq} (dB)
Compound set up	Creation of site compound, secure site office, materials storage compound & erection of fencing to site works area	460	47	195	55
	Generator & potable water bowser	460	31	195	39
	Fencing	460	30	195	39
	Fencing	460	39	195	48
Construction phase	Site clearance - Removal of existing lampposts, street furniture, shelters, key clamp railings, storm gates..	85	62	260	51
	Perforating existing Promenade and highway	85	68	260	57
	Drainage	85	57	260	46
	Earthworks	85	64	260	53
	Structures	85	63	260	52
	Revetment	85	68	260	57
	Materials delivery	85	57	260	46
	Materials delivery	85	63	260	52
	Pavement foundation construction	85	64	260	53
	Pavement	85	68	260	57
	Signs and lines	85	60	260	49
	VRS and lighting	85	52	260	41
Piling works	Access build-out - approx. 285m of piling	440	51	440	51
	Perpendicular steps (x3) - approx. 60m of piling	145	62	145	62
	Fishing platform - 14 piles required for the platform	495	50	495	50
Outfalls and culvert works	Outfalls and culvert works	495	50	495	50
Occasional night-time material/rock deliveries	Material delivery step 1: Vessel to barge and tugboat	1,090	34	1,090	34
	Material delivery step 2: Barge/tugboat to shore	90	52	90	52

Source: Mott MacDonald, 2020

Table 13.15: Construction Noise Levels at Receptor R6 due to the Scheme

Activities	Construction tasks	Construction Phase 1		Construction Phase 2	
		Threshold = 75 dB L_{Aeq}			
		Distance (m)	**Predicted construction noise level L_{Aeq} (dB)**	**Distance (m)**	**Predicted construction noise level L_{Aeq} (dB)**
Compound set up	Creation of site compound, secure site office, materials storage compound & erection of fencing to site works area	155	58	155	58
	Generator + Potable water bowser	155	41	155	41
	Fencing	155	41	155	41
	Fencing	155	50	155	50
Construction phase	Site clearance - Removal of existing lampposts, street furniture, shelters, key clamp railings, storm gates etc.	140	57	150	56
	Perforating existing Promenade and highway	140	63	150	63
	Drainage	140	52	150	51
	Earthworks	140	59	150	58
	Structures	140	58	150	58
	Revetment	140	63	150	63
	Materials Delivery	140	52	150	51
	Materials Delivery	140	58	150	57
	Pavement Foundation Construction	140	59	150	58
	Pavement	140	63	150	62
	Signs & Lines	140	55	150	54
	VRS and Lighting	140	47	150	47
Piling works	Access build-out - approx. 285m of piling	305	54	305	54
	Perpendicular steps (x3) - approx. 60m of piling	205	58	205	58
	Fishing platform - 14 piles required for the platform	690	46	690	46
Outfalls and culvert works	Outfalls and culvert works	690	46	690	46
Occasional night-time material/rock deliveries	Material delivery step 1: Vessel to barge and tugboat	1,155	33	1,155	33
	Material delivery step 2: Barge/tugboat to shore	155	47	155	47

Source: Mott MacDonald, 2020

Table 13.16: Construction Noise Levels at Receptor R7 due to the Scheme

Activities	Construction tasks	Construction Phase 1		Construction Phase 2	
		Threshold = 75 dB L_{Aeq}			
		Distance (m)	Predicted construction noise level L_{Aeq} (dB)	Distance (m)	Predicted construction noise level L_{Aeq} (dB)
Compound set up	Creation of site compound, secure site office, materials storage compound & erection of fencing to site works area	555	45	120	60
	Generator + Potable water bowser	555	29	120	44
	Fencing	555	29	120	43
	Fencing	555	38	120	52
Construction phase	Site clearance - Removal of existing lampposts, street furniture, shelters, key clamp railings, storm gates etc.	605	43	125	58
	Perforating existing Promenade and highway	605	49	125	64
	Drainage	605	38	125	53
	Earthworks	605	45	125	60
	Structures	605	44	125	60
	Revetment	605	49	125	65
	Materials Delivery	605	38	125	53
	Materials Delivery	605	44	125	59
	Pavement Foundation Construction	605	45	125	60
	Pavement	605	49	125	64
	Signs & Lines	605	41	125	56
	VRS and Lighting	605	33	125	49
Piling works	Access build-out - approx. 285m of piling	335	53	335	53
	Perpendicular steps (x3) - approx. 60m of piling	540	49	540	49
	Fishing platform - 14 piles required for the platform	1,320	40	1,320	40
Outfalls and culvert works	Outfalls and culvert works	1,320	40	1,320	40
Occasional night-time material/rock deliveries	Material delivery step 1: Vessel to barge and tugboat	1,155	33	1,155	33
	Material delivery step 2: Barge/tugboat to shore	160	46	160	46

Source: Mott MacDonald, 2020

Table 13.17: Construction Noise Levels at Receptor R8 due to the Scheme

Activities	Construction tasks	Construction Phase 1		Construction Phase 2	
		Threshold = 70 dB L_{Aeq}			
		Distance (m)	Predicted construction noise level L_{Aeq} (dB)	Distance (m)	Predicted construction noise level L_{Aeq} (dB)
Compound set up	Creation of site compound, secure site office, materials storage compound & erection of fencing to site works area	710	43	225	54
	Generator & potable water bowser	710	26	225	38
	Fencing	710	26	225	37
	Fencing	710	35	225	46
Construction phase	Site clearance - Removal of existing lampposts, street furniture, shelters, key clamp railings, storm gates etc.	765	40	245	51
	Perforating existing Promenade and highway	765	47	245	58
	Drainage	765	36	245	47
	Earthworks	765	42	245	53
	Structures	765	42	245	53
	Revetment	765	47	245	58
	Materials delivery	765	35	245	47
	Materials delivery	765	41	245	53
	Pavement foundation construction	765	42	245	53
	Pavement	765	47	245	58
	Signs & lines	765	38	245	49
	VRS and lighting	765	31	245	42
Piling works	Access build-out - approx. 285m of piling	480	50	480	50
	Perpendicular steps (x3) - approx. 60m of piling	695	46	695	46
	Fishing platform - 14 piles required for the platform	1,470	39	1,470	39
Outfalls and culvert works	Outfalls and culvert works	1,470	39	1,470	39
Occasional night-time material/rock deliveries	Material delivery step 1: Vessel to barge and tugboat	1,145	33	1,145	33
	Material delivery step 2: Barge/tugboat to shore	265	42	265	42

Source: Mott MacDonald, 2020

13.7.8 Results in Table 13.10 to Table 13.17 indicate that, during the weekday daytime period, the predicted construction noise is unlikely to exceed the daytime threshold set out in Table 13.7. Therefore, daytime noise level from construction activities are likely to result in not significant adverse direct effects.

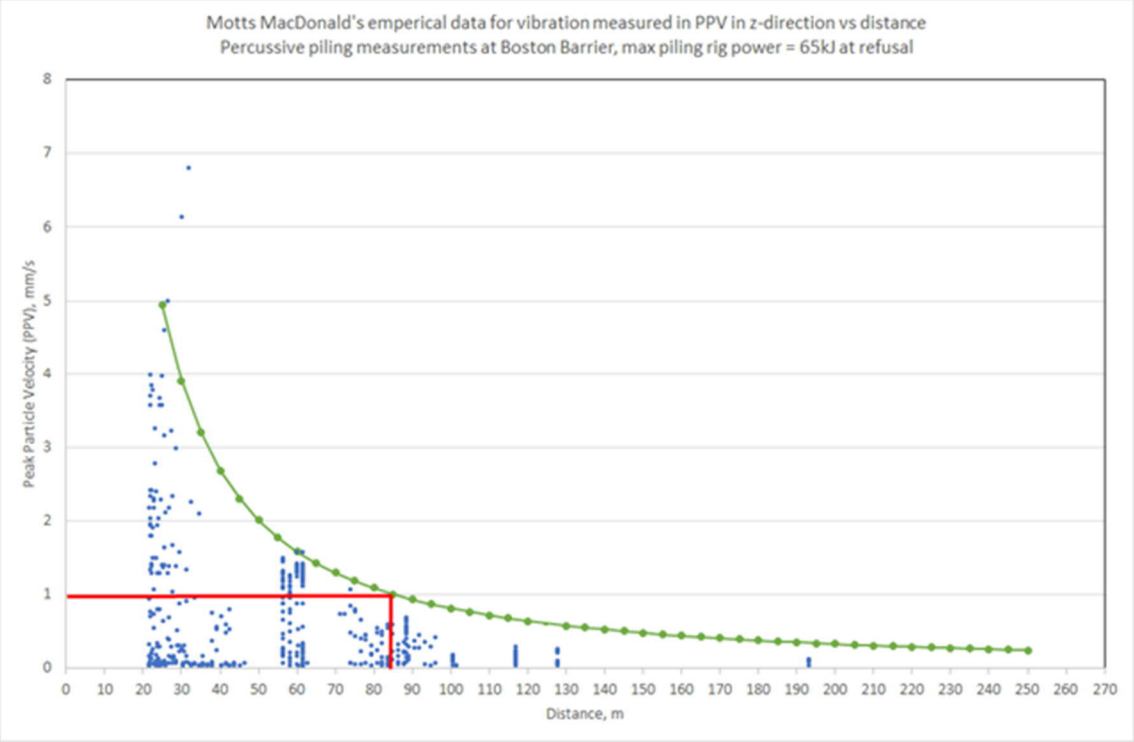
13.7.9 Similarly, at night during the week, the noise levels generated from the material delivery is predicted to be below the night-time threshold. Therefore, night-time noise level from construction activities are likely to result in not significant adverse direct effects.

13.7.10 However, piling activities during the weekend after 1300hr are likely to pose major adverse impacts, for residents near R4 (Figure 13.1) or residents less than 103m from the piling works for perpendicular steps No. 2 (located in the middle of Area 2, Construction Phase 1). These effects are assessed as significant and direct.

Construction Vibration

13.7.11 Historic empirical data measured by Mott MacDonald on another construction site[194] have been used to predict PPV levels at the receptors for this project. Measured long-term vibration data have been collected by Mott MacDonald adjacent to percussive piling activity for the construction of flood defences. The vibrations associated with the use of a percussive piling rig with the maximum power of 65kJ were measured at various distances ranging from 22m to 193m. The measured PPV values against distance is presented in Figure 13.5.

Figure 13.5: Measured Piling Vibration Levels



Source: Mott MacDonald

[194] Mott MacDonald's measured data at Boston Barrier between 2018 and 2019

13.7.12 The Significant Adverse Effect Level for vibration has been set at 1mm/s PPV. Figure 13.5 shows that 1mm/s PPV is likely to occur at receptors 85m from the proposed piling rig.

13.7.13 The distance from the closest receptors on Min-Y-Don Drive to the nearest piling work area (perpendicular steps) is approximately 95m. Vibration levels in these areas during piling work is expected to be around 0.8mm/s. This may be perceptible, but it is just below the significant adverse effect value. On this basis, it is anticipated that vibration from piling work is unlikely to result in a significant adverse impact.

13.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures

13.8.1 Results in Table 13.8, Table 13.10 to Table 13.17 indicate that major adverse impacts are expected during the piling activities at the weekend at residents near R4 (42 Min-Y-Don Drive) and for residents less than 103m away from the proposed piling areas. Moderate adverse impacts are also expected on Marine Road due to construction traffic.

13.8.2 It is recommended that the following mitigation should be implemented during the construction phase, as far as possible, to minimise these adverse impacts from noise and vibration.

Mitigation Measures

Construction Noise

13.8.3 Mitigation measures would help to further reduce the scale of the effects on the environment. BS5228-1:2009+A1:2014 recommends that, in some circumstances, a greater noise level may be tolerated if the overall duration of construction and therefore length of disruption is reduced. Construction noise and vibration would be managed through implementation of the good practice documented within the Construction Environmental Management Plan (CEMP). It is advisable that piling activities at the Perpendicular Step No.2 area (located in the middle of Area 2, Construction Phase 1). would be avoided during the weekend beyond 1300hr.

13.8.4 Furthermore, below are some example mitigation measures from BS5228-1:2009+A1:2014.

- Unnecessary revving of engines would be avoided, and equipment would be switched off when not in use;
- Internal haul routes would be kept well maintained;
- Rubber linings in, for example, chutes and dumpers would be used to reduce impact noise;
- Drop heights of materials would be minimised;
- Plant and vehicles would be sequentially started up rather than all together;
- Use of effective exhaust silencer systems or acoustic engine covers as appropriate;
- As far as reasonably practicable, sources of significant noise would be enclosed;
- Plant would always be used in accordance with manufacturers' instructions. Care would be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading would also be carried out away from such areas;
- Regular and effective maintenance by trained personnel would be undertaken to keep plant and equipment working to manufacturers specifications;
- Screening e.g. noise barriers and blinds would be used as appropriate;
- Consideration should be given to traffic routing, timing and access points to the Site so as to minimise noise impacts at existing receptors following contractor appointment, and as construction working methods are developed. However, increases in road traffic noise levels during works would be temporary, relatively short term, and although the effect would be

dependent on the actual number of HGV deliveries, it is considered that significant effects can be managed and avoided;

- Contractors would issue a project route map and delivery schedule to control construction traffic. Traffic management would be employed to guide and control both public and construction traffic during deliveries;

13.8.5 All work outside these hours would be subject to prior agreement of, and/or reasonable notice to CCBC. Night-time working would be restricted to exceptional circumstances, and minor work internally within buildings.

13.8.6 Based on the baseline survey results in Table 13.7 and BS5228-1:2009+A1:2014 construction, noise levels at the nearby representative receptors should not exceed the thresholds set out in Table 13.7 to avoid adverse significant effects.

Construction Traffic

13.8.7 To mitigate potential disturbance traffic calming measures and/or enforcement would potentially be effective if traffic is perceived as noisier due to increases in combination with speeding vehicles. To prevent complaints, good community consultation and communication would be vital along with effective complain management. It would be important to gather information on any received complaints and respond quickly.

Construction Vibration

13.8.8 A risk assessment identifying the probability of vibration from any piling activities should also be carried out prior to commencement of construction activities, to determine the need for periodic or continuous vibration monitoring. It is recommended that the contractor uses techniques such as rotary piling methods that are least likely to cause vibration. Should the need arise, additional means of mitigating potential effects would be considered as the construction arrangements are developed further. It is likely that the magnitude of the potential vibration effects can be reduced, if not avoided altogether, as a result of these further considerations.

13.8.9 For the general control of vibration, BS5228-2:2009+A1:2014 recommends:

- Selection of appropriate pilling technique and energy input;
- Provision of cut off trenches (which are similar to noise screens in that they interrupt the direct path between source and receiver);
- Pre-boring which can reduce resistance to penetration;
- Site management and planning;
- Working methods such as hours of work;
- Control of vibration at source by replacing plant/methods of works at or near vibration sensitive premises, where reasonably practicable, with less intrusive plant and/or methods of working;
- Where reasonably practicable, vibrating equipment would be located as far from sensitive premises as possible, and, if on a structure, not on one which is continuous with that of the sensitive premises; and
- Identify any opportunities to reduce vibrations from piling activities through identifying any alternative methods available and removal of obstructions to reduce the exacerbation of transmission of vibration.

13.8.10 BS5228-2:2009+A1:2014 includes guidance on measures to mitigate vibration arising due to construction activity. The level of vibration at the point of the receptor would normally be a function of many variables including:

- Energy per blow or cycle of the piling activity;
- Distance between source and receiver;
- The conditions of the intervening ground between the source and receiver e.g. soft or hard ground;
- Soil-structure interaction, i.e. the nature of the connection between soil and structure being monitored; and
- Type and nature of structure and location of point of reception, for example: on the soil surface; on a building foundation; or on an internal structural element.

13.9 Assessment of Likely Significant Effects

13.9.1 The assessment of likely significant effects has been undertaken following the methodology described in Section 13.4.

13.9.2 Table 13.18 summarises the Scheme assessment of effects, detailing the potential effect identified and appropriate mitigation measures for a particular receptor. The receptor sensitivity and magnitude of impact has been estimated followed by the identification of the significance category after mitigation and enhancement measures have been taken into account (as detailed in Section 13.8).

Table 13.18: Assessment of Effects Summary during Construction Phase

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 13.8)	Action by (Contractor/ Designer)	Receptor sensitivity	Magnitude	Residual Significance Category (with mitigation)
GENERAL CONSTRUCTION NOISE						
R1-R3, R5-R8	Construction noise	Although no significant adverse impacts are anticipated arising from the construction phase, implementation of industrial good practice to further reduce the impacts from construction noise and vibration is recommended. Details of recommendations are set out in Section 13.8.	Contractor	High	N/A	**Direct, Temporary, (Magnitude N/A – noise criteria), Not Significant**
R4	Construction noise due to piling activities at the weekend near perpendicular steps No. 2.	Avoid piling on Saturdays after 13:00 at perpendicular steps No. 2 as well as implementing mitigation measures recommended in Section 13.8.	Contractor	High	N/A	**Direct, Temporary, (Magnitude N/A – noise criteria), Not Significant**
CONSTRUCTION TRAFFIC						
• West Promenade • Promenade • B5133 • A547 • A55 (Jct21-22)	Traffic noise	Not required	N/A	High	Negligible-Minor	**Direct, Temporary Slight Adverse (Not Significant)**

Receptor	Summary of Impacts	Mitigation and Enhancement Measures (further details contained in Section 13.8)	Action by (Contractor/ Designer)	Receptor sensitivity	Magnitude	Residual Significance Category (with mitigation)
Marine Road	Traffic noise	• Traffic calming/enforcement; • Effective complaint management; and • Revise traffic routing if possible.	Contractor	High	Minor	**Direct, Temporary Slight Adverse (Not Significant)**

Source: Mott MacDonald, 2020

Likely Residual Significant Effects Recorded (Post-Mitigation)

Construction

13.9.3 Incorporating the enhancement measures as outlined in Section 13.8, the maximum residual effect identified is temporary **Slight Adverse**. Therefore, no residual significant effects are expected.

13.10 Requirements for Tertiary Mitigation/Monitoring

13.10.1 Noise and vibration monitoring are generally used to control exposure where significant adverse effects are anticipated. The predictions show that with mitigation in place, no significant adverse effects would be anticipated, although some piling activities and construction traffic on Marine Road may come close to the proposed limits.

13.10.2 It is therefore considered that monitoring would not be needed, but should be kept as an option in the event that levels are exceeded in practice.

13.11 Conclusions

13.11.1 In summary, the noise and vibration assessment has shown that with the inclusion of appropriate mitigation as outlined in Section 13.8, construction stage effects on identified receptors are considered to be temporary **Slight Adverse** (not significant).

13.11.2 However, the outcome of this assessment is based on assumptions listed in Table 13.9. Impact magnitude may change if the sound power levels, % on-time and the amount of construction equipment are changed. If this is the case, additional mitigation may be required and would be included within the CEMP.

13.11.3 The construction phase of the Scheme is not expected to result in any significant adverse effects due to temporary noise and vibration impacts.

13.12 Drawings

13.12.1 There are no drawings accompanying this chapter. Relevant figures are provided throughout.

13.13 List of Documents Included in ES Volume 2: Technical Appendix 13

13.13.1 This chapter has no supporting technical appendices.

14 Population and Health

14.1 Introduction

14.1.1 This chapter considers the impact of the Scheme on population and health, including the impact on employment, local businesses, tourism and human health. The population and human health assessment is guided by the EIA Regulations[195] as well as legislation and national and local planning policy.

14.1.2 This chapter is intended to be read as part of the wider ES, with particular reference to ES Volume 1, Chapter 13 Noise and Vibration, Chapter 7 Air Quality and the Transport Statement (ES Volume 2, technical Appendix 15.1). The technical appendices in support of this chapter are listed in Section 14.13 and can be found in the ES Volume 2, Technical Appendix 14.

14.2 Legislative and Policy Framework

14.2.1 The principal legislative and planning context in relation to the assessment of the environmental effects of the Scheme on population and health is discussed below.

National Legislation

Town and Country planning (EIA)(Wales) Regulations 2017

14.2.2 The EIA Regulations transpose the revised EIA Directive into law. One of the amendments clarifies that 'population and human health' factors should be on the list of environmental topics considered by EIA.

National Policy

Planning Policy Wales (2018)[196]

14.2.3 Planning Policy Wales (PPW) sets out the land use planning policies of Welsh Government to ensure the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural wellbeing of Wales. PPW also describes the Government's vision for how the planning system should operate to achieve the 'right development in the right place' through place-making and well-being approach. PPW's key planning principles are:

- **Growing the economy in a sustainable manner:** The planning system should enable development which contributes to long term economic well-being and development, making use of existing infrastructure and planning for new supporting infrastructure and services. Communities, national and local government, businesses and the third sector must work together to take a long-term view, integrating and aligning priorities through greater collaboration between stakeholders to achieve sustainable economic benefits in line with the well-being goals;
- **Making best use of resources:** The planning system should enable sustainable and efficient use of resources in underpinning sustainable development and place-making. Planning has a vital role to play in making development resilient to climate change,

[195] The Town and Country Planning (Environmental Impact Assessment)(Wales) Regulations 2017

[196] Welsh Government (2018) Planning Policy Wales – Edition 10. Accessible at: https://gov.wales/sites/default/files/publications/2019-02/planning-policy-wales-edition-10.pdf

decarbonising society and developing a circular economy for the benefit of the built and natural environments and to contribute to the achievement of the well-being goals;

- **Facilitating accessible and healthy environments:** Land use choices and the places created should be accessible and usable for all and support healthy lifestyles. High-quality places are also barrier-free and inclusive to all members of society, considering the needs of all people. This would ensure everyone can live, work, travel and access leisure services in a way that supports good physical and mental health outcomes;
- **Creating and sustaining communities:** The planning system must work in a holistic and integrated way to maximise its contribution to well-being of the population. This could be achieved through creating well-designed places and cohesive rural and urban communities which can be sustained by ensuring the appropriate balance of uses and density, planning and making places where people want to be and interact with others in their community. A sense of belonging would also contribute to the community atmosphere and interconnectedness; and
- **Maximising environmental protection and limiting environmental impact:** The planning system must protect, promote, conserve and enhance the natural, historic and cultural assets. Negative environmental impacts should be avoided in the wider interest of public and communities. This requires acting in the long term to respect environmental thresholds and operating in a holistic way so that resources and assets are not irreversibly damaged or depleted beyond the limits.

14.2.4 Technical Advice Notes (TANs) are specialist series published to supplement the PPW policies and principles with further technical guidance. Three topics were identified to be relevant to the population and health assessment which are summarised below.

Technical Advice Note 16: sport, recreation and open space (2009)[197]

14.2.5 TAN 16 provides technical guidance and policies on sport, recreation and open space. It outlines the importance of protecting existing facilities and open spaces in rural Wales and urban areas which is of relevance to the Scheme as there are active travel components.

14.2.6 The Advice Note states that the natural and built environments of Wales are a valuable resource for sport and recreational activities. However, these areas need to be managed in an effective way to ensure that they can be used sustainably.[198].

Technical Advice Note 20: planning and the Welsh language (2017)[199]

14.2.7 TAN 20 provides technical guidance to promote and facilitate the use of the Welsh language with the aim to conserve the social and cultural heritage of Wales. The Welsh Government aims and ambitions for the Welsh language are set out in the Welsh Language Strategy – Cymraeg 2050. Key principles to conserve the Welsh language of relevance to the Scheme are:

- Considering the use of Welsh language so far as it is relevant in community engagement and consultation; and
- Making sure to use the Welsh language in signs in planning and regeneration projects, in line with place-making and planning principles.

[197] Welsh Government (2009) Sport Recreation and Open Space Technical Advice Note 16. Accessible at: https://gov.wales/sites/default/files/publications/2018-09/tan16-sport-recreation-open-space.pdf

[198] Health in Wales (2009) Climbing Higher – Creating an Active Wales. Accessed from: http://www.wales.nhs.uk/documents/100121activewalesen.pdf

[199] Welsh Government (2017) Planning and Welsh Language Technical Guidance Note 20. Accessible at: https://gov.wales/sites/default/files/publications/2018-09/tan20-welsh-language.pdf

Technical Advice Note 23: economic development (2014) [200]

14.2.8 TAN 23 defines economic development broadly so that it includes any form of development that generates wealth, jobs and income. This is of relevance to the Scheme as jobs would be generated during the construction phase and it is envisaged that the enhanced facilities on the waterfront would encourage more people to visit the area which would have an impact on the local economy. The TAN recognises that a wide range of economic activities may be sustainably accommodated and that sustainable development is essential to building strong communities and vibrant communities.

Local Policy

Conwy Local Development Plan (LDP) 2007-2022 [201]

14.2.9 The Conwy LDP sets out the Council's priorities for the development and use of the County Borough. LDP also sets out policies to address the social, environmental and economic challenges. The policies and objectives relevant to the Scheme are:

- **SO2:** To promote the comprehensive regeneration of Colwyn Bay, Abergele, Towyn and Kinmel Bay to broaden economic activity, address social exclusion and reduce deprivation through the Strategic Regeneration Area Initiative;
- **SO4**: Identify and safeguard land to meet the community's needs for more jobs and greater economic prosperity – developing employment opportunities and skills development within and around the strategic hubs of Conwy, Llandudno, Llandudno Junction and Colwyn Bay;
- **SO5**: Encourage the strengthening and diversification of the rural economy where it is compatible with the local economy, community and environmental interests;
- **SO7:** Concentrate development along existing and proposed infrastructure networks, and, at locations that are convenient for pedestrians, cyclists and public transport;
- **SO8:** Assist tourism through the protection and enhancement of coastal and rural based tourism attractions and accommodation and further exploit the potential to develop, strengthen and encourage an all year around tourism industry;
- **SO10**: Ensure that good, sustainable, inclusive design is delivered which includes the opportunity to design out crime, to develop strong, safe and locally distinctive communities and encourage the younger population to remain and return to the area;
- **SO13**: To protect and improve accessibility to essential services and facilities, including open space, allotments, health, education and leisure; and
- **SO16**: Ensure that the development supports and sustains the long-term wellbeing of the Welsh language and the character and linguistic balance of communities within the Plan Area.

[200] Welsh Government

[201] Conwy County Borough Council (2013). Conwy Local Development Plan 2007-2022. Accessible at: https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Adopted-Local-Development-Plan-LDP/Assets-written-proposals-maps/Conwy-Local-Development-Plan-2007-2022.pdf

Other Policy and Guidance

Well-being of Wales 2018-2019[202]

14.2.10 The national wellbeing report provides insight into the progress which has been made in Wales against seven well-being goals which are outlined in the Well-being of Future Generations (Wales) Act 2015. Each goal is divided into national sub-indicators to improve the social, economic, environmental and cultural well-being of Wales. Of relevance to the Scheme are the statistics on activity levels in Wales. The report concludes that physical activity guidelines are not being met by approximately half of the population.

Welcome to Wales: Priorities for the visitor economy 2020-2025[203]

14.2.11 This document outlines the visions and ambitions for the Welsh tourism industry. The vision includes growing tourism in a way that also delivers benefits for people and places including environmental sustainability, social and cultural enrichment, and health benefits. The strategy identifies that the focus needs to be on developing the infrastructure needed to make everyone feel welcome, that improves access and contributes to creating a distinctive character and identity, particularly for market towns and coastal villages.

Health Impact Assessment – A practical guide[204]

14.2.12 The assessment is also guided by the Health Impact Assessment 'A practical guide' which outlines human health assessment methods for Wales. This is considered the most up-to-date and relevant piece of guidance for human health assessments in Wales. The Institute of Environmental Management and Assessment Guidelines for assessing health within EIA have also been used to inform the assessment. [205]However, professional judgement is also used to guide the assessment.

14.3 Study Area

14.3.1 Baseline data has been calculated for a Local Impact Area (LIA), Wider Impact Area (WIA) and for the CCBC area. These areas have been created based on guidance and professional judgement and are defined as follows:

- LIA – The area located within 500m of the Scheme would be referred to as the LIA. This is is designed to capture localised population and human health effects of the Scheme. This is shown on Figure 14.1 and comprises the eastern part of the Colwyn Bay Waterfront known as Old Colwyn;
- WIA – The town of Colwyn Bay would be referred to as the WIA. This is also shown on Figure 14.1 This area would be used to assess potential active travel effects as these may occur at distances which are greater than 500m from the Scheme; and
- CCBC – The area covered by CCBC which would be used to inform assessment of employment effects during construction of the Scheme.

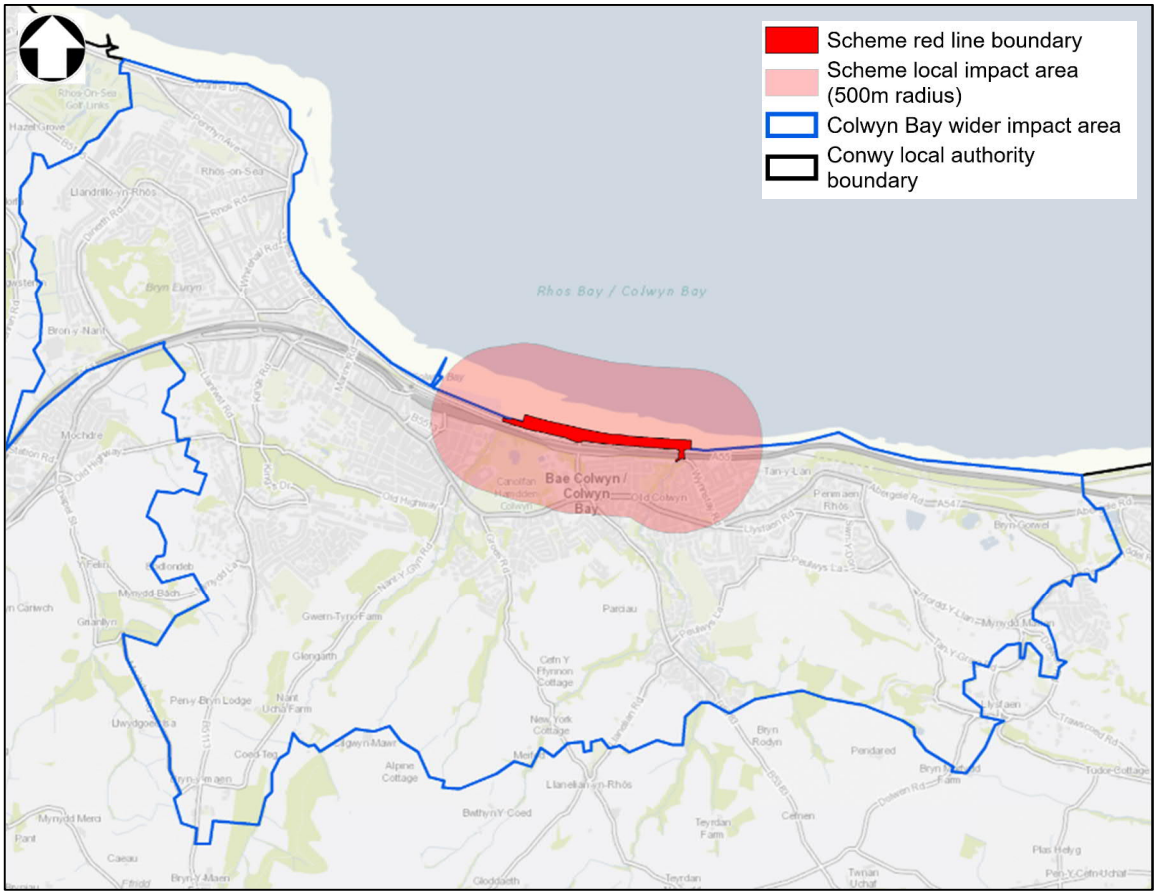
[202] Welsh Government (2019). Wellbeing of Wales 2018-2019. Accessible at: https://gov.wales/sites/default/files/statistics-and-research/2019-11/well-being-of-wales-2019.pdf

[203] Welcome to Wales: Priorities for the visitor economy 2020-2025. Accessible at: https://gov.wales/sites/default/files/publications/2020-01/welcome-to-wales-priorities-for-the-visitor-economy-2020-to-2025.pdf .

[204] Health Impact Assessment A practical guide. Accessible at https://whiasu.publichealthnetwork.cymru/files/1415/0710/5107/HIA_Tool_Kit_V2_WEB.pdf

[205] Health in Environmental Impact Assessment, A Primer for a Proportionate Approach. Accessible at: https://www.iema.net/assets/newbuild/documents/IEMA%20Primer%20on%20Health%20in%20UK%20EIA%20Doc%20V11.pdf

Figure 14.1: Impact Areas Used in the Population and Health Assessment



Source: Mott MacDonald, 2020

14.4 Assessment Methodology

Introduction

14.4.1 This section describes the methodology which has been used for the assessment of the population which may be affected by the construction and operation of the Scheme and any associated health effects.

14.4.2 The assessment methodology comprises first assessing the sensitivity of receptors that have the potential to be affected by the construction or operation of the Scheme. A combination of the sensitivity of receptor and the magnitude of impact in relation to the receptor has been used to determine the significance of effects. Effects have been determined as neutral, slight, moderate, large or very large, and either beneficial or adverse.

Sensitivity of Receptors

14.4.3 The sensitivity (value) of receptors has been determined according to the descriptions provided within Table 14.1.

Table 14.1: Scale for Evaluating the Sensitivity (Value) of Population and Health Receptors

Receptor Value (Sensitivity)	Description
High	• An already vulnerable receptor with very little capacity and means to absorb changes. • No alternative resources, access arrangements or opportunities are available within an easily accessible distance. • A highly or frequently accessed resource.
Medium	• A non-vulnerable receptor with limited capacity and means to absorb changes. • A limited range of alternative resources, access arrangements or opportunities are available within and easily accessible distance. • A moderately or semi-frequently accesses resource.
Low	• A non-vulnerable receptor with sufficient capacity and means to absorb changes. • A wide range of alternative resources, access arrangements or opportunities are available within an easily accessible distance. • An infrequently accessed resource.

Source: DMRB Volume 11 Section 3 Part 11 HA (LA109)

Magnitude of Impact

14.4.4 The magnitude of impact is determined by the predicted deviation from the baseline conditions and the scale of the effect. The qualitative magnitude of each impact (in the absence of quantitative data) has been determined according to the descriptions provided within Table 14.2.

Table 14.2: Impact Magnitude Criteria for Receptors

Magnitude of Impact	Typical Description
Major	• Affects receptors within the LIA and potentially beyond. • Affects many receptors. • A substantial change (positive or negative) from the baseline position. • A large widening or narrowing of inequalities. • Majority of communities affected have high levels of deprivation. • The impact is permanent or long-term (e.g. more than a year). • Requires considerable intervention to return to the baseline.
Moderate	• Affects receptors beyond the application site into the LIA. • Affects a moderate number of receptors. • A notable change (positive or negative) from the baseline position. • A widening or narrowing or inequalities. • Majority of communities affected have average or above average levels of deprivation. • The duration over which the impact is experienced is medium-term (e.g. between six months and a year). • May require some intervention to return to the baseline.
Minor	• Affects receptors in the LIA only, and mostly within the application site • Affects a small number of receptors • A slight change (positive or negative) from the baseline position with evidence available to demonstrate change • A slight widening or narrowing of inequalities with evidence available to demonstrate change

Magnitude of Impact	Typical Description
	• Few people in a community affected (positively or negatively) • The duration over which the impact is experienced is short-term (e.g. between three and six months) • Baseline returns without intervention or with only limited intervention
Negligible	• Affects receptors within the site boundary only • Baseline remains consistent/no discernible change (positive or negative) from the baseline position • Majority of communities affected are not deprived • Impact is very short-term (e.g. less than three months) • Affects the well-being of very few receptors
No change	• No loss or alteration of characteristics, features or elements; no observable impact in either direction

Source: DMRB Volume 11 Section 3 Part 11 HA (LA109)

Significance of Effect

14.4.5 Subsequent to identifying an appropriate receptor sensitivity and magnitude of impact using Table 14.1and Table 14.2 the likely significance category and overall significance of effects has been assessed by using the matrix provided within Table 14.3 along with professional judgment to consider site specific factors that may be of relevance.

Table 14.3: Rating of Effects Criteria

Magnitude of Potential Impact	Environmental Value (Sensitivity of Receptor)		
	High	Medium	Low
Major	Large / Very Large	Moderate / Large	Slight / Moderate
Moderate	Moderate / Large	Moderate	Slight
Minor	Slight / Moderate	Slight	Neutral / Slight
Negligible	Slight	Neutral / Slight	Neutral / Slight
No Change	Neutral	Neutral	Neutral

Source: Adapted from DMRB Volume 11 Section 2 Part 4 (LA104)

14.4.6 Effects are identified as neutral, slight, moderate, large or very large; adverse or beneficial. For the purposes of this assessment, effects of Moderate (Adverse or Beneficial) and above would be considered to be significant.

Assessment Assumptions and Limitations

Assumptions

14.4.7 The following assumptions should be considered when reading this population and health assessment:

- The construction and operation of the Scheme would not render any properties unusable and there would be no displacement of local residents;
- The level of community infrastructure provision would not alter as a result of the Scheme. It is assumed that health, education and community provision would remain unchanged; and
- The construction process may cause some disruption but would not cause temporary business closure. There are existing businesses at Porth Eirias and kiosks along the Promenade. At the time of writing, there is likely to be temporary disruption to access. Management measures are recommended within the Construction Environmental Management Plan (CEMP) and it is envisaged that there would be further engagement between CCBC and these businesses.

Limitations

14.4.8 The following limitations should be considered when reading this Population and Health assessment:

- The assessment of the potential for significant effects has been carried out against a benchmark of current baseline conditions within the LIA, WIA and CCBC area. As with any dataset, these may be subject to change over time, which may influence the findings of the assessment and could lead to the assessment being subject to statistical time lag;
- Information presented within this assessment is from 2018 and 2019 and therefore does not reflect any changes to the economy and employment associated with the Covid-19 pandemic in 2020. As comparable information becomes available for the 2020 period, the baseline can be updated if required; and
- No formal consultation or primary research, such as engagement with affected resources, has been undertaken in production of this chapter.

14.5 Baseline Conditions

14.5.1 A range of publicly available data sources have been used to determine population and health baseline. These include statistics on population and employment from the Office of National Statistics (ONS) and data from local authorities.

Population

14.5.2 Colwyn Bay is a seaside town in Conwy County Borough on the North Wales coast. The main settlements are Rhos-on-Sea to the west, the town of Colwyn Bay in the centre and Old Colwyn to the east, which is the closest to the Scheme. The A55 Expressway passes through the town, running parallel to the NWC Railway Line, both of which separate Old Colwyn and Colwyn Bay from the waterfront.

14.5.3 The total population of the LIA and WIA is 4,012 and 17,935 respectively. Table 14.4 shows the population and age structure of the LIA, WIA, CCBC and Wales in detail.

Table 14.4: Population Baseline Data

Area	Total Population	Under 16	Age 16-64	65+
LIA	4,012	20%	59%	21%
WIA	26,806	17%	56%	23%
CCBC	117,181	16%	56%	27%
Wales	3,138,631	18%	61%	21%

Source: ONS Population Estimates 2018

14.5.4 The proportion of children in the LIA (20%) is slightly higher than the proportion in the WIA (17%) and CCBC (16%). The proportion of people aged 65 and older in the LIA (21%) and WIA (23%) is consistent with the proportion in Wales (21%) but lower than the proportion in CCBC (27%). People aged between 16 and 64 make up the majority of the population in the LIA and WIA.

Deprivation

14.5.5 The Welsh Index of Multiple Deprivation (WIMD) is used for the measurement of relative level of deprivation (poverty). Table 14.5 shows the income deprivation quintiles across the LIA, WIA, CCBC and Wales.

Table 14.5: Population by Deprivation Quintiles

Location	Most Deprived	Second Most Deprived	Third Most Deprived	Fourth Most Deprived	Least Deprived
LIA	24%	11%	0%	41%	24%
WIA	22%	18%	7%	25%	17%
CCBC	12%	22%	18%	24%	25%
Wales	20%	20%	20%	20%	20%

Source: Indices of Multiple Deprivation, 2019

14.5.6 Most of the residents in the LIA live in either the least deprived (24%) or fourth most deprived (41%) neighbourhoods in the country. This is a higher proportion than the WIA, CCBC and Wales proportions in these two quintiles. The population in the LIA is therefore less deprived in comparison to the WIA, CCBC and Wales populations.

Employment and Economic Activity

14.5.7 As shown in Table 14.6, the proportion of working age individuals aged 16-64 in the LIA and WIA is 68% and 65% respectively. This is broadly in line with the CCBC (66%) and Wales statistics (66%). There is a greater proportion of economically active people in the LIA compared to the three other areas.

Table 14.6: Economic Activity Baseline Data (16-64 year olds)

Area	Economically Active	Economically Inactive	Unemployment rate
LIA	67%	33%	N/A
WIA	65%	35%	N/A
CCBC	66%	34%	3.2%
Wales	66%	30%	4.2%

Source: ONS Population Estimates 2018; 2019 Annual Population Survey

14.5.8 The Office for National Statistics provides data on employment estimates by industry[206]. The largest industries of employment in the WIA are health (28%), education (11%), arts, entertainment, recreation and other services (9%) and retail (9%). The proportion of employees within the health sector is higher than the CCBC and Wales proportion as there is a community hospital and a number of General Practitioner clinics within the WIA. In general, the WIA is made up of predominantly public sector employment activity.

[206] Office for National Statistics 2018

Businesses

14.5.9 There are several businesses within the LIA located at the western end of Old Colwyn within the Porth Eirias building (to the west of the car park), and accessible from the pedestrian Promenade, Promenade highway and beach. These include water sports providers and a beach front restaurant as well as a café and bar. Porth Eirias also offers spaces to hold events and has conference rooms available. There is also a single kiosk (the Bay Kiosk) located in the central area of the Promenade which is open seasonally.

14.5.10 Other businesses within the LIA are located in Colwyn Bay, to the south of the A55 Expressway.

Tourism

14.5.11 North Wales accounts for approximately a third of domestic tourism nights within Wales, which is more than any other Welsh region[207]. In 2018 tourism generated around £887 million to the CCBC economy[208].

14.5.12 Colwyn Bay's long Promenade, ease of access to blue-flag beaches and nearby harbours attracts tourists, particularly in the summer months. The area has been a popular seaside destination since Victorian times. The Promenade gives easy access to the town's beaches, pier and the harbour, popular for water-sports including kayaking, windsurfing, sailing and swimming and there are separate slipways situated along the Promenade[209]. There are also local businesses providing water-sports services and equipment along the Colwyn Beach.

Health

14.5.13 Table 14.7 presents key health indicators within CCBC and Wales. CCBC generally performs consistently on a par with the national statistics in relation to public health indicators, including for conditions sensitive to environmental indicators such as respiratory diseases. Physical activity levels in CCBC (61%) are higher than the national average (53%).

Table 14.7: Public Health Baseline Data

Measure	CCBC	Wales
Long-term health problem or disability (2011) (%)	24	24
Life expectancy at birth (male 2015-17) (years)	79	78
Life expectancy at birth (female 2015-17) (years)	83	82
Under-75 mortality rate, cardiovascular diseases (per 100,000, 2016-18)	84	86
Physically active adults (% 2017/18)	61%	53%

Source: NHS Wales, Public Health Indicators

Residential properties

14.5.14 The nearest residential properties to the Scheme are located to the south on Min-Y-Don Avenue, Cliff Gardens, Queens Avenue and Beach Avenue. These properties are also located to the south of the Promenade, A55 Expressway and NWC Railway Line which provide a buffer

[207] Mott MacDonald (2013) Colwyn Bay Waterfront Project: Environmental Statement Addendum for Phase 1b

[208] Conwy Borough Council (2019) Destination Conwy Management Plan. Available here: http://www.conwy.gov.uk/en/Council/Strategies-Plans-and-Policies/Destination-Conwy

[209] 'Go North Wales' Tourism Site for Colwyn Bay (2020)

between the properties and the Scheme. No properties are directly accessible from the A55 Expressway as it runs through the LIA.

Open Space and Recreation, including active travel routes

14.5.15 People are able to walk and cycle along the Promenade which is a popular activity for residents and visitors.

14.5.16 National Cycle Route 5 passes through the LIA and along the Promenade in Old Colwyn. This is a main cycle route in CCBC. As shown on Drawing 415437-MMD-00-XX-DR-N-1704 in Chapter 3 Section 3.5, there are Public Rights of Way (PRoW) in the LIA which provide pedestrians and cyclists access around Colwyn Bay town. One PRoW provides access to the Promenade from the A55 Expressway and intersects with the western end of the Scheme. Beach access is currently provided through slipways located at regular intervals.

14.5.17 Eirias Park includes amenities such as tennis courts, play areas, sports fields, a skate park and an indoor leisure centre is located within the LIA. There is also a bowling club and boat club at the park.

Baseline Receptor Summary

14.5.18 From the baseline data above, the receptors within the baseline with the potential to be affected by the Scheme are summarised within Table 14.8 using the sensitivity scale in Table 14.6.

Table 14.8: Identified Receptors

Receptor	Details	Receptor Sensitivity	Reasoning
Local businesses	Businesses at Porth Eirias are located within the LIA, to the west of the red line boundary of the Scheme, in close proximity to proposed construction activity.	Medium	These businesses have limited alternative arrangements to absorb the potential impacts of construction and operation of the Scheme as they have a fixed location. They are the only businesses on the waterfront providing water sports and hospitality services, so are assumed to be well utilised.
Walkers, cyclists and other recreational receptors such as anglers who use the Promenade for recreational activities.	Areas within the WIA used for recreational activities, particularly walking and cycling. The Promenade is well used by the local population for walking and cycling. National Cycle Route 5 passes through the LIA. Additionally, Area 2 is popular with the angling community.	Medium	The area is very popular and well utilised by the community for a range of recreational activities. There are a limited range of alternative routes of the same length that are as proximate to the coast. However, there are other active travel routes available to the west along the Promenade and other places for recreation within the WIA, such as Eirias Park.

Receptor	Details	Receptor Sensitivity	Reasoning
Users of Old Colwyn Beach	Within the LIA there is a portion of the Scheme which includes Old Colwyn Beach.	Medium	Although Old Colwyn Beach is frequently utilised by the local population, Colwyn Bay Beach is located directly to the west of Porth Eirias and so is only a short walking distance away. Therefore, there is an alternative beach available for the local population to use at an accessible distance.
Residential properties on Min-Y-Don Avenue, Cliff Gardens, Queens Avenue and Beach Avenue	Within the LIA, these are the closest properties to the Scheme. They are located between 70-100 m to the south of the Scheme but are separated by the A55 Expressway and NWC Railway Line.	High	As effects on these residential receptors concern potential changes to amenity, from activities associated with construction. There would be limited ability to absorb these changes as no alternative properties are being provided. The properties are also a highly accessed resource as residents access them every day.
Local visitors to the area (tourist receptors)	Old Colwyn, which is located within the WIA, is a popular tourist destination and one of the attractions, particularly during the summer months, is Old Colwyn Beach.	Medium	Particularly during the summer months, Colwyn Bay is a popular tourist destination. Therefore, it is considered to be a moderately accessed area due to its popularity during the summer months.

Source: Mott MacDonald (2020)

14.6 Consultation

14.6.1 No additional consultation specific to population and human health has been required.

14.6.2 Scheme-wide consultation details are provided in Chapter 5.

14.7 Potential Impacts (Pre-Secondary Mitigation)

14.7.1 This section presents the likely direct and indirect impacts on the baseline environment as a result of construction and operation of the Scheme.

Primary (Embedded Mitigation)

14.7.2 A number of primary mitigation and enhancement measures have been incorporated into the Scheme proposals, in terms of working methodology and Scheme design. These are outlined below. Unless otherwise stated, these primary mitigation measures have been assessed as part of the Scheme proposals in the “pre-mitigation” effects. The primary mitigation for this Scheme includes the following:

- The Scheme has been designed, as far as possible, to minimise adverse effects on population and health receptors and improve outcomes for the local population;

- Key parts of the design enhance walking and cycling opportunities for the local population including enhancements to walking and cycling routes and a new connection to National Cycle Route 5;
- Access to the beach would be improved through a new stepped and ramp pedestrian access through the proposed revetments; and
- There are additional recreational opportunities provided through improvements to the existing picnic area to the south of the Promenade highway and south east of Porth Eirias, a new fishing platform in the Splashpoint Area and marine ecological enhancements as described in Chapter 3, Scheme Description, Section 3.3.

Construction

Employment and Economic Activity

14.7.3 A Contractor has not yet been appointed to construct the Scheme. However, based on contractor estimates, it is anticipated that the peak workforce on site would be 20 to 30 people for the duration of the construction period.

14.7.4 It is presently unknown where the staff who would undertake the construction of the Scheme would reside. As part of the tendering process it is recommended that the contractor is required to demonstrate the measures it would utilise to employ a local workforce so that long- and short-term benefits can be attributed to the local area (CCBC area).

14.7.5 It is also likely that there would be increased economic activity as a result of construction workers utilising goods and services in Colwyn Bay, particularly in the Old Colwyn area where construction site is located

Local Businesses

14.7.6 There is the potential for temporary disruption during the construction phase. As outlined in Chapter 4 Scheme Construction, there would be full closure of Area 2 to traffic and Area 1 would be closed for another 10 months for eastbound traffic. There would also be temporary closure and diversion of walking and cycling routes. The eastern third of the Porth Eirias car park may be required for a third construction compound. This car park currently provides parking for people wanting to access the businesses at Porth Eirias. This temporary disruption to access may have an impact on the number of patrons accessing these businesses, given the usual routes to access the business would be temporarily disrupted and there may be a reduction in amenity for patrons due to the presence of construction activity in close proximity to the premises.

14.7.7 Additionally, there the temporary closures of sections of the pedestrian Promenade to walking and cycling, which would be for a maximum 7 months fully closed in Section 1, would cause temporary disruption to a kiosk called Seasonal which operates on the Promenade.

Recreation

14.7.8 Access to Old Colwyn beach would be restricted throughout construction. There may be a requirement to deliver some of the rock revetment by barge within the intertidal zone of the beach. This would temporarily impact on the ability for recreational users to use this area.

14.7.9 The restrictions to access the Promenade, would also impact other recreational activities such as angling which is an activity regularly undertaken from this location. These restrictions to recreational activities would impact the wellbeing of residents, particularly within the WIA as they are most likely to go to the Promenade and beach as they are in such close proximity.

Active Travel

14.7.10 During construction there would be restrictions to pedestrian and cycle movements as detailed in Chapter 4 Scheme Construction. Pedestrian movements would be partially and fully restricted on the Promenade. National Cycle Route 5 would also be temporarily diverted through residential streets. This would impact the ability for people to walk and cycle continuously along the coast.

Amenity

14.7.11 The introduction of construction works as part of the Scheme has the potential to result in a temporary reduction in amenity primarily affecting local residents, business and community facilities. This is due to changes in factors which contribute to amenity value, such as air quality, landscape and visual and noise effects. noise, air quality and landscape and visual effects. These individual effects are reported within Chapter 7 Air Quality, Chapter 11, Landscape and Visual and Chapter 13, Noise and Vibration and. However, where reported residual significant effects combine to affect a receptor in a particular location, this combination of effects are assessed within this chapter.

Operation

Local Businesses

14.7.12 The regeneration of the Promenade area would improve the condition of the waterfront in Old Colwyn and is likely to increase the number of people who use the area. This is likely to increase activity for existing businesses along the Promenade. An increased demand is also likely to encourage more business activity along the Promenade, although the exact number and type of business opportunities are unable to be quantified at this point in time. However, as part of the Scheme, a space for concessions buildings in the active area to the south of the would be provided for commercial activity.

Recreation

14.7.13 A major focus of the Scheme is improving recreational opportunities for the community:

- Improvements to the existing picnic area to the south of the Promenade highway and south-east of Porth Eirias, including a formal picnic area garden setting and outdoor classroom. Drawings showing these scheme components can be found in ES Volume 2, Technical Appendix 3.1;
- New stepped and ramp pedestrian accesses (Equality Act compliant) to the beach through the proposed revetments
- A variety of marine ecological enhancements, such as the Outdoor Classroom, (as described in Chapter 3, Scheme Description, Section 3.3); and
- A new fishing platform in the Splashpoint Area to ensure anglers do not block active travel routes.

14.7.14 These improvements enhance the public realm, increasing opportunities for the local population to undertake outdoor recreational activities.

Active Travel

14.7.15 Another focus of the Scheme is improving active travel opportunities along the Promenade. The Scheme provides the following:

- Improvements to the alignment and width of pedestrian and cycle paths along the active travel route within the LIA;
- Regular pedestrian crossings of the Promenade highway to enable pedestrians and cyclists to cross the highway safely; and
- Improvements to the connection to National Cycle Route 5 from the Promenade. There Scheme provides continuous connection for cyclists transitioning between the shared used portion of the Promenade and the National Cycle Route 5.

These enhancements would have a beneficial impact on walkers and cyclists as the Scheme provides a continuous route for walkers and cyclists along the coast in Colwyn Bay, with improved connections to existing routes within the area.

Amenity

14.7.16 The Scheme includes landscaping improvements to the Promenade such as intermittent artwork in the activity zone (which is located in the southern half of the Scheme), landscape features within the access built out area and the utilisation of an inset into the NWC Railway Line as a landscape feature. The artwork strategy for the Promenade is shown on BCA Landscape Drawing 19.537-103-GA04 in Chapter 3, Section 3.5. These features positively contribute to the amenity of the Promenade for the local population.

14.7.17 Although the Scheme would make a positive contribution to amenity, air quality, landscape and visual and noise effects have been scoped out for the operational phase of the assessment. Therefore, although it is anticipated that it is recognised that improvements to the public realm would improve the use and enjoyment of the area for the populations, these are not included within the assessment of significant effects of this chapter.

Tourism

14.7.18 This Scheme is part of the Colwyn Bay Waterfront Project which aims to protect the community and infrastructure through improving the existing coastal defences, whilst also creating a Promenade which would attract both local residents and visitors. These enhanced facilities are likely to encourage more people to visit the area and/or spend a longer time enjoying the improved waterfront.

14.8 Design Mitigation (Secondary Mitigation) and Enhancement Measures

14.8.1 Appropriate mitigation options have been identified utilising professional judgement.

Mitigation

Construction

14.8.2 The following secondary mitigation measures are proposed during the construction stage:

- The Contractor would develop a CEMP to minimise disruption to businesses for customers, deliveries and staff and to minimise disruption to pedestrians, cyclists and users of the beach;
- Temporary diversions and other management procedures would be advertised throughout the WIA; and
- The Contractor would develop a Traffic Management Plan to minimise disruption to motorised users (more detail provided within the Transport Assessment located in ES Volume 2, Technical Appendix 15.1); and

- It is recommended that the Contractor identifies commitments to benefit local workforce and these are implemented and monitored.

Operation

14.8.3 No mitigation measures are proposed during operation.

Enhancement

14.8.4 No further enhancement measures are proposed during both construction or operation as the Scheme already embeds improvements as part of the design of the Scheme. These include improvements to the Promenade area and active travel routes, enhancements to picnic areas, additional recreational activities, such as the fishing platform, and increased learning opportunities for the local population provided by the Outdoor Classroom.

14.9 Assessment of Likely Significant Effects

14.9.1 The assessment of likely significant effects has been undertaken following the methodology described in Section 14.4.

Construction

Employment and Economic Activity

14.9.2 It is expected that during construction there would be benefits for the local economy due to the small number of extra employment. Approximately 20-30 construction workers would be required to build the Scheme.

14.9.3 The sensitivity of local economic receptors is considered to be medium due to the unemployment rate being consistent with national averages and construction activity taking up a small proportion of the economy.

14.9.4 It is presently unknown where the staff who would undertake the construction of the Scheme would reside. As part of the tendering process it is recommended that the contractor is required to demonstrate the measures it would utilise to encourage access to the local workforce so that some long- and short-term benefits can be attributed to the local area (CCBC area). However, due to the temporary nature of these jobs and the uncertainty about whether this would benefit the labour force in the CCBC area, the magnitude of change is minor.

14.9.5 The construction phase would have a beneficial, though temporary effect on the local economy through the construction labour employed and potentially supporting local businesses through expenditure from direct spend on materials for the Scheme. Therefore, there is likely to be a direct, temporary **Slight Beneficial** effect on local (CCBC) receptors (not significant).

Local Businesses

14.9.6 Due to restricted access to cyclists, pedestrians and vehicles for up to 7 months, there are likely to be adverse effects felt by those businesses within the LIA which operate from the Promenade. This may have a temporary impact on footfall. This is due to disruption to access, and a reduction in amenity from construction activities in close proximity to the premises at Porth Eirias (see Chapter 11, Landscape and Visual). These effects are applicable to those businesses which operate from Porth Eirias and ‘Seasonal’ which is a kiosk which operates from the Promenade.

14.9.7 Mitigation measures would be put in place to reduce potential impacts from noise, dust and vibration as much as practicable and to maintain access to staff, deliveries and patrons. Therefore, the magnitude of change for these local businesses is considered to be minor due to the small number of businesses impacts and the temporary nature of these effects.

14.9.8 As such, there is considered to be a direct, temporary **Slight Adverse** effect on local businesses (not significant) with mitigation.

Recreation

14.9.9 There would be restrictions to access and use of the Promenade and beach during construction for up to seven months. These closures and restrictions are likely to impact anglers who regularly use the Promenade and beach area as well as local residents who use the area for recreational pursuits. The sensitivity of these receptors (recreational receptors within the WIA) is medium as the area is very popular for a range of recreational activities and there are some alternative places nearby which could be used for similar recreational pursuits.

14.9.10 The effects on wellbeing from this temporary disruption are anticipated to be minor given there are alternative facilities within walking distance, including alternative beach access at Colwyn Bay and Eirias Park to the west. It is not envisaged that these temporary reductions would significantly dissuade people from undertaking physical activity or other recreational pursuits within the WIA.

14.9.11 Therefore, during construction, there is likely to be a temporary direct **Slight Adverse** effect (**not significant**) on the local population within the WIA from disruption to recreational pursuits.

Active Travel

14.9.12 During construction there would be restrictions to pedestrian and cycle movements as detailed in Chapter 4 Scheme Construction. Pedestrian movements would be partially and fully restricted on portions of the Promenade, National Cycle Route 5 would be temporarily diverted through residential streets. This would have an impact on the local population to walk or cycle continuously along the coast within Colwyn Bay for a period of 20 months.

14.9.13 Although though walking and cycling routes within the WIA would be restricted, people would still be able to walk and cycle along the coast to the west of Porth Eirias for the duration of the construction period. Where appropriate, temporary diversions would be implemented and clearly advertised to the public Therefore the magnitude of change is considered to be minor.

14.9.14 Therefore, during construction, there is likely to be a temporary direct **Slight Adverse** effect (**not significant**) on walkers and cyclists within the LIA from temporary disruption to walking and cycling routes.

Operation

Local Businesses

14.9.15 The regeneration of the Promenade area would improve the condition of the waterfront in Old Colwyn. This is likely to increase business activity for existing businesses along the Promenade as more people would use the area. Additionally, the improved coastal protection may encourage more businesses to relocate to the Promenade, although the exact number and type of business opportunities are unable to be quantified at this point in time.

14.9.16 The sensitivity of the existing local businesses is considered to be medium as there are a small number of businesses which operate from this part of the LIA, but they have limited alternative

locations to be able to operate. The magnitude of the impact is considered to be minor as effects are limited to the LIA, there are only a small number of existing businesses that would be impacted and the extent to which the Scheme would encourage additional business activity cannot currently be determined.

14.9.17 Therefore, during operation, there is likely to be a permanent, direct **Slight Beneficial** effect (not significant) on businesses within the LIA.

Recreation

14.9.18 A major focus of the Scheme is improving recreational opportunities along the Promenade and increasing access and use of the beach. The full extent of these improvements are outlined in Chapter 3, Scheme Description. These improvements are considered to be beneficial for the population living within the WIA. This is because the enhancements, would increase opportunities to undertake recreational pursuits and appeal to a wide range of interests. There are also improvements to the public realm of the Promenade and beach accesses. Therefore, it is more likely that people would participate in outdoor recreational activities as a result of the Scheme.

14.9.19 Providing these enhancements would have a moderate impact the wellbeing of the local population (within the WIA). This is because the Scheme provides the opportunity for people to lead healthy lifestyles through exercising to increase their physical activity, enjoying the coastal environment and meeting and interacting with other people from their community, which enhances mental health and wellbeing.

14.9.20 Therefore, during operation, there is likely to be a permanent, direct **Moderate Beneficial** effect (significant) on the local population within the WIA from increased opportunities to undertake recreational pursuits.

Active Travel

14.9.21 Another major focus of the Scheme is improving active travel opportunities along the Promenade that connect to the wider walking and cycling network within Colwyn Bay.

14.9.22 The full extent of these improvements are outlined in Chapter 3, Scheme Description and summarised in paragraph 14.7.13 and include upgrades to the existing alignment of walking and cycling paths within the LIA and the connection to National Cycle Route 5. These improvements are considered to bring moderate beneficial impacts to the population living within the WIA. This is because it is noticeable change to the baseline condition, the routes are well connected to existing routes and would encourage people to walk or cycle along the coast for recreational purposes or use the route to travel between places in Colwyn Bay and therefore a moderate number of receptors would be impacted by the Scheme.

14.9.23 Providing these enhancements benefits physical health, mental health and wellbeing of the local population (within the WIA), providing infrastructure that enables and encourages people to exercise. Therefore, during operation, there is likely to be a permanent, direct **Moderate Beneficial** effect (significant) on the local population within the WIA from improvements to active travel infrastructure.

Tourism

14.9.24 As mentioned above, the enhanced facilities are likely to encourage more people to visit the area. The profile of Colwyn Bay a tourist destination is likely to be raised as a result of the Scheme which would bring more people to the local area. The CCBC economy is likely to benefit from an increased tourist footfall and increased visitor spend.

14.9.25 The magnitude of the impact on tourism is considered to be minor as the operation of the Scheme is not likely to attract a significant number of more tourists to Colwyn Bay as the Scheme is unlikely to be the primary reason visitors come to the Colwyn Bay area. However, it is recognised that there may be some increase in tourism activity.

14.9.26 As such, during operation, there is likely to be a permanent, indirect, **Slight Beneficial** effect on tourism activities within the WIA.

14.9.27 Table 14.9 summarises the Scheme assessment of effects, detailing the potential effect identified and appropriate mitigation measures for a particular receptor. The receptor sensitivity and magnitude of impact has been estimated followed by the identification of the significance category after mitigation and enhancement measures have been taken into account (as detailed in Section 14.8.

Table 14.9: Assessment of Effects Summary

Receptor	Summary of Impacts	Mitigation and Enhancement Measures	Action by (Contractor/Designer)	Receptor sensitivity	Magnitude	Residual Significance Category (with mitigation)
CONSTRUCTION						
Local economy (CCBC area)	The construction phase would have a beneficial, though temporary effect on the local economy through the construction labour employed and potentially supporting local businesses through expenditure from direct spend on materials for the Scheme.	N/A	Inclusion of mitigation measures within CEMP	Medium	Minor	**Direct, Temporary Slight Beneficial, (Not Significant)**
Local businesses	Local businesses - Disruption to access to the Promenade and to trade.	Require the Contractor to develop a CEMP to minimise disruption to Promenade access for customers, deliveries and staff.	Inclusion of mitigation measures within CEMP	Medium	Minor	**Direct, Temporary, Slight Adverse, (Not Significant)**
Local residents	Recreation - Temporary closure of the Promenade and portions of the Old Colwyn beach impacting the ability for people to undertake recreational activities.	Require the Contractor to develop a CEMP to minimise disruption to recreational users of the waterfront area and the beach. Ensure that temporary diversions and other management procedures are well advertised throughout the WIA.	Inclusion of mitigation measures within CEMP	Medium	Minor	**Direct, Temporary, Slight Adverse, (Not Significant)**
Local residents	Active travel - Temporary closure of walking and cycling routes affecting the ability for people to walk and cycle along the waterfront in Old Colwyn	Require the Contractor to develop a CEMP to minimise disruption to walking and cycling routes. Ensure that temporary diversions and other management procedures are well advertised throughout the WIA.	Inclusion of mitigation measures within CEMP	Medium	Minor	**Direct, Temporary, Slight Adverse, (Not Significant))**

Receptor	Summary of Impacts	Mitigation and Enhancement Measures	Action by (Contractor/Designer)	Receptor sensitivity	Magnitude	Residual Significance Category (with mitigation)
OPERATION						
Local businesses	Business activity - increase in business activity from an increase in footfall from people using the Promenade area and/or additional business activity along the Promenade from more businesses moving to this area of Old Colwyn.	N/A	N/A	Medium	Minor	**Indirect, Permanent, Slight Beneficial (Not Significant)**
Local residents	Recreation – the Scheme increases opportunities for the local population to undertake outdoor recreational pursuits.	N/A	N/A	Medium	Moderate	**Indirect, Permanent, Moderate Beneficial (Significant)**
Local residents	Active travel – the Scheme increases walking and cycling opportunities along the coast by enhancing connectivity to existing routes and improving the infrastructure along the Promenade.	N/A	N/A	Medium	Moderate	**Indirect, Permanent Moderate Beneficial (Significant)**
Tourism receptors	Potential increase in tourism activity within the WIA.	N/A	N/A	Medium	Minor	**Indirect, Permanent Slight Beneficial (Not Significant)**

Source: Mott MacDonald Ltd, 2020

Likely Residual Significant Effects Recorded (Post-Mitigation)

Construction

14.9.30 Incorporating the mitigation and enhancement measures as outlined in Section 14.8, the maximum residual effect identified is **Slight Adverse** (not significant). Therefore, no residual significant effects are recorded.

Operation

14.9.31 Incorporating the mitigation and enhancement measures as outlined in Section 14.8, the maximum residual effect identified is **Moderate Beneficial**. Therefore, significant residual beneficial effects are anticipated for the local population as a result of the enhanced opportunities provided as a result of the Scheme leading to improved recreational and active transport opportunities.

14.10 Requirements for Tertiary Mitigation/Monitoring

14.10.1 There are no requirements for monitoring given significant residual effects are limited to beneficial effects to the local population from enhanced, walking, cycling and recreational facilities provided by the Scheme.

14.11 Conclusions

14.11.1 The construction phase is likely to give rise to some adverse effects, including the impacts likely to be felt by businesses and residents due to temporary closure of sections of the Promenade and Old Colwyn beach. By implementing appropriate mitigating measures (for example an appropriate CEMP and Construction Traffic Management Plan) it would be possible to reduce these impacts to minor adverse.

14.11.2 During the operational phase all population and health effects are likely to be significant, beneficial and permanent. The most significant positive effect would be for the local population who has enhanced walking, cycling and recreational opportunities as a result of the Scheme's enhancements to the Promenade area. This would lead to improved wellbeing for the local population. The Scheme also contributes to the regeneration of Colwyn Bay waterfront which would lead to slight beneficial impacts for businesses and tourism.

14.12 Drawings

14.12.1 No key drawings are provided in support of this chapter, however the Scheme red line boundary can be found in Chapter 1 Introduction, Section 1.8, and the Landscape and Heritage Environmental Constraints Drawing 415437-MMD-00-XX-DR-N-1704 (displaying public rights of way) can be found in Chapter 3 Scheme Description, Section 3.5.

14.13 List of Documents Included in ES Volume 2: Technical Appendix 14

- Appendix 14.1: Assessment of Vulnerable Groups.

15 Other Environmental Disciplines

15.1 Geology and Soils

15.1.1 Geology and Soils was scoped out of the EIA in the Scoping Report ES Volume 1, Technical Appendix 1.3) for the following reasons:

- There are no geologically designated sites within the Scheme area. Effects in relation to the underlying geology would be anticipated to be negligible given the proposals are predominantly concerned with raising levels rather than lowering them;
- There are no agricultural soils within the Scheme area. While there are proposals to enhance the embankment ecologically, it is assumed that this would not include the removal of any topsoils or subsoils and with best practice applied during the construction period, effects are anticipated to be negligible;
- From the assessment of site history, the Scheme area does not include any potentially contaminative past land uses. Contaminated land is not anticipated to be encountered and therefore significant adverse effects associated with contaminated land are not anticipated; and
- Effects on groundwater within this area are anticipated to be negligible.

15.2 Traffic and Transport

15.2.1 In the Scoping Report ,Traffic and Transport effects were anticipated to be concentrated in the construction phase with the key effects being that in the short term:

- Construction traffic would temporarily impact on the quality of life of local residents/businesses although the main access route would be directly off the A55 Expressway;
- The temporary closure of pedestrian and cycle routes would have a small impact on users, but alternative and suitable diversion routes would be available;
- There would be temporary increases in traffic volumes on the local road network due to diversions and lorries delivering construction material (depending on construction traffic routes from different locations);
- Temporary traffic management and highway diversions would to be required during the construction period, resulting in some access difficulties; and
- Temporary alterations to parking facilities would impact upon residents and businesses.

15.2.2 Traffic, Transport and Access was scoped out of the EIA in the Scoping Report (ES Volume 2, Technical Appendix 1.3) on the understanding that a Transport Statement (TS) would be produced for the Scheme (ES Volume 2, Technical Appendix 15.1) and that compliance with the measures outlined in this document would ensure effects were not significant..

15.2.3 The completed TS has demonstrated that:

- The site benefits from having convenient and direct access from the A55 Expressway. Construction vehicles and material delivers would be via Junction 22, avoiding the need to use the local highway network, with minimal disruption expected;
- There is good opportunity for construction staff to reach the site via sustainable modes of travel, with suitable footpaths, bus services and train connections within Colwyn Bay; and

- The temporary diversion of traffic can be accommodated via recognised diversion routes, which are used when the Promenade is closed to traffic.

15.2.4 On the basis of this assessment it is considered that the traffic impacts associated with the construction of the coastal defences would be satisfactorily accommodated by the existing highway network and proposed diversion routes.

15.3 Archaeology and Cultural Heritage

15.3.1 Archaeology and Cultural Heritage was scoped out of the EIA in the Scoping Report (ES Volume 2, Technical Appendix 1.3) for the following reasons:

- Potential effects from construction and operation of the Scheme are limited due to the nature and location of the Scheme and negligible potential for further archaeological remains to be present within the Scheme boundary;
- There would be no effects on any known built heritage sites, designated assets or listed buildings or their settings due the separation of the Scheme from these features by the A55 Expressway and the NWC Railway Line as well as the design, nature and overall aim of the Scheme itself;
- The Scheme would have no permanent effect on the Old Colwyn conservation area to the south of the Scheme beyond A55 Expressway and the NWC Railway Line;
- The Promenade itself is of negligible value as there is little left of its original appearance and its condition has been degraded following years of storm damage; and
- While the potential of removal of previously unidentified archaeological assets would constitute a significant effect, the potential of finding any such features within the Scheme area is considered to be negligible and as such no mitigation would be recommended.

15.3.2 An Archaeological and Historical Assessment completed by Birmingham Archaeology[210] for the whole of the Colwyn Bay waterfront area is included as ES Volume 2, Technical Appendix 15.2.

15.3.3 In the Scoping Response (ES Volume 2, Technical Appendix 1.4), CPAT advised that there may be the potential for encountering the former prehistoric land surface as part of the beach excavation works (peat deposits and submerged forest remains have been recorded to the east around Rhyl and Prestatyn in association with coastal protection works).

15.3.4 CPAT recommended that If any preliminary geotechnical works are proposed on the beach (e.g. excavated test pits or cores) it would be useful to have an archaeological contractor attached to the GI team conducting these works so that the beach deposits can be examined in profile and recorded.

15.3.5 A GI would be completed in the near future for this Scheme once a Marine Licence has been granted. An archaeological watching brief would be organised to record any findings during intrusive beach excavations. Should anything of note be identified, consultation would be completed with CPAT to determine what supplementary standalone archaeological assessment may be required.

15.4 Risk of Major Accidents and Disasters

15.4.1 Given that the principal aim of the Scheme is to provide coastal defence and reduce the risk of damage to key infrastructure in the Old Colwyn area and that construction best practice would be utilised to ensure no increased risks during construction, the creation of a new or different

[210] Colwyn Bay Waterfront Project Archaeological and Historical Assessment, Birmingham Archaeology, October 2010

risk of major accidents and disasters is not considered to be significant and was scoped out of the EIA within the Scoping Report.

15.5 Outline Environmental Management Plan

15.5.1 The Outline Environmental Management Plan (OEMP) has been produced (included as ES Volume 2, Technical Appendix 15.3) to assist with the implementation of the construction mitigation detailed within this ES. The purpose of the OEMP is to manage the environmental effects of the Scheme as identified within the associated ES and to demonstrate compliance with environmental legislation, providing clear and concise information which states how the mitigation and management of environmental effects would be delivered and maintained.

15.5.2 The OEMP is based on the current design for which planning permission and the Marine Licence is being applied. It has been prepared using a combination of the Design manual for Roads and Bridges (DMRB) Volume 11, Section 2, Sustainability and Environment Appraisal, LA 120 Environmental Management Plans and professional judgment (regarding naming of the plan for ease of understanding).

15.5.3 In accordance with LA 104 'Environmental Assessment and Monitoring', the results of monitoring shall be used to update the EMP during the construction and handover phase.

15.5.4 EMPs set out the control of environmental effects through all lifecycle stages from the design stage in accordance with Table 15.1. This document is currently in the design stage.

Table 15.1: Evolution of the EMP[211]

Project Stage	EMP Iteration	Produced/ Refined
Design	**First iteration of EMP (OEMP) produced during the design stage for the preferred option.**	**Produced**
Construction (refined for the consented project)	Construction EMP (CEMP) refined during the construction stage of the consented project, in advance of construction.	Refined
End of Construction	Handover EMP (HEMP) building on the CEMP refined at the end of the construction stage to support future management and operation.	Refined

Source: Referenced DMRB LA120

15.5.5 The EMP (whether OEMP, CEMP or HEMP) is a live document and shall be refined and updated when additional information comes to light to capture any necessary alterations to the proposed mitigation and management of environmental effects. Such additional information or alterations can include:

1. New or updated survey data;
2. Changes in the physical characteristics of the project;
3. Changes in the design and mitigation assumptions;
4. Changes in the level of understanding of the current state of the environment and the potential effects of the development (e.g. due to greater data availability);
5. Changes in legislation, policy and guidance/advice relating to any environmental topic; and
6. Changes response to stakeholder consultation.

[211] Highways England, 2020. Design Manual for Roads and Bridges Volume 11 Section 2 LA 120, Environmental Management Plans [online] Available at: https://www.standardsforhighways.co.uk/dmrb/search/a3a99422-41d4-4ca1-bd9e-eb89063c7134 [Accessed: July 2020]

15.5.6 The overall objectives of the EMP are as follows:

- To document all environmental actions and commitments that are required to manage and minimise environmental effects reported within the ES;
- To minimise the risk of any type of pollution incident or other form of unauthorised discharge;
- To minimise any nuisance to the nearby receptors;
- To maintain communication between the Client (Employer), the Project Manager and relevant third parties, with assignment of any specific and / or statutory reporting duties to third parties, where these are to remain their statutory duty;
- To be compliant with statutory legislation and contract specifications; and
- To provide a framework for the implementation and review of the EMP and other relevant documents.

15.6 Drawings

15.6.1 No drawings accompany this Chapter.

15.7 List of Documents Included in ES Volume 2: Technical Appendix 15

- Appendix 15.1: Transport Statement;
- Appendix 15.2: Archaeological and Historical Assessment; and
- Appendix 15.3: Environmental Management Plan (First Iteration).

16 Cumulative Effects

16.1 Overview

16.1.1 According to the EIA Regulations, an ES should include and assessment of "*the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources*".

16.1.2 Combined and cumulative effects result from multiple actions on receptors over time and are generally additive or interactive (synergistic) in nature. They can also be considered as effects resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the Scheme, identified as:

- Combined effects from a single Scheme (the inter-relationship between different environmental factors); and
- Cumulative effects from different projects (with the Scheme being assessed).

16.1.3 Cumulative effects have therefore been assessed in this chapter considering both the interrelationship between environmental disciplines for the Scheme as assessed in Chapters 7 to 14 and the environmental impacts of the development proposals when considered cumulatively with the environmental impact of other existing adjacent and approved development projects at the time of submission of the ES.

16.2 Methodology

16.2.1 The approach for combined and cumulative effects follows the guidance presented within DMRB Document LA104[212] along with professional judgment. The outcome has been used to aid the development of appropriate mitigation measures in order to avoid or reduce potential adverse effects.

Combined Effects

16.2.2 The methodology involves the identification of impact interactions associated with the Scheme, in order to better understand the overall environmental effect of the proposed Scheme. The significance of construction and operational phase environmental effects are brought forward from the preceding chapters of this ES (Chapters 7 to 14) into a matrix, providing an overview of the potential effects on individual receptors. The significance of combined effects upon each environmental resource has then been made based upon the balance of scores and using professional judgement.

Cumulative Effects

16.2.3 The assessment methodology for cumulative effects involves the identification of incremental changes likely to be caused by other developments together with the Scheme.

16.2.4 Four stages of assessment have been followed:

- Stage 1: Establish the ZOI and baseline of 'Other Development';
- Stage 2: Identify relevant 'Other Development' for assessment;

[212] Design Manual for Roads and Bridges LA104 Environmental Assessment and Monitoring Revision 1, July 2019

- Stage 3: Information gathering; and
- Stage 4: Assessment.

16.2.5 For the purposes of this assessment, the following criteria, based on the type and scale of potential effects generated by a proposed development, were used to determine other developments (based on the EIA Regs).

- The development includes more than 1ha of development which is not dwelling house development;
- The development includes more than 150 dwelling houses;
- The area of the development exceeds 5ha; and in addition; and in addition,
- Any development directly associated with the Colwyn Bay Waterfront area.

16.2.6 Other developments considered include those that are classified as Nationally Significant Infrastructure Projects (NSIPs).

Significance Criteria

16.2.7 For the purposes of this combined and cumulative effects assessment, the value of a resource and magnitude of impact is determined according to the criteria set within the preceding chapters of this ES. Typically, the greater the environmental sensitivity or value of the receptor or resource, and the greater the magnitude of impact, the greater the effect. The significance of effect is then carried forward from preceding chapters to enable an assessment of combined significance upon environmental receptors, as well as to identify the significance of cumulative effects with other developments.

16.2.8 Typical descriptors of combined and cumulative significance are included within Table 16.1, which reflects this approach. Overall significance is determined with mitigation included, in accordance with Table 16.2.

16.2.9 For the purposes of this assessment, effects that are Moderate Adverse or Beneficial and above are considered to be significant. Where significant combined and cumulative effects, beyond those identified as residual effects from the proposed scheme in isolation, have been identified, additional mitigation measures have been proposed.

Table 16.1: Combined and Cumulative Effects Typical Significance Descriptors

Significance Category	Typical Effect Descriptors
Very Large (Adverse or Beneficial)	Where the balance of the effects of the Scheme or combined effects of the Scheme in association with other existing or more than likely / near certain future major development upon an individual or collection of environmental receptors would be very highly significant (positive or negative). Effects would be: • Permanent and far reaching for receptors of very high value.
Large (Adverse or Beneficial)	Where the balance of the effects of the Scheme or combined effects of the Scheme in association with other existing or more than likely / near certain major future developments upon an individual or collection of environmental receptors would be highly significant (positive or negative). Effects would be: • Permanent and far reaching for receptors of high value; • Localised for a receptor of very high value; and • Temporary for receptor of very high value.

Significance Category	Typical Effect Descriptors
Moderate (Adverse or Beneficial)	Where the balance of the effects of the Scheme or combined effects of the Scheme in association with other existing or more than likely / near certain major future developments upon an individual or collection of environmental receptors would be significant (positive or negative). Effects would be: • Permanent and far reaching for receptors of medium value; • Localised for receptors of high value; and • Temporary for a receptor of high value.
Slight (Adverse or Beneficial)	Where the balance of the effects of the Scheme or combined effects of the Scheme in association with other existing or more than likely / near certain major development upon an individual or collection of environmental receptors would be noteworthy but not significant (positive or negative). Effects would be: • Permanent and far reaching for receptors of low value; • Localised for receptors of medium value; and • Temporary for a receptor of medium value.
Neutral	Where the positive or negative effects of the Scheme or the combined effects of the Scheme in association with other existing or more than likely / near certain future major developments would balance.

Source: Adapted from DMRB Volume 11 Section 2 Part 4 (LA104)

Table 16.2: Scale for Evaluating the Significance Category with Respect to Combined and Cumulative Effects

Magnitude of Potential Impact	Environmental Value (Sensitivity)				
	Very high	High	Medium	Low	Negligible
Major	Very large	Large / Very Large	Moderate / Large	Slight / Moderate	Slight
Moderate	Large / Very Large	Moderate / Large	Moderate	Slight	Neutral / Slight
Minor	Moderate / Large	Slight / Moderate	Slight	Neutral / Slight	Neutral / Slight
Negligible	Slight	Slight	Neutral / Slight	Neutral / Slight	Neutral
No Change	Neutral	Neutral	Neutral	Neutral	Neutral

Source: Adapted from DMRB Volume 11 Section 2 Part 4 (LA104)

16.3 Assumptions and Limitations

16.3.1 This assessment has been carried out using professional judgement and based on currently available information. It is likely that some of the environmental effects of the other developments outlined within this chapter would be superseded as detailed design for the other developments continues. However, where limited information is available, a worst-case approach has been taken to identifying the likely environmental effects of the other developments, and therefore the overall conclusions are unlikely to change (specifically worsen) if further detailed assessment is undertaken for the developments.

16.3.2 The list of other developments has been identified through analysis of the planning portal and confirmed through consultation with CCBC Planning. However, it should be highlighted that although every care has been made to include every relevant development, it cannot be

guaranteed that all have been included. For the purpose of this assessment the cut-off date for including additional developments was 12th July 2020.

16.4 Study Area

Combined Effects

16.4.1 The study area for the assessment of combined effects reflects the study areas, also termed the spatial Zones of Influence (ZOI), identified within the relevant topic chapters of this ES (Chapters 7 to 14).

Cumulative Effects

16.4.2 The study area for the assessment of cumulative effects should be defined on a case-by-case basis reflecting the Scheme in question and the area over which significant effects can reasonably be considered to have the potential to occur from both the Scheme and in combination with other developments. On this basis, given the scope and scale of the proposed works, the study area used for the identification of other developments for the assessment of cumulative effects reflects a 2km ZOI around the boundary of the Scheme.

16.5 Baseline Conditions

Combined Effects

16.5.1 The baseline for the combined effects is described in the individual environmental topic chapters that precede this chapter (Chapters 7 to 14).

Cumulative Effects

16.5.2 Development projects with the potential to cause cumulative effects on Scheme receptors identified in the Scoping Report comprised:

- Colwyn Bay Waterfront project Phase 2b: Not yet in the planning system but known to be at outline design stage). This project forms part of the wider Colwyn Bay Waterfront Project for coastal defence remediation (repairs to the sea wall), beach recharge (understood to be from the location of Horizon Shine kiosk (approximate NGR 284880, 379374) westward to Rhos-on-Sea Harbour (approximate NGR 284253, 380450) and Promenade enhancements for the western third of Colwyn Bay (approximately 1.3km in length in total of which ~850m comprise the sea wall and Promenade improvements). The plans for this scheme are yet to be finalised and the construction timetable would be determined by availability and grant of funding. In late 2018 Welsh Government approval was given to proceed with the detailed design of the Phase 2b beach recharge and associated works. On this basis, it is assumed that there could potentially be some overlap in the construction period between the Phase 2b scheme and the Scheme (Old Colwyn Coastal Defence and Active Travel); and
- Construction of Truncated Victoria Pier: (Dismantling of the seaward end of the pier (retrospective), the dismantling of bays 1-14, the reconstruction of a replacement truncated pier, and associated works including reinstatement of the sea defence wall, reinstatement of balustrading and public realm works to reinstate the surfacing at the entrance to the pier. The construction of the truncated pier is currently underway and anticipated to be complete by the time the Scheme construction would commence, therefore any effects are anticipated to be associated with its operation only.

Planning Applications

16.5.3 In the CCBC Scoping Response dated 26th April 2020, no additional projects were identified for consideration. CCBC's planning portal was searched for details of recent planning applications which could have the potential to result in cumulative effects. Of all the applications viewed none exceeded the criteria in Paragraph 16.2.5. The majority comprised small scale residential developments to the south of the A55 Expressway, which are not considered likely to result in significant cumulative effects. CCBC Planners were contacted by the Applicant on 12th July 2020 and confirmed that they were not aware of any additional significant developments within the vicinity of the Scheme.

Recent Marine Licence and Nationally Significant Project Applications

16.5.4 NRW publish lists of applications received and determined for Marine Licences. The lists have been searched and the applications detailed in Table 16.3 identify the Awel y Môr Offshore Wind Farm project as being located off the North Wales coast.

Table 16.3: NRW Marine Licence Search Results

Date	Licence number	Applicant	Site Location	Type of Application
May 2020 (submitted)	RML2023	Innogy Renewables UK	Awel y Môr Offshore Wind Farm – benthic surveys	Band 1
March 2020 (submitted)	SC2001	Awel y Môr	North East Wales coast	Screening and Scoping

Source: NRW Website https://naturalresources.wales/permits-and-permissions/marine-licensing/applications-received-and-determined/?lang=en, accessed June 2020

16.5.5 The Planning Inspectorate publish details of NSIPs located within England and Wales. A search of the projects by region (Wales) provided more information on the Awel y Môr Offshore Wind Farm project:

- Awel y Môr Offshore Wind Farm[213] (pre-application stage, application anticipated to be submitted to Planning Inspectorate Q2 2022 by Innogy Renewables Ltd). Awel y Môr is an offshore wind farm (extension of the existing Gwynt y Môr Offshore Wind Farm) north of Llandudno, to generate in excess of 500MW. The project would be comprised of (but not limited to): an offshore wind farm, including wind turbine generators and associated foundations, wind measurement equipment and array cables; transmission infrastructure, including offshore substations and associated foundations, offshore and onshore export cables (underground), including associated transition bays and jointing bays, an onshore substation, and connection infrastructure into the National Grid.

16.5.6 While this project is located off the coast of North Wales, given that the application is not anticipated to be submitted until Q2 2022, construction of the Scheme should be complete by the time this project approaches the construction stage. The project is also located around 12km off-shore. There are not considered to be any cumulative effects with the Scheme.

Other Development Associated with Colwyn Bay Waterfront

16.5.7 Rhos Point (approximate NGR 284298, 380811) comprises a redevelopment project to build a new restaurant, café and small ice cream retail unit created around a courtyard focussed on the Grade II listed toll booth on the site at Rhos-on-Sea.

[213] National Infrastructure Planning website: https://infrastructure.planninginspectorate.gov.uk/projects/wales/awel-y-mor-offshore-wind-farm/, accessed June 2020

16.5.8 The construction for this project is already underway and so has been considered as part of the baseline assessment for this Scheme, therefore any cumulative effects are anticipated to be associated with its operation only.

Developments Identified with the Potential for Cumulative Effects

16.5.9 Following a review of the above baseline, the following developments have been selected for further assessment given the potential for in-combination effects with the Scheme:

- Colwyn Bay Phase 2b (construction and operation);
- Colwyn Bay new truncated Victoria Pier (operation only in relation to wider Colwyn Bay Waterfront regeneration); and
- Rhos Point (operation only in relation to wider Colwyn Bay Waterfront regeneration).

16.6 Assessment of Likely Significant Effects

Combined Effects

16.6.1 During construction and operation, there is the potential for combined effects to all receptors due to the potential effects reported in Chapters 7 to 14. A summary of all identified combined effects is provided within Table 16.1.

16.6.2 During construction, these effects would potentially include the culmination of disturbance from construction dust, noise, vibration, and lighting or other visual intrusions on sensitive wildlife, human and visual receptors in addition to construction traffic and disruption to journeys. However, these effects would be temporary in nature and best practice mitigation measures included in the CEMP would ensure that combined effects are reduced as far as possible (temporary **Slight Adverse**).

16.6.3 During operation a number of beneficial combined effects (permanent **Slight Beneficial**) have been identified generally relating to overall Scheme benefits on population and health and biodiversity including the creation of new marine habitat and combined effects improved amenity, landscapes areas, outdoor classroom/picnic area and active travel provision.

16.6.4 While the potential for a significant noise impact on local residents in relation to diversion traffic using Marine Road has been noted (temporary **Moderate Adverse**), this was identified within Chapter 13 Noise and Vibration. No additional significant combined effects have been identified in addition to the assessments presented within Chapters 7 to 14.

Table 16.4: Summary Table of Interrelationship Effects between Environmental Disciplines

	Air Quality	Climate	Coastal Processes and Flood Risk	Landscape	Materials	Noise and Vibration	Population and Health	Overall Significance of Combined Effects
Biodiversity	**Receptors:** Designations, habitats and species (construction). **Effects:** Dust and traffic emissions generated during construction. Air quality impacts at receptors considered but assessed as negligible for construction effects. **Mitigation:** Mitigation safeguards specified in CEMP.	No interdisciplinary effects identified.	**Receptors:** Designations, habitats and species (construction). **Effects:** Damage, destruction or disturbance to intertidal and marine designations, habitats and species; Pollution and run-off during construction; and oil/fuel spill or other pollution event. Spread/ introduction of INNS. **Mitigation:** Mitigation safeguards and contingency planning specified in CEMP and biosecurity risk assessment.	**Receptors:** All habitats and protected species (operation). **Effects:** N/A **Mitigation:** Habitat creation and enhancement measures proposed as part of a Landscape and Ecology Management Plan (LEMP).	**Receptors:** Designations, habitats and species (construction). **Effects:** Spread/ introduction of INNS through import of materials. **Mitigation:** Measures specified in Biosecurity Risk Assessment.	**Receptors:** All habitats and protected species (construction). **Effects:** Construction noise and associated traffic noise generated during construction has the potential for disturbance, particularly with regard to piling operations. **Mitigation:** Implementation of set working hours for noisy activities. Construction good practice. Noise and vibration impacts mitigation specified in CEMP.	**Receptors:** Designations, habitats and species (construction). **Effects:** Potential beneficial effects relating to education and stakeholder engagement. Potential benefits to marine ecology and human health through plastic free initiatives. **Mitigation:** LEMP and CEMP	• Construction: **Temporary Slight Adverse** (construction). • Operation: **Permanent Slight Beneficial** • Significance: **Not Significant**
Climate	No interdisciplinary effects identified.		**Receptors:** Scheme assets (operation). **Effects:** Promenade flooding due to large waves overtopping the revetment. **Mitigation:** Scheme design accounts for climate change.	**Receptors:** Mitigation and enhancement planting (operation). **Effects:** Changing temperature and precipitation patterns can affect the establishment of mitigation planting. **Mitigation:** Planting and seeding proposals carefully selected considering location and anticipated future conditions.	**Receptors:** Climate (operation). **Effects:** Increased material use increases the embodied carbon associated with the Scheme contributing towards climate change. **Mitigation:** Design resource efficiency has resulted in decreased embodied carbon. The reduction of raw material usage, recycling and the use of local suppliers where feasible would limit emissions. Mitigation measures as identified in the CEMP.	No interdisciplinary effects identified.	**Receptors:** Climate (operation) **Effects:** Change in societal and personal behaviours influenced by the Scheme to reduce climate change including potential provision of electric vehicle charging points, auto cycle hire scheme and other active travel provisions **Mitigation:** N/A	• Construction: **Temporary Slight Adverse** • Operation: **Permanent Slight Beneficial** • Significance: **Not Significant**
Coastal Processes and Flood Risk	No interdisciplinary effects identified.			**Receptors:** Scheme assets (construction) **Effects:** Changes in beach levels during construction from plant and stockpiles **Mitigation:** Where stockpiles of vehicles routes result in localised lowering of the beach levels the beach is to be reinstated with existing beach material.	**Receptors:** Designations, habitats, species and controlled waters (construction). **Effects:** During the construction phase, there is potential for materials to leach or cause run off which could have an impact on sensitive receptors, including species, habitats and controlled waters. These effects may include damage, destruction or disturbance to these receptors, and pollution and run-off during construction.	No interdisciplinary effects identified.	**Receptors:** Public and Promenade users (operation). **Effects:** Decrease in overtopping rates along the frontage. Fewer closures of the Promenade. Lowering of risks. Severe events may still require closure. **Mitigation:** N/A for reduction in closures (beneficial effect). For severe events CCBC to monitor tides and weather conditions, and follow existing procedures for Promenade closure.	• Construction: **Temporary Slight Adverse** • Operation: **Permanent Slight Beneficial** • Significance: **Not Significant**

	Air Quality	Climate	Coastal Processes and Flood Risk	Landscape	Materials	Noise and Vibration	Population and Health	Overall Significance of Combined Effects
					Mitigation: Mitigation measures would be identified in the CEMP. Also. specific materials have been selected for ecological beneficial effects (enhanced revetment, sea walls, vertipools, tide pools etc).			
Landscape	No interdisciplinary effects identified.				No interdisciplinary effects identified.	No interdisciplinary effects identified.	**Receptors:** Residents and waterfront users (construction and operation). **Effects:** Temporary lack of access to public rights of way and recreational facilities during construction. Once operational, potential for beneficial in-combination effects relating to improved amenity, landscapes areas, outdoor classroom/picnic area and active travel provision. **Mitigation:** During construction, suitable safe diversions provided, effects temporary.	• Construction: **Temporary Slight Adverse** • Operation: **Permanent Slight Beneficial** • Significance: **Not Significant**
Materials	**Receptors:** Designations, habitats, species and human health (construction). **Effects:** Dust emissions during construction as a result of type of material used, placement of waste and materials on site, transportation and movement of materials to and from the site. Air quality changes on receptors were considered but assessed as negligible for construction effects. **Mitigation:** Mitigation measures are identified in the CEMP.					No interdisciplinary effects identified.	**Receptors:** Occupants of buildings in the vicinity of the site (construction). **Effects:** There may be traffic (transport emissions, accidents and road safety etc), noise and air quality effects relating to the transportation, movement and placement of material to and from the site, however these are not expected to be significant with appropriate mitigation in place. **Mitigation:** Appropriate construction management processes would be implemented to mitigate potential effects. These measures are outlined in the CEMP.	• Construction: **Temporary Slight Adverse** • Operation: **Neutral** • Significance: **Not Significant**
Noise and Vibration	**Receptors:** Human health (construction) **Effects:** Dust and traffic pollutant and noise emissions generated during construction. Air quality impacts at receptors considered but						**Receptors:** Local residents (construction). **Effects**: Noise and vibration effects during construction associated. **Mitigation:** Set construction working times. Piling at the weekend beyond 1pm would be	• Construction: **Temporary Slight Adverse** • Operation: **Neutral** • Significance: **Not Significant**

	Air Quality	Climate	Coastal Processes and Flood Risk	Landscape	Materials	Noise and Vibration	Population and Health	Overall Significance of Combined Effects
	assessed as negligible for construction effects. **Mitigation:** Mitigation safeguards specified in CEMP.						avoided at the perpendicular steps No.2 area. Construction traffic noise adverse impact would be reduced by good community consultation, effective complaint management and traffic calming measures. Good industrial practice is also recommended to be implemented to further reduce impacts during the construction phase of the Scheme.	
Population and Health	No interdisciplinary effects identified.							• Significance: **Not Significant**

Cumulative Effects

Colwyn Bay New Truncated Victoria Pier and Rhos Point Development (operation only)

16.6.5 The Colwyn Bay New Truncated Victoria Pier and Rhos Point Development both located to the west of the Scheme and provide further enhancement to the Colwyn Bay area The Rhos Point Development includes a restaurant, café and ice cream and upgrades to the public realm on the seafront, proving employment opportunities to the local population as well as facilities for the local population and visitors to enjoy. The Colwyn Bay New Truncated Pier provides the opportunity for people to view and enjoy the harbour.

16.6.6 The continuity in the development along the coast is beneficial for the local population as it provides further opportunity to enjoy the high-quality coastal environment. Additionally, it is likely to impact on the wider regeneration of the Colwyn Bay area, encouraging further development along the coast due to increased use of the area by the local population which increases footfall for local businesses within the area.

16.6.7 There is also likely to be a beneficial impact on tourism. The high-quality coastal environment and associated amenities are likely to encourage visitors to come the area which would have a beneficial effect on the local economy from increased spending.

16.6.8 The operational in-combination effect with the pier is considered to be **Slight Beneficia**l (not-significant) relating to ensuring the quality of the Old Colwyn Promenade is in-keeping with the enhancements taking place in the wider Colwyn Bay area.

Colwyn Bay Phase 2b

16.6.9 An assessment of the significance of cumulative effects from the Scheme and the Colwyn Bay Phase 2b development on the identified receptors when considering all mitigation already outlined in this ES, is set out in Table 16.5

16.6.10 During construction, there would be the potential for cumulative effects on all receptors, as a result of the proposed Scheme cumulatively with any of the other developments, for which the construction stages overlap. These effects could include (but not limited to) a culmination of disturbance from construction dust, noise, vibration, and lighting or other visual intrusions on sensitive wildlife, human and visual receptors in addition to construction traffic and disruption to journeys through the impact of overlapping construction periods. However, effects would be temporary in nature and it is assumed that best practice measures would be included in an EMP for each of the other developments, reducing the likelihood of significant cumulative effects.

16.6.11 Once operational, the potential for significant beneficial effects has been identified as summarised in Section 16.7.

Table 16.5: Assessment for Potential of Cumulative Effects of the Scheme with Colwyn Bay 2b on Identified Receptors

Discipline and Receptor	Sensitivity of Receptor (see Chapters 7-14)	Assessment of Cumulative Effects on Receptor (Including Mitigation Detailed within this ES)	Magnitude (see Chapters 7-14)	Significance of Cumulative Effect (see Table 16.1)
CONSTRUCTION				
Air Quality: Human receptors	High	There may be cumulative effects from noise and air quality due to construction diversions, may expose receptors close to the roads to both vehicle emissions and noise emissions from traffic. Effects are not predicted to be significant with the application of the mitigation measures in a CEMP.	N/A	**Not Significant**
Air Quality: Ecological receptors	High	Changes in air quality have the potential to impact on sensitive ecological receptors, either through dust deposition or changes in ambient NO_X concentrations or nitrogen deposition rates. For the Scheme the NO_X concentrations are predicted to be below the relevant air quality objective at the Upper Dingle Wood LWS/LNR, and sensitive ecological sites are not close enough to the Scheme site to be at risk of dust effects.	N/A	**Not Significant**
Biodiversity: Liverpool Bay SPA (and wintering birds)	International	Cumulative effects from disturbance have been assessed under the HRA/AA as no likely significant effect, following implementation of mitigation measures.	Negligible Adverse	**Temporary Slight Adverse (Not Significant)**
Biodiversity: Fish	Regional	Cumulative effects are possible on fish from underwater noise and vibration. The Scheme has multiple mitigation stages in place to reduce this, but there may be a residual cumulative impact if other Schemes are undertaken at the same time and involve working within the water column. Sound can travel large distances underwater and the fact that both Schemes involve working on the foreshore makes it likely for noise impacts to coincide. As a result, a worst-case scenario has been applied, assuming that piling Is required that would occur at the same time.	Negligible Adverse	**Temporary Slight Adverse (Not Significant)**
Climate (emissions)	N/A	The Climate assessment for the Scheme has not considered quantitatively the cumulative emissions associated with all the relevant developments, however, all developments would result in carbon emissions through construction plant use, material consumption and transport to site. Due to the scale of the emissions associated with the Scheme and	N/A	**Not Significant**

Discipline and Receptor	Sensitivity of Receptor (see Chapters 7-14)	Assessment of Cumulative Effects on Receptor (Including Mitigation Detailed within this ES)	Magnitude (see Chapters 7-14)	Significance of Cumulative Effect (see Table 16.1)
		other developments it is not anticipated the inclusion of these emissions in cumulation with other developments would result in a significant effect.		
Coastal Processes: Coastal hydromorphology	Low	If construction of the schemes overlap, there is a potential for material from the recharge to move down the coastline into the Scheme. However, the effects of this would be negligible over the timescales involved as the volumes of material moving would be small and would take time to reach the Scheme.	Negligible	**Neutral / Slight Beneficial (Not Significant)**
Flood Risk: Promenade, active travel routes and Highway	High	Should the construction periods for both Schemes overlap there would be no increase in the flood risk to the wider Colwyn Bay area owing to flood routes and both existing flood defences proposed not being removed along with phased construction. Both Schemes would have a Flood Risk Management Plan in place to reduce the flood risk during construction.	Negligible	**Temporary Slight Adverse (Not Significant)**
Coastal Processes: North Wales Coastal Waterbody	High	If construction periods for both the Scheme and Phase 2b overlap, there is the potential for the increased generation of suspended solids and increased turbidity from the beach recharge Scheme which has the potential to affect Bathing Waters within Colwyn Bay. The effects are considered to be limited given that there would be no public access to the beach within works areas for the duration of both projects. For the Scheme long-shore drift is to the east away from the Bathing Water. The majority of impacts would therefore result from the Phase 2b Scheme in isolation rather than in combination. The Phase 2b works would need to be designed to minimise and mitigate effects through the use of appropriate construction method statements and measures contained within the CEMP.	Negligible Adverse	**Temporary Slight Adverse (Not Significant)**
Landscape and Visual: LCA and visual receptors	Medium (Landscape) High (Visual)	With a potential overlap during construction of the Scheme with the 2b and pier schemes there is the potential for adverse cumulative impacts. Noise and vibrations associated with the construction could potentially affect the tranquillity of the landscape character area, though this would only be a temporary effect. Similarly, diversions to the Promenade would temporarily affect residents and recreational users of the Promenade during the construction period. However both Schemes would be working under a CEMP which would mitigate these temporary effects.	Minor adverse	**Temporary Minor Adverse (Not Significant**)

Discipline and Receptor	Sensitivity of Receptor (see Chapters 7-14)	Assessment of Cumulative Effects on Receptor (Including Mitigation Detailed within this ES)	Magnitude (see Chapters 7-14)	Significance of Cumulative Effect (see Table 16.1)
Materials: Sources of secondary materials (recycled)	N/A	There is the potential that the Colwyn Bay Waterfront Phase 2b Scheme may have potential adverse impacts on material resources as there may be a significant requirement for materials, particularly during its construction. It is recognised that the cumulative effects are likely to be greater than the individual effects, although good practice would seek to reuse material on the development sites where possible to reduce C&D waste arisings as far as practicable, thereby reducing the need to import material. Mitigation measures would be implemented as part of the construction of Phase 2b. Those pertaining to materials are outlined in the CEMP. These include potentially sourcing material considered to be waste rather than primary material where possible, which would minimise the cumulative impact on material receptors.	Moderate adverse	**Permanent, Moderate Adverse (Significant)**
Materials: Quarries/finite sources of virgin materials	N/A	There is no revetment proposed within the Phase 2b area, and beach recharge materials are likely to be sourced from within the vicinity of Liverpool Bay. Other primary materials would be sourced at a regional geographical scale. However, the potential requirement for internationally sourced revetment stone remains for the Scheme.	Large Adverse (relating to international sourcing of revetment rock for the Scheme)	**Permanent, Large Adverse (Significant)**
Noise & Vibration: Sensitive noise receptors	High	The outcome of the noise and vibration assessment has shown that, when taking mitigation into account during the construction phase, the Scheme would not result in significant effects on sensitive receptors. However, should piling activities coincide, particularly during weekend working, there is the potential for significant effects to arise. There is also the potential for construction diversion routes to result in additional adverse effects, although without information on timings and routing these cannot be quantified. It is recommended that noise and vibration assessment is completed for the Phase 2b project in order to determine appropriate mitigation.	Minor-Large (depending whether there are simultaneous piling activities to be undertaken)	**Temporary-Slight-Large Adverse (Potentially Significant)**
Population & Human Health: Local economy	Medium	With a potential overlap during construction of the Scheme with the 2b there is the potential for beneficial impacts on the local economy from temporary employment of construction worker within the local area. However, as Colwyn Bay 2b is likely to require a	Slight beneficial	**Temporary, Slight Beneficial**

Discipline and Receptor	Sensitivity of Receptor (see Chapters 7-14)	Assessment of Cumulative Effects on Receptor (Including Mitigation Detailed within this ES)	Magnitude (see Chapters 7-14)	Significance of Cumulative Effect (see Table 16.1)
		similar number of construction workers, the cumulative effects are not considered to be significant, given the size of the local economy.		**(Not Significant)**
Population & Human Health: Local businesses	Medium	The construction of Colwyn Bay 2b may cause temporary disruption to businesses in close proximity to the construction activity. Given there are likely to be overlaps in the construction period with the Scheme, there may be cumulative impacts on footfall to businesses along the coast in Colwyn Bay from a temporary reduction in footfall due to disruption to access. However, both Schemes would have CEMP which would require management measures to be put in place to maintain access to businesses, for staff, delivered and patrons.	Slight adverse	**Temporary, Slight Adverse (Not Significant)** **(Not significant)**
Population & Human Health: Local residents	Medium	The temporary reduction in access to the beach, pedestrian and cycling routes is likely to reduce the recreational opportunities for local residents. This is like to have a cumulative impact on the quality of life of local residents, particularly if there are unable to walk, cycle or undertake recreational activities along a significant portion of the coast in Colwyn Bay. Both Schemes would have a CEMP, which would require temporary diversions to be widely publicised in the community and for pedestrian and beach access to be maintained for at least a portion of the construction period. Therefore, cumulative effects are not considered to be significant.	Slight adverse	**Temporary, Slight Adverse (Not Significant)**
OPERATION				
Biodiversity: Wintering birds and intertidal habitats	International	In terms of operational effects, an overall decrease in maintenance requirements would be required which would reduce disturbance to wintering birds and intertidal habitats in the long-term.	Negligible Beneficial	**Permanent, Slight Beneficial (Not Significant)**
Climate (emissions)	N/A	The Climate assessment for the Scheme has not considered quantitatively the cumulative emissions associated with all the relevant developments, however, all developments would result in carbon emissions through operational energy use and maintenance. Due to the scale of the emissions associated with the Scheme and other developments it is not anticipated the inclusion of these emissions in cumulation with other developments would result in a significant effect.	N/A	**Not Significant**

Discipline and Receptor	Sensitivity of Receptor (see Chapters 7-14)	Assessment of Cumulative Effects on Receptor (Including Mitigation Detailed within this ES)	Magnitude (see Chapters 7-14)	Significance of Cumulative Effect (see Table 16.1)
Coastal Processes: Coastal Hydromorphology	Low	The Phase 2b scheme is proposed to have beach recharge as part of the outline design. It is considered that material from this scheme could be transported eastwards in line with the sediment transport patterns onto the Old Colwyn Coastal Defence and Active Travel scheme. This would be beneficial to maintaining existing beach levels along the frontage.	Moderate beneficial	**Slight Beneficial (Not Significant)**
Flood Risk: Promenade, active travel routes and Highway	High	The extension of coastal protection westward is considered to have a beneficial in-combination effect operationally by ensuring the continuation of coastal defence improvements for the protection of assets including residential properties and businesses, the NWC Railway Line and a key connecting stretch of the pedestrian Promenade and Promenade highway vital for the continuation of active travel routes.	Major beneficial	**Large/Very Large Beneficial (Significant)**
Coastal Processes: North Wales Coastal Waterbody	High	The combined Scheme would protect the wider Promenade and vastly reduce the risks of severe damage and associated pollution events.	Minor beneficial	**Permanent Slight Beneficial (Not Significant)**
Landscape and Visual: LCA	Operational landscape effects not assessed as part of the Scheme. However, the provision of a continuous high quality well-defenced Promenade with associated active travel routes, and improved intertidal area access is considered to have a **Permanent Beneficial Effect.**			
Materials:	No cumulative effects identified. Phase 2b may require future beach replenishment in isolation from the Scheme. Future maintenance of Promenade and structures likely to require less materials during operation given the anticipated reduction in storm damage.			
Population & Human Health: Local residents	Medium	The improvements as part of Phase 2b also provide active travel improvements along the coast. This is in addition to the cycling, walking and other recreational opportunities provided as part of the Scheme would be beneficial for local residents, providing a continuous active travel route along the coast. This is considered to be a significant cumulative effect due to the enhanced environment and provision of recreational opportunities along a substantial portion of the coast in Old Colwyn which is likely to have a beneficial effect on the quality of life of local residents.	Moderate	**Permanent Moderate Beneficial (Significant)**

Discipline and Receptor	Sensitivity of Receptor (see Chapters 7-14)	Assessment of Cumulative Effects on Receptor (Including Mitigation Detailed within this ES)	Magnitude (see Chapters 7-14)	Significance of Cumulative Effect (see Table 16.1)
Population & Human Health: Tourism receptors	Medium	The cumulative effect of Phase 2b and the Scheme covers a substantial portion of the coast so is likely to encourage more people to visit the local area. There are improvements to access the beach, a range of recreational activities and amenities which all contribute to people wanting to visit the local area or spend a longer time in Old Colwyn. This would have a beneficial effect on tourism activity and local spending within the WIA.	Moderate	**Permanent Moderate Beneficial (Significant)**

16.7 Conclusion

Significant Combined Effects

16.7.1 While the potential for in-combination effects has been identified, predominantly relating to combined additional effects generated during construction, no *additional* significant adverse effects have been noted to those already discusses within Chapter 7-14 and no supplementary mitigation or monitoring is considered to be necessary in addition to that already detailed within each technical discipline chapter.

Significant Cumulative Effects (and Mitigation where Appropriate)

16.7.2 Permanent **Moderate-Large Adverse** effects have been identified for the use of secondary and virgin materials respectively. While there is no revetment proposed within the Phase 2b area, and beach recharge materials are likely to be sourced from within the vicinity of Liverpool Bay, the potential requirement for internationally sourced revetment stone remains for the Scheme. The Colwyn Bay Waterfront Phase 2b would also have a significant requirement for materials, particularly during its construction. It is recognised that the cumulative effects are likely to be greater than the individual effects, although good practice would seek to reuse material on the development sites where possible to reduce waste arisings as far as practicable, thereby reducing the need to import material. Mitigation measures would be implemented as part of the construction of Phase 2b. Those pertaining to materials are outlined in the CEMP. These include potentially sourcing material considered to be waste rather than primary material where possible, which would minimise the cumulative impact on material receptors.

16.7.3 The outcome of the noise and vibration assessment has shown that, when taking mitigation into account during the construction phase, the Scheme would not result in significant effects on sensitive receptors. However, should piling activities coincide, particularly during weekend working, there is the potential for significant effects to arise. Effects may be temporary **Slight-Large Adverse (Potentially Significant)**. There is also the potential for construction diversion routes to result in additional adverse effects, although without information on timings and routing these cannot be quantified. It is recommended that noise and vibration assessment is completed for the Phase 2b project in order to determine appropriate mitigation.

16.7.4 Additional significant cumulative beneficial effects have been identified for flood risk and population and health as detailed below:

- The improvements as part of Phase 2b also provide active travel improvements along the coast. This is in addition to the cycling, walking and other recreational opportunities provided as part of the Scheme would be beneficial for local residents, providing a continuous active travel route along the coast. This is considered to be a significant cumulative effect due to the enhanced environment and provision of recreational opportunities along a substantial portion of the coast in Old Colwyn which is likely to have a permanent **Moderate Beneficial** effect on the quality of life of local residents;
- The cumulative effect of Phase 2b and the Scheme covers a substantial portion of the coast so is likely to encourage more people to visit the local area. There are improvements to access the beach, a range of recreational activities and amenities which all contribute to people wanting to visit the local area or spend a longer time in Old Colwyn. This would have a permanent **Moderate Beneficial** effect on tourism activity and local spending within the WIA; and
- The extension of coastal protection westward is considered to have a **Large/Very Large Beneficial** in-combination effect operationally by ensuring the continuation of coastal

defence improvements for the protection of assets including residential properties and businesses, the NWC Railway Line and a key connecting stretch of the pedestrian Promenade and Promenade highway vital for the continuation of active travel routes. The coastal defence of Colwyn Bay in its entirely is likely to impact on the wider regeneration of the Colwyn Bay area, encouraging further investment and regeneration in the newly defended areas.

16.8 Drawings

16.8.1 No drawings accompany this Chapter.

16.9 List of Documents Included in ES Volume 2: Technical Appendix 16

16.9.1 No Technical Appendices accompany this chapter.

17 Summary

17.1 Outcome of EIA

17.1.1 A summary of the significant effects, mitigation measures and residual effects identified in each of the chapters of the ES is provided in Table 17.1.

Table 17.1: Significant Effects, Mitigation Measures and Residual Effects Summary

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
CONSTRUCTION			
Air Quality	Air quality effects on human receptors close to roads affected by the construction diversions.	• Minimising construction traffic movements through reducing materials and use of barges for transport of materials. • Production of a CEMP.	**Direct, Temporary, Slight Adverse (AQ descriptor), Not Significant**
	Air quality effects on ecological receptors (Upper Dingle Woods LWS/LNR) close to roads affected by the construction diversions.	• None proposed.	**Direct, Temporary, Negligible Adverse (AQ descriptor), Not Significant**
Biodiversity	Pollution impacts to Liverpool Bay SPA, disturbance to SPA qualifying wintering and foraging bird species, and changes in turbidity (increased sediment affecting foraging habitats).	• Pollution prevention measures in CEMP. • Tool box talks. • Noise reduction measures. • Use of suitable piling methods. • Minimisation of night-time working where feasible.	**Direct, Temporary, Slight Adverse (Not Significant)**
	Impacts on other statutory designations (SSSIs and LNRs).	• None required.	**Neutral (Not Significant)**

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
	Impacts on non-statutory designations (LWSs).	• None required.	**Neutral (Not Significant)**
	Impacts on wintering birds.	• As for SPA above.	**Direct, Temporary Slight Adverse (Not Significant)**
	Death or injury to reptiles during habitat enhancement works (to NWC Railway Line embankment).	• Mitigation in CEMP to include tool box talks, phased and appropriately timed vegetation clearance under ecological supervision.	**Neutral (Not Significant)**
	Physical damage, increase in noise and vibration and water pollution impacts on Blue Mussel (*Mytilus edulis*) bed.	• Mitigation measures outlined in Section 8.7 (Primary Mitigation) and Section 8.8 (Secondary Mitigation).	**Direct, Temporary, Slight Adverse (Not Significant)**
	Physical damage and water pollution impacts on Honeycomb Worm (*Sabellaria alveolate)*.	• Mitigation measures outlined in Section 8.7 (Primary Mitigation) and Section 8.8 (Secondary Mitigation).	**Direct, Temporary, Slight Adverse (Not Significant)**
	Increases in underwater noise and vibration and water pollution impacts on marine mammals.	• Unloading of revetment rock (if barge delivery selected) into shallow water. • Noise reduction measures to be outlined in CEMP.	**Neutral (Not Significant)**
	Underwater noise and vibration increases, physical damage, water pollution and artificial lighting impacts on fish species.	• Mitigation measures outlined in Section 8.7 (Primary Mitigation) and Section 8.8 (Secondary Mitigation).	**Direct, Temporary Slight Adverse (Not Significant)**
	Underwater noise and vibration increases, physical damage, water pollution and artificial lighting impacts on benthic species.	• Mitigation measures outlined in Section 8.7 (Primary Mitigation) and Section 8.8 (Secondary Mitigation).	**Direct, Temporary Slight Adverse (Not Significant)**

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
Climate	The construction of the Scheme would result in GHG emissions through embodied carbon of the materials, use of construction plant and transport of materials to site. The carbon emissions are estimated at 44,586tCO_2e.	• Through the design process a large number of carbon savings have been implemented. To date the quantifiable reductions implemented prior to the carbon assessment being completed have resulted in 21,220tCO_2e of savings or 32%**.** • Further mitigation measures have been determined that are the contractor's responsibility or are yet to be implemented. It is estimated these could result in an additional saving of up to 5,117tCO_2e.	**Direct, Permanent, Not Significant**
Coastal Processes and Flood Risk	Coastal hydromorphology: Scour of the stockpiles and toe of structures Movement of existing material away from the Scheme	• Primary working area to be 50-60m from sea wall. Lower beach only to be accessed for deliveries by barge and groyne enhancements. • Move rock stockpiles as soon as practicable and locate as high up the beach as possible. Stockpiles to be short-term only. • Contractor led inspection scheme, review the size of the stockpiles and if scour effects are being recorded reduce size. Localised beach reinstatement if required. • Minimise sediment stockpiles and potential for suspended sediments. • Work to be undertaken at low tide and outside stormy periods. • Keep excavations to a minimum. • Transhipment Management Plan required if revetment to be delivered by barge.	**Direct, Temporary, Slight Adverse (Not Significant)**
	Promenade, active travel routes and Highway: Increased flood risk and damage to the Promenade	• Revetment construction to be completed in phases. • Flood Risk Management Plan to be completed by the Contractor. • Working in stormy weather to be avoided where possible or where spring/annual high tides are predicted.	**Indirect, Temporary, Slight Adverse (Significant)**
	Assets within Promenade and behind including A55 Expressway, NWC Railway Line and Buried Utilities. Increased flood risk and damage to the Promenade		**Indirect, Temporary,**

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
	potentially exposing the utilities, damage to A55 Expressway and railway.	• Sections of frontage to be closed as necessary for safety. • Temporary works to prevent failure of the existing structures. • Temporary extension of outfalls across the beach away from the works during construction. • Revetment construction to be done in phases. • Flood risk management plan to be completed by the Contractor. • Winter working to be avoided where possible. • Temporary works to prevent failure of the existing structures.	**Slight Adverse (Not Significant)**
	WFD Water Body Hydromorphology: Scour of the stockpiles and toe of structures. Movement of existing material away from the Scheme. Potential for rock armour to be lost overboard.	• As for coastal hydromorphology above.	**Direct, Temporary, Slight Adverse (Not Significant)**
	Bathing Waters: Increased turbidity as a result of intertidal area plant movements and from revetment delivery (if delivery is to be via barge)	• The revetment construction works would be completed at low tide, meaning that there would be limited potential for the generation of suspended sediments in relation to this activity. • Deliveries by barge would result in a temporary, intermittent and short duration increase in turbidity. • All necessary pollution prevention measures would be detailed in the Contractor-produced CEMP during the construction phase to minimise potential adverse impacts on water quality.	**Indirect, Temporary, Slight Adverse (Not Significant)**
	Phytoplankton: No anticipated impact upon phytoplankton	• Application of measures in biosecurity risk assessment (ES Volume 2, Technical Appendix 8.6).	**Neutral (Not Significant)**
Landscape: Colwyn Bay	The construction activities would result in a temporary, partial loss or alteration to key elements/ features/characteristics of the Colwyn Bay Waterfront LCA.	• Footpaths would be diverted to allow access where possible.	**Direct, Temporary, Moderate**

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
Waterfront Local LCA		• Cycleways would be diverted to allow access where possible. • During offloading of materials, beach area would be off limits to recreational users of the beach and water. Users would be encouraged to use other stretches of the coast-line. • Lighting during construction would be designed to minimise light pollution during the hours of darkness. Lighting would be directional to prevent light spill and designed to reduce skyglow; • Site fencing around the construction sites would be well maintained throughout the construction period; • All areas of land within the Scheme red line boundary that have been temporarily occupied during the construction phase (areas not to be re-developed) would be re-instated to pre-construction condition.	**Adverse (Significant)**
Visual Receptor 1 Transitory users of the Promenade looking east	The Promenade would be temporarily closed or diverted during construction, which would result in a noticeable change or alteration to one or more key characteristics of the view.		**Direct, Temporary, Minor Adverse, (Not Significant)**
Visual Receptor 2 Permanent residents on Penman Bod Elias looking west	Residents would have distant, but unfiltered views of the works. The wide expansive sea views would still be available, but the works would result in a slight deterioration of these views.		**Direct, Temporary, Minor Adverse, (Not Significant)**
Visual Receptor 3 Users of designated bridleway 52 looking north	Residents, pedestrians and visitors to the Porth Eirias would have clear unfiltered views of the Promenade raising and revetment work at the Dingle Road – Promenade highway junction. Prior to this there would be no views of the Scheme as it is obscured by the A55 Expressway and steep sides of the path. The proposed construction activities would result in a slight loss or alteration to one or more characteristics of the view.		**Direct, Temporary, Moderate Adverse (Significant)**
Visual Receptor 4 Cyclists on Wales National cycle route 5	The Promenade cycleway would be temporarily closed or diverted during construction, which would result in a noticeable change or alteration to one or more key characteristics of the view.		**Direct, Temporary, Minor Adverse, (Not Significant)**
Visual Receptor 5	Pedestrians would have some clear and some filtered views of the Promenade raising and revetment work. There would		**Direct, Temporary,**

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
Pedestrians on Rainbow footbridge looking West	be a small deterioration affecting a small proportion of the view.		**Minor Adverse, (Not Significant)**
Visual Receptor 6 Residents on Rhos Promenade looking east	For residents along Rhos Promenade, construction elements and activity would be visible in the distance across a proportion of the view. There would be a small deterioration affecting a small proportion of the view.		**Direct, Temporary, Moderate Adverse (Significant)**
Visual Receptor 7 Recreational users of Colwyn Bay (sailing. fishing)	The area surrounding the works would be temporarily prohibited or closed during construction and offloading of rock revetment from offshore barges (should this delivery method be selected). This would result in a noticeable change or alteration to one or more key characteristics of the view.		**Direct, Temporary, Minor Adverse, (Not Significant)**
Visual Receptor 8 Train users on NWC Railway Line	Commuters would have filtered views of the Promenade raising and revetment work, becoming clearer as the train approaches the station. The works would introduce uncharacteristic features into the existing views of the river corridor and there would be a slight deterioration in the view.		**Direct, Temporary, Minor Adverse, (Not Significant)**
Visual Receptor 9 Car users on Promenade highway	Road users have filtered views of the Promenade raising and revetment work. The works would introduce uncharacteristic features into the existing views of the seafront; however this would be limited by temporary road closures and diversions during construction. There would be a slight deterioration in the view.		**Direct, Temporary, Moderate Adverse (Significant)**
Visual Receptor 10	Users of the restaurant and facilities would be in close proximity to the site works and potentially a plant compound sited in part of the building's car park. This would result in a		**Direct, Temporary, Moderate**

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
Users of Porth Eirias	noticeable change or alteration to one or more key characteristics of the view.		**Adverse (Significant)**
Materials	Impacts on the availability of secondary (recycled) material resources, and subsequent impacts on the demand for key construction materials.	• Mitigation measures outlined in Section 12.7 (Primary Mitigation) and Section 12.8 (Secondary Mitigation).	**Direct, Permanent, Moderate Adverse (Significant)**
Materials	Depletion of non-renewable resources (virgin materials).	• Mitigation measures outlined in Section 12.7 (Primary Mitigation) and Section 12.8 (Secondary Mitigation).	**Direct Permanent Large Adverse (Significant)**
Construction noise and vibration: General and traffic	Receptors R1-R3, R5-R8: Although no significant adverse impacts are anticipated arising from the construction phase, implementation of industrial good practice to further reduce the impacts from construction noise and vibration is recommended. Receptor R4: Details of recommendations are set out in Section 13.8.	• Although no significant adverse impacts are anticipated arising from the construction phase, implementation of industrial good practice to further reduce the impacts from construction noise and vibration is recommended. Details of recommendations are set out in Section 13.8.	**Direct, Temporary, (Magnitude N/A – noise criteria), Not Significant**
	Construction noise due to piling activities at the weekend near perpendicular steps No. 2.	• Piling would be avoided on Saturdays after 13:00 at perpendicular steps No. 2 as well as implementing mitigation measures recommended in Section 13.8.	**Direct, Temporary, (Magnitude N/A – noise criteria), Not Significant**
	Construction traffic noise: • West Promenade. • Promenade. • B5133. • A547. • A55 Expressway (Jct 21-22).	• Not required	**Direct, Temporary Slight Adverse (Not Significant)**
	Construction diversion traffic noise: Marine Road	• To mitigate potential disturbance traffic calming measures and/or enforcement would potentially be	**Direct, Temporary Slight**

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
		effective if traffic is perceived as noisier due to increases in combination with speeding vehicles. • To prevent complaints, good community consultation and communication would be vital along with effective complain management. • It would be important to gather information on any received complaints and respond quickly.	**Adverse (Not Significant)**
Population and health	Local economy: The construction phase would have a beneficial, though temporary effect on the local economy through the construction labour employed and potentially supporting local businesses through expenditure from direct spend on materials for the Scheme.	• N/A	**Direct, Temporary Slight Beneficial, (Not Significant)**
	Local businesses: Disruption to access to the Promenade and to trade.	• Contractor would be required to develop a CEMP to minimise disruption to Promenade access for customers, deliveries and staff.	**Direct, Temporary, Slight Adverse, (Not Significant)**
	Local residents (recreation): Temporary closure of the Promenade and portions of the Old Colwyn beach impacting the ability for people to undertake recreational activities.	• Contractor would be required to develop a CEMP to minimise disruption to recreational users of the waterfront area and the beach. Ensure that temporary diversions and other management procedures are well advertised throughout the WIA.	**Direct, Temporary, Slight Adverse, (Not Significant)**
	Local residents (active travel): Temporary closure of walking and cycling routes affecting the ability for people to walk and cycle along the waterfront in Old Colwyn	• Contractor would be required to develop a CEMP to minimise disruption to walking and cycling routes. Ensure that temporary diversions and other management procedures are well advertised throughout the WIA.	**Direct, Temporary, Slight Adverse, (Not Significant)**
OPERATION			
Biodiversity	Reduced disturbance to SPA qualifying wintering birds (reduced maintenance requirements).	• No mitigation required. However, measures to raise awareness of bird sensitivity by contractors and visitors proposed in the form of a guidance note, information leaflet and signage.	**Indirect, Temporary Slight Beneficial (Not Significant)**

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
		• Given that the results of these measures cannot be guaranteed in the long-term, the residual effects have been assessed as temporary rather than permanent as a precaution.	
	Impacts on other statutory designations (SSSIs and LNRs).	• None required.	**Neutral (Not Significant)**
	Impacts on non-statutory designations (LWSs).	• None required.	**Neutral (Not Significant)**
	Impacts on wintering birds.	• As for SPA above.	**Temporary Slight Beneficial (Not Significant) Indirect (Not Significant)**
	Habitat enhancements on site benefitting reptiles.	• None required.	**Indirect, Permanent Slight Beneficial (Not Significant)**
	Habitat creation benefits for other habitats and species that were originally scoped out of the impact assessment.	• None required.	**Indirect, Permanent Slight Beneficial (Not Significant)**
	Habitat enhancement benefits for Blue Mussel (*Mytilus edulis*) beds.	• None required.	**Indirect, Permanent Slight Beneficial (Not Significant)**
	Habitat enhancement benefits for Honeycomb Worm (*Sabellaria alveolata*) reef.	• None required.	**Indirect, Permanent Slight Beneficial (Not Significant)**

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
	Impacts on marine mammals from ongoing maintenance.	• None required.	**Neutral (Not Significant)**
	Habitat creation and enhancement benefits for fish species.	• None required.	**Indirect, Permanent Slight Beneficial (Not Significant)**
	Habitat creation and enhancement benefits for benthic species.	• None required.	**Indirect, Permanent Slight Beneficial (Not Significant)**
	It should be noted that all operational effects have been assessed as either neutral or beneficial under the operational phase of the Scheme. Whilst none of the beneficial effects have individually been assessed as more than "Slight" significance following the LA108 guidance, the benefits at a local level have been assessed as moderate or major significance for many of the receptors whilst other local ecological features scoped out of this assessment would also benefit from the enhancements proposed. Providing management and maintenance is successful in the long-term and these habitats mature and are colonised as anticipated, it is considered that the long-term cumulative benefits of these multiple enhancements is more substantial as a package, particularly if considered in a local context.	• None required.	**Indirect, Permanent Slight-Moderate Beneficial (Significant)**
Climate	The operation of the Scheme would result in GHG emissions through operational energy use and maintenance required. Estimated at 246tCO_2e over the lifetime for street lighting.	• Through the design process assets have been designed with longevity in mind. Energy efficiency would be considered in the specification of operating equipment such as the street lighting.	**Direct, Permanent, Not Significant**
Coastal Processes	Coastal Hydromorphology: Scour of the tie in of Scheme. Lowering/rising of beach levels.	• CCBC to monitor the end of the Scheme structures (see Chapter 3 Scheme Description, Section 3.4).	**Direct, Permanent Slight**

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
and Flood Risk	Changes in sediment transport patterns.	• CCBC to monitor beach level and recycle material in front of structure if beach drops by 0.5m or undertake beach management if it rises by 1m.	**Adverse (Not Significant)**
	Promenade, active travel routes and Highway: Reduced flood risk and damage to the Promenade.	• Regular inspection of defence structures (see Chapter 3 Scheme Description, Section 3.4). • Ongoing beach monitoring and beach recycling if required to prevent failure of the rock revetment. • Maintenance of outfalls. • Potential closure of Promenade for extreme storm events. • Design allows for repair and reconfiguration of coastal defences as required should conditions change beyond those designed for.	**Indirect, Permanent, Large / Very Large Beneficial (Significant)**
	Assets within Promenade and behind including A55 Expressway and NWC Railway Line Buried Utilities. Reduced flood risk and damage to the Promenade.		**Indirect, Permanent, Very Large Beneficial (Significant)**
	WFD Water Body Hydromorphology: Development of heavily modified water body for same purpose.	• As for coastal hydromorphology above.	**Indirect, Permanent, Slight Adverse, (Not Significant)**
	Bathing Waters: Reduction in risk to Bathing Waters in the long term from severe pollution event.	• The Scheme would protect the Promenade and vastly reduce the risks of severe damage during an extreme storm event, which could rupture Welsh Water sewerage services beneath the Promenade and result in a major release of raw sewage directly onto the intertidal area.	**Indirect, Permanent Slight Beneficial, (Not Significant)**
	Phytoplankton: Reduction in risk to phytoplankton status of water body in the long term from severe pollution event.		**Indirect, Permanent Slight Beneficial, (Not Significant)**
Population and Health	Local businesses (business activity): Increase in business activity from an increase in footfall from people using the Promenade area and/or additional business activity along the Promenade from more businesses moving to this area of Old Colwyn.	• N/A	**Indirect, Permanent, Slight Beneficial (Not Significant)**

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
	Local residents (recreation): The Scheme increases opportunities for the local population to undertake outdoor recreational pursuits and includes provision of an outdoor classroom.	• N/A	**Indirect, Permanent, Moderate Beneficial (Significant)**
	Local residents (active travel): The Scheme increases walking and cycling opportunities along the coast by enhancing connectivity to existing routes and improving the infrastructure along the Promenade.	• N/A	**Indirect, Permanent Moderate Beneficial (Significant)**
	Tourism receptors: Potential increase in tourism activity within the WIA as a result of the enhancements to the Promenade.	• N/A	**Indirect, Permanent Slight Beneficial (Not Significant)**
Cumulative Effects with Colwyn Bay Waterfront Project Phase 2b (Significant Effects Listed Only, see Table 16.5 for full list)			
Materials	Secondary (recycled materials): There is the potential that the Colwyn Bay Waterfront Phase 2b Scheme may have potential adverse impacts on material resources as there may be a significant requirement for materials, particularly during its construction.	• It is recognised that the cumulative effects are likely to be greater than the individual effects, although good practice would seek to reuse material on the development sites where possible to reduce C&D waste arisings as far as practicable, thereby reducing the need to import material.	**Direct, Permanent, Moderate Adverse (Significant)**
	Virgin materials: There is no revetment proposed within the Phase 2b area, and beach recharge materials are likely to be sourced from within the vicinity of Liverpool Bay. Other primary materials would be sourced at a regional geographical scale. However, the potential requirement for internationally sourced revetment stone remains for the Scheme.	• Mitigation measures would be implemented as part of the construction of Phase 2b. Those pertaining to materials are outlined in the CEMP. These include potentially sourcing material considered to be waste rather than primary material where possible, which would minimise the cumulative impact on material receptors.	**Direct, Permanent, Large Adverse (Significant)**

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
Noise and vibration	Sensitive receptors: should piling activities coincide, particularly during weekend working, there is the potential for significant effects to arise. There is also the potential for construction diversion routes to result in additional adverse effects, although without information on timings and routing these cannot be quantified.	• It is recommended that noise and vibration assessment is completed for the Phase 2b project in order to determine appropriate mitigation.	**Direct, Temporary-Slight-Large Adverse (Potentially Significant)**
Coastal process and flood risk	The extension of coastal protection westward is considered to have a beneficial in-combination effect operationally by ensuring the continuation of coastal defence improvements for the protection of assets including residential properties and businesses, the NWC Railway Line and a key connecting stretch of the pedestrian Promenade and Promenade highway vital for the continuation of active travel routes.	• N/A	**Indirect, Large/Very Large Beneficial (Significant)**
Population and human health	Local residents: The improvements as part of Phase 2b also provide active travel improvements along the coast. This is in addition to the cycling, walking and other recreational opportunities provided as part of the Scheme would be beneficial for local residents, providing a continuous active travel route along the coast. This is considered to be a significant cumulative effect due to the enhanced environment and provision of recreational opportunities along a substantial portion of the coast in Old Colwyn which is likely to have a beneficial effect on the quality of life of local residents.	• N/A	**Indirect, Permanent Moderate Beneficial (Significant)**

Discipline	Potential Effect	Proposed Mitigation	Residual Effect Significance
	Tourism receptors: The cumulative effect of Phase 2b and the Scheme covers a substantial portion of the coast so is likely to encourage more people to visit the local area. There are improvements to access the beach, a range of recreational activities and amenities which all contribute to people wanting to visit the local area or spend a longer time in Old Colwyn. This would have a beneficial effect on tourism activity and local spending within the WIA.	• N/A	**Indirect, Permanent Moderate Beneficial (Significant)**

Source: Mott MacDonald Ltd, 2020

17.2 Summary of Monitoring Requirements

17.2.1 A summary of the monitoring requirements identified within this ES for the identified potentially Significant Adverse effects (and in addition where identified as being necessary elsewhere in the ES) is provided in Table 17.2.

Table 17.2: Summary of Tertiary Mitigation/Monitoring Requirements

Discipline	Potential Residual Significant Effect	Tertiary Mitigation/Monitoring Proposed
Biodiversity	N/A	Overall only a slight adverse effect has been concluded from the construction phase in respect of Liverpool Bay SPA and a number of marine receptors. As such, there are no long-term requirements of monitoring. However, in line with best practice, monitoring of certain receptors is proposed in order to inform on-going maintenance and enhancements. This includes: • Habitats and Faunal Enhancements: Monitoring, maintenance and aftercare for newly created marine and terrestrial habitats, in order to ensure these establish and develop as required to be of biodiversity benefit. This would include annual checks to ensure that these are on track (in line with the management prescriptions), in good condition and, in the case of point features, are not missing or damaged; and • *Sabellaria alveolata* (Honeycomb Worm) and *Mytilus edulis* (Blue Mussel bed): Pre-construction photographic condition surveys have been undertaken of the marine habitats on site. It is important to take ongoing images of the site immediately after construction is completed as this would enable records to be taken of the amount of existing habitat that was lost to incorporate the site enhancements (e.g. sections of groynes and associated Sabellaria alveolata that were removed to enable the installation of ecological armouring units). This would provide a suitable baseline against which to assess any improvement in colonisation of the enhanced areas of the site over the future years. It is anticipated that the above monitoring as well as prescriptions for the creation and management of new terrestrial and intertidal habitats would be set out within a Landscape and Ecological Management Plan (LEMP), to be delivered by an appointed Contractor as part of the CEMP under the guidance of, and with specialist input from, ecologists as needed. It is recommended that this LEMP takes into account management of the marine environmental enhancements over a ten year period to ensure enough time for establishment once construction and then colonisation by marine species.
Coastal processes: Hydromorp-hology	N/A	During the construction of the Scheme, monitoring of the beach levels and the impacts of localised scour would need to be undertaken by the Contractor, in addition, monitoring of the tides and any storm events would also be necessary. A management plan for a response to storms would be included in the Contractors Flood Risk Management Plan. Following the construction of the Scheme, ongoing monitoring of the beach levels would be undertaken and the results reviewed against historic and as-built information. This would allow any erosion or accumulation to be assessed to determine if action is

Discipline	Potential Residual Significant Effect	Tertiary Mitigation/Monitoring Proposed
		required. This action could include beach recycling should the beach fall by 0.5m or localised beach management should levels rise by 1.0m. A Flood Management Plan would be required.
Landscape	Temporary, partial loss or alteration to key elements/ features/characteristics of the Colwyn Bay Waterfront LCA. Temporary Promenade/cycleway/beach closure or diversion. Temporary effects on views from Porth Eirias.	The significant construction landscape and visual effects anticipated in this report would require further mitigation and monitoring, summarised as follows: • The Contractor would adopt sensitive policies towards reducing visual impact as far as possible. Wherever possible viewing platforms would be provided so that members of the public can safely view the ongoing work; • Areas where works are complete would be reopened to the public as soon as safely possible; • Complaints from residents would be collated by the Contractor and wherever possible mitigation undertaken to reduce that impact; and • Where planned activities are anticipated to cause a visual disturbance the Council would be informed in advance to allow notification of the proposed works to be disseminated.
Materials	Impacts on the availability of secondary (recycled) material resources, and subsequent impacts on the demand for key construction materials. Depletion of non-renewable resources (virgin materials).	Material and waste audits would be undertaken throughout the construction phase. This would ensure that re-use and recycling targets are met on-site and would ensure that there is no surplus of materials. By conducting audits regularly this would give an indication of where continual improvements to waste management and minimisation of material use can be made throughout the construction phase. The SWMP and CEMP should include monitoring measures to prevent the significant effects from the use of material resources and the generation of waste, where possible. The Contractor would report on the types and quantities of construction and demolition waste taken off-site, who removed it and where to. It would also require the Contractor to report on performance against re-use and recycling targets throughout the construction phase and justify any deviations from the forecasted waste quantities, to minimise material import requirements. The MMP, if required, would also require a verification report to confirm that only the material identified suitable for use in the MMP was used and placed in accordance with the MMP.
Noise and vibration	N/A	Noise and vibration monitoring are generally used to control exposure where significant adverse effects are anticipated. The predictions show that with mitigation in place, no significant adverse effects would be anticipated, although some piling activities and construction traffic on Marine Road may come close to the proposed limits. It is therefore considered that monitoring would not be needed but should be kept as an option in the event that levels are exceeded in practice.

Source: Mott MacDonald, 2020