

PROJECT TITLE	St. Ishmaels Sea Wall defence	ELR & Mileage	SWM2 237.033m
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NR/L2/CIV/003/FormG. Combined Certificate of Approval in Principle, Design and Check for Design Check Category I permanent works.

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St. Ishmaels Sea Wall defence

SWM2 237.033m

Repairs to Sea Wall defence

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Revision History

Edition	Description	Prepared		Checked		Approved	
		By	Date	By	Date	By	Date
1	First Issue - DRAFT	RB	22/06/2022	JR	22/06/2022	SAG	22/06/2022

Document: 22166C/001 A01 – St. Ishmaels Sea Wall defence repairs Form G

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Project Title	St. Ishmaels Sea Wall defence – Repairs to Sea Wall defence	
Project Nr	168951 – 6.98.60	
Remit / Technical Work Scope (TWS) Nr	1949_WAL_DAB	N/A
Requirements documents reference Nr	N/A	N/A
CR-T Reference Nr	N/A	
Other documents associated with this combined submission	22166C/CAL – A01 Sea Wall defence design 22166C/DRA-001 - A01 Designer’s Risk Assessment	

PART 1: DETAILS

1.1 PROPOSED WORKS AND SCOPE OF DESIGN.

As set out in the Contracts Requirement Technical (CR-T) & Requirements documents, this combined submission relates to the Design of the following altered or new asset(s).

Asset No 1

Description	St. Ishmaels Sea Wall defence – Repairs to Sea Wall defence		
Location	St. Ishmael, Ferryside, Wales, SA17 5UL		
ELR	SWM2	Mileage	237.033 m
Asset Nr	237.0330	OS grid ref	SN 3614 0845
Permanent Works	Concrete toe repair	Design Check Category	CAT I

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1.2 DESIGN CRITERIA AND DESIGN STATEMENT

1.2.1 General

A section of 10m approximately of sea wall defence has failed at St. Ishmaels. This section of sea wall defence protects the existing masonry sea wall supporting the bidirectional SWM2 line. The masonry wall is approximately 6.5m height with masonry counterforts reinforcing the wall separated every 20.5m.

During the site visit carried out on 07/04/2022, it was confirmed that a 10m of sea wall defence section was detached from the masonry sea wall. The concrete section is approximately 900mm height and 1150mm thick. No apparent connection between the concrete sea wall and the masonry wall was noted.

1.2.2 Scope of works

As per the remit provided by the Contractor, a like for like replacement is to be designed. Preference is that the new concrete sea wall is to be cast in situ using a suitable concrete mixture for the marine environment. The required Formwork design is to be covered under a separate Form C submission. Additionally, appropriate TW might be needed depending on the depth of the rock level encountered.

1.2.3 Proposed works

The proposed works is the like for like replacement of the concrete sea wall as per the remit requirement. An approximate 900mm x 1150mm concrete block is to be cast in situ with temporary timber formwork. 50mm chamfer to all external concrete edges and a 1:60 fall is to be provided.

The concrete block is to be installed with 16mm diameter sacrificial stainless steel diwidags (grade 304 or 316) to connect the concrete block on to the masonry wall. The concrete block is to be founded on rock material to an unknown depth and anchored with 16mm diameter stainless steel dowels (grade 304 or 316), 600mm long, embedded 300mm into each concrete pour at 500mm centres. The toe of the foundation is to be embedded 500mm minimum into the sand level.

The concrete specification is to be C35/45 with an exposure class XS3 and minimum cover of 60mm to protect the concrete against the marine environment. The table below extracted from NR/L2/CIV/140/1700N shows the complete specification needed for the concrete to protect it against marine environment:

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Requirement	Schedule
Designed Concrete Ref / Location in the Works	Sea Wall defence
Intended Working Life of Structure	100 years
Nominal Cover to Reinforcement	60mm
Applicable Exposure Classes (Excluding DC-class)	XS3
DC-class (where appropriate)	
Compressive Strength Class of Concrete	C35/45
Minimum Cement Content (kg/m ³)	380
Maximum Free Water/Cement Ratio	0.40
Required Group or Type and Class of Cement or Combination (where a DC-class has not been specified)	IIB-V, IIIA
Maximum Aggregate Size, mm	20mm
Chloride Content Class	Cl0,30
For Lightweight Concrete, the Density Class or Target Density	
For Heavyweight Concrete, the Target Density	25 kg/m ³
Consistence Class	S3
Special Type or Class of Cement or Combination	
Required Source/Special Type of Aggregate	
Maximum Cement Content (kg/m ³)	
Required Admixture	
Air Entrainment Required [YES/NO]	No
Minimum or Maximum Temperature of Fresh Concrete °C	
(12/14) Sampling and Testing	
(12/14) Requirements to Control Early Thermal Cracking [See 1704.7 and NG 1704.12] or Other Requirements [See Clause 4.3 of BS 8500-1]	

1.2.4 Geotechnical Design and considerations

GI investigation works were carried out by Geotechnical Engineering Limited. GI investigation works were aborted due to the presence of obstructions and boulders found 300mm below ground level. Due to the failed investigations works, the Contractor is to be prepared to provide appropriate TW (Temporary excavation support) depending on the depth of the rock level encountered.

As per the proposed section above, the concrete block is to be founded on rock material to an unknown depth with the toe of the foundation embedded 500mm minimum into the sand level.

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1.2.5 Design Criteria

Design life

The C35/45 concrete sea wall will have a design life of 100 years.

Operational requirements

The concrete sea wall and foundation is to be cast in situ carried out in one stage as shown on the construction sequence in section '1.5. Other relevant information'.

Loading requirements

Design loading used for the concrete pour is the following:

- Wet concrete lateral pressure: 25.0 kN/m³

Fire resistance and escape times

Not Applicable.

Diversity and Inclusion requirements arising from a DIA

Not Applicable.

Station pedestrian capacity assessment

Not Applicable.

Environmental requirements

Concrete specification to be provided to protect the concrete against the marine environment.

1.3 STANDARDS USED IN THE DESIGN

1.3.1 Date of standard freeze

June 2022.

1.3.2 List of Design standards

1.3.2.1 EUROCODES

Reference	Title
BS EN 1990: 2002+A1:2005	Basis of Structural Design

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BS EN 1991-1-1:2002	Actions on structures. General actions – Densities, self-weight and imposed loads for buildings
BS EN 1991-1-2: 2002	Actions on Structures. General Actions. Actions on Structures Exposed to Fire.
BS EN 1991-1-3:2003+A1: 2015	Actions on structures. General actions – Snow loads
BS EN 1991-1-4:2005 + A1: 2010	Actions on structures. General actions – Wind actions
BS EN 1991-1-5: 2003	Actions on structures. General actions – Thermal Actions
BS EN 1991-1-6: 2005	Actions on structures. General Actions – Actions During Execution
BS EN 1991-1-7:2006 + A1: 2014	Actions on structures. General actions – Accidental actions
BS EN 1991-2: 2003	Actions on structures. Traffic loads on bridges.
BS EN 1991-3:2006	Actions on Structures. Actions induced by cranes and machinery
BS EN 1991-4:2006	Actions on Structures. Silos and Tanks
BS EN 1992-1-1: 2004 + A1: 2014	Design of concrete structures. General rules and rules for buildings.
BS EN 1992-1-2: 2004	Design of concrete structures. General rules – structural fire design
BS EN 1992-2:2005	Design of concrete structures. Concrete Bridges. Design and detailing rules
BS EN 1992-3:2006	Design of concrete structures. – Liquid retaining and containment structures
BS EN 1993-1-1:2005 + A1: 2014	Design of steel structures. General rules and rules for buildings
BS EN 1993-1-2: 2005	Design of steel structures. General rules – Structural Fire Design
BS EN 1993-1-3:2006	Design of steel structures. General rules – Supplementary rules for cold-formed members and sheeting
BS EN 1993-1-4:2006 + A1: 2015	Design of steel structures. General rules. Supplementary rules for stainless steels
BS EN 1993-1-5:2006 – A1:2017	Design of steel structures. Plated structural elements
BS EN 1993-1-6:2007 – A1:2017	Design of steel structures. Strength and Stability of Shell Structures
BS EN 1993-1-7:2007	Design of steel structures. Plated structures subjected to out of plane loading
BS EN 1993-1-8:2005	Design of steel structures. Design of joints.
BS EN 1993-1-9: 2005	Design of steel structures. Fatigue.

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BS EN 1993-1-10: 2005	Design of steel structures. Material toughness and through thickness properties.
BS EN 1993-1-11: 2006	Design of steel structures. Design of structures with tension components
BS EN 1993-1-12: 2007	Design of steel structures. Additional rules for the extension of EN 1993 up to steel grades S 700
BS EN 1993-2: 2006	Design of steel structures. Steel Bridges
BS EN 1993-3-1: 2006	Design of steel structures. Towers, masts and chimneys – Towers and masts
BS EN 1993-3-2: 2006	Design of steel structures. Towers, masts and chimneys – Chimneys
BS EN 1993-4-1: 2007 + A1: 2017	Design of steel structures. Silos, tanks and pipelines – Silos
BS EN 1993-4-2: 2007	Design of steel structures. Silos, tanks and pipelines – Tanks
BS EN 1993-4-3: 2007	Design of steel structures. Silos, tanks and pipelines. Pipelines
BS EN 1993-5: 2007	Design of steel structures. Piling
BS EN 1993-6: 2007	Design of steel structure. Crane supporting structures
BS EN 1994-1-1: 2004	Design of composite steel and concrete structures. General rules and rules for buildings
BS EN 1994-1-2: 2005 + A1: 2014	Design of composite steel and concrete structures. General rules – Structural fire design
BS EN 1994-2: 2005	Design of composite steel and concrete structures. General rules and rules for bridges
BS EN 1995-1-1: 2004 + A2: 2014	Design of timber structures. General. Common rules and rules for buildings
BS EN 1995-1-2: 2004	Design of timber structures. General. Structural fire design.
BS EN 1995-2: 2004	Design of timber structures. Bridges
BS EN 1996-1-1: 2005 + A1: 2012	Design of masonry structures. General rules for reinforced and unreinforced masonry structures.
BS EN 1996-1-2: 2005	Design of masonry structures. General rules – Structural fire design.
BS EN 1996-2: 2006	Design of masonry structures. Design considerations, selection of materials and execution of masonry.
BS EN 1996-3: 2006	Design of masonry structures. Simplified calculations for unreinforced masonry structures.
BS EN 1997-1: 2004 + A1: 2013	Geotechnical design. General rules.
BS EN 1997-2: 2007	Geotechnical design. Ground investigation and testing.

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1.3.2.2 EUROCODES – SUPPLEMENTARY DOCUMENTS

Reference	Title
PD 6687-1: 2010	Background paper to the UK National Annex BS EN 1992-1 and BS EN 1992-3
PD 6687-2: 2008	Recommendations for the design of structures to BS EN 1992-2-2005
PD 6688-1: 2011	Background paper to the UK National Annex to BS EN 1991-2 Traffic loads on bridges
PD 6693-1: 2012	Recommendations for the design of timber structures to Eurocode 5
PD 6694-1: 2011	Recommendations for the design of structures subject to traffic loading to BE EN 1997-1:2004
PD 6695-1-9: 2008	Recommendations for the design of structures to BS EN 1993-1-9
PD 6695-1-10: 2009	Recommendations for design of structures to BS EN 1993-1-10
PD 6695-2: 2008	Recommendations for the design of bridges to BS EN 1993
+A1: 2012	
PD 6696-2-2007 + A1: 2012	Background paper to BS EN 1994-2 and the UK NA to BS EN 1994-2
PD 6697: 2010	Recommendations for design of masonry structures to BS EN 1996-1-1 and BS EN 1996-2
BS EN 206: 2013 + A1: 2016	Concrete. Specification, performance, production and conformity
BS EN 338: 2016	Structural timber – Strength Classes
BS EN 752: 2017	Drain and sewer systems outside buildings. Sewer system management
BS EN 772-1: 2011	Methods of test for masonry units. Determination of compressive strength
+A1: 2015	
BS EN 1317-5: 2007	Road Restraint systems. Product requirements and evaluation of conformity for vehicle restraint systems
+A2: 2012	
BS EN 10025-2: 2004	Hot Rolled Products of Structural Steels. Technical Delivery Conditions for Non-Alloy Structural Steels
BS EN 10088-3: 2014	Stainless Steels – Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes.
BS EN 10210-1: 2006	Hot Finished Structural Hollow Sections of Non-Alloy and Fine Grain Steels.
BS EN 12812: 2008	Falsework – Performance requirements and general design
BS EN ISO 1461: 2009	Hot Dip Galvanised Coatings on Fabricated Iron and Steel Articles – Specifications and Test Methods

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1.3.2.3 SUPPLEMENTARY INFO - BRITISH STANDARDS

Reference	Title
<i>BS 476-7: 1997</i>	<i>Fire tests on building materials and structures. Method of test to determine the classification of the surface spread of flame of products.</i>
<i>BS 4190: 2014</i>	<i>ISO Metric Black Hexagon Bolts, Screws and Nuts – Specification</i>
<i>BS 4449: 2005+A3:2016</i>	<i>Steel for the reinforcement of concrete – Weldable reinforcing steel – Bar, coil and decoiled product – Specification</i>
<i>BS 5975: 2019</i>	<i>Code of Practice for Temporary Works Procedures and the Permissible Stress Design of Falsework</i>
<i>BS 5977-1: 1981</i>	<i>Lintels. Method of Assessment of Load.</i>
<i>BS 6180:2011</i>	<i>Barriers in and about buildings. Code of practice (AMD 13292)</i>
<i>BS 6187: 2011</i>	<i>Code of Practice for Full and Partial Demolition.</i>
<i>BS 7371-6: 1998 +A1:2011</i>	<i>Coatings on Metal Fasteners – Specification for Hot Dip Galvanised Coatings</i>
<i>BS 8300: 2009 +A1 2010</i>	<i>Design of buildings and their approaches to meet the needs of disabled people – Code of practice</i>
<i>BS 8666: 2005</i>	<i>Scheduling, dimensioning, bending and cutting of steel reinforcement for concrete – Specification.</i>
<i>BS 9999:2008</i>	<i>Code of practice for fire safety in the design, management and use of buildings</i>

1.3.2.4 BRIDGES AND STRUCTURES, STANDARDS (BD SERIES)

Reference	Title
<i>BD 2/12</i>	<i>Technical Approval of Highway Structures</i>
<i>BD 13/06</i>	<i>Design of Steel Bridges</i>
<i>CS 454</i>	<i>The Assessment of Highway Bridges and Structures</i>
<i>BD 29/17</i>	<i>Design Criteria for Footbridges</i>
<i>CS 454</i>	<i>Loads For Highway Bridges</i>
<i>BD 44/15</i>	<i>The Assessment of Concrete Highway Bridges and Structures</i>
<i>BD 63/17</i>	<i>Inspection of Highway Structures</i>
<i>BD 100/16</i>	<i>The use of Eurocodes for the Design of Highways Structures</i>

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1.3.2.5 INTERIM ADVICE NOTES

Reference	Title
IAN 90/07. Amnt No. 1	Guidance for the use of emergency patching materials
IAN 97/07	Assessment and Upgrading of Existing Vehicle Parapets
IAN 104/15	The anchorage of reinforcement & fixings in hardened concrete.
IAN 124/11	Use of Euro codes for the design of highway structures
IAN 128/15/C	Highways Agency Supply Chain Health and Safety Incident Reporting

1.3.2.6 OTHER RELEVANT DOCUMENTS:

Reference	Title
TG 20:21	Technical Guidance on the use of BS EN 12811-1
TG4:17	Anchorage Systems for Scaffolding
TG5:18	Technical Guidance. Timber scaffold boards – BS 2482:2009
SG4:10	Preventing Falls in Scaffolding
SG4:05 Appendix A	Interim Guidance on Collective Fall Preventing Systems in Scaffolding

1.3.2.7 CURRENT VERSIONS OF BUILDING REGULATIONS:

Approved Document	Subject	Comments
A-2010	Structure	
B-2010	Fire Safety – Dwelling Houses	Also BS9999 applies
C-2010	Site Prep and contaminants and moisture	
D-2010	Toxic substances	
E-2010	Sound	
F-2010	Ventilation	
G-2010	Sanitation	
H-2010	Drainage	
J-2010	Combustion appliance and fuel storage	
L1B-2010	Conservation of fuel and power in existing dwellings	
L2A-2010	Conservation of fuel and power	
M-2010	Access to and Use of Buildings	
N-2010	Glazing	

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P-2010	Electrical	
Q-2010	Security Dwellings	
R-2010	Electronic communications	

1.3.2.8 OTHER APPLICABLE STANDARDS AND PUBLICATIONS:

Publisher	Title or Criteria
Department for Transport	Accessible Railway Stations: Design Standards – March 2015
Health and Safety Executive	HSG 153/2 - Railway Safety Principles and Guidance Part 2A – Guidance on the Infrastructure
Health and Safety Executive	HSG 153/3 - Railway Safety Principles and Guidance Part 2B – Guidance of Stations
Health and Safety Executive	The Work at Height Regulations 2005 (WAHR)
Health and Safety Executive	The Health and Safety at Work Act (1974)
Health and Safety Executive	The Construction (Design and Management) Regulations (2015)
Office of Rail Regulation	Guidance on minor railways
Rail Safety and Standards Board	Way Finding at Station: A good practice guide. Railway and Safety Standards Boards.
Sign Design Society (SDS) and Royal National Institute of Blind People (RNIB)	Sign Design Guide, Inclusive signage.
British Constructional Steelwork Association Ltd	National Structural Steelwork Specification for Building Construction – 6 th Edition
BRE	BRE Special digest 1 – Concrete in aggressive ground
BRE	BRE 470 – Working Platforms for tracked plant. Good Practice Guide to the design installation, maintenance and repair of ground supported working platforms.

1.3.2.9 RAILWAY GROUP STANDARDS:

Reference	Title
RIS-7700-INS	Rail Industry Standard for Station Infrastructure

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GC/RT5112	Rail Traffic Requirements for the Design of Railway Structures
GC/RT5161	Station Design and Maintenance Requirements
GC/RT5212	Requirements for Defining and Maintaining Clearances
GI/RT 7016	Interface between Station Platforms, Tracks and Trains
GE/RT 8073	Requirements for Applications of Standard Vehicle Gauges
GE/GN 8573	Guidance on Gauging and Platform Distances

1.3.2.10 NETWORK RAIL STANDARDS:

Reference	Title
GI/GN 7616 Issue 2	Guidance on Interface between Station Platform, Track and Trains.
NR/CAT/STP/001 Issue 111	Catalogue of Network Rail Standards
NR/CIV/TUM/400 Issue E	Eurocode Design Technical User Manual for non-Station Footbridges and Non-Canopy Station Footbridges
NR/CS/CIV/044 Issue 1	Managing Structures Work
NR/GN/ENV/004 Issue 1	Waste Management Manual
NR/L1/CIV/032	The Management of Structures
NR/L1/FIR/100 Issue 6	Fire Safety Policy
NR/L2/AMG/1030 Issue 1	Working Safely in the Vicinity of Buried Services
NR/L2/AMG/1040 Issue 1	Buried Services Data Feedback
NR/L2/CIV/003 Issue 5	Engineering and Architectural Assurance of Building and Civil Engineering Works
NR/L2/CIV/003/F1990 Issue 3	Technical Design Requirements for BS EN 1990: Eurocode Basis of Structural Design
NR/L2/CIV/003/F1991 Issue 3	Technical Design Requirements for BS EN 1991: Eurocode 1 Actions on Structures
NR/L2/CIV/003/F1992 Issue 3	Technical Design Requirements for BS EN 1992: Eurocode 2 Design of Concrete Structures
NR/L2/CIV/003/F1993 Issue 3	Technical Design Requirements for BS EN 1993: Eurocode 3 – Design of Steel Structures
NR/L2/CIV/003/F1997 Issue 3	Technical Design Requirements for BS EN 1997: Eurocode 7 – Geotechnical Design
NR/L2/CIV/177 Issue 1	Monitoring track over or adjacent to building and civil engineering works
NR/L2/ENV/015 Issue 8	Environment and Social Minimum Requirements for Projects – Design and Construction
NR/L2/INI/02009 Issue 1	Engineering Management of Projects- Module 01 - Roles, Responsibilities and Accountabilities

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NR/L2/OHS/0047 Issue 6	Application of the Construction, Design & Management Regulations
NR/L2/OHS/019 /01 Issue 1	Safety of People at work on or near the line – Module 01 Planning and working during incident response
NR/L2/OHS/019 /02 Issue 1	Safety of People at work on or near the line – Module 02 Planning and working in a possession
NR/L2/OHS/019 /03 Issue 1	Safety of People at work on or near the line – Module 03 Planning and working using protection arrangements
NR/L2/OHS/019 /04 Issue 1	Safety of People at work on or near the line – Module 04 Planning and working using warning arrangements
NR/L3/CIV/020 Issue 1	Design of Bridges
NR/L3/CIV/040 Issue 1	Specification for the Use of Protective Coatings and Systems
NR/L3/CIV/065 Issue 6	Examination of Earthworks
NR/L3/CIV/071 Issue 4	Geotechnical Design
NR/L3/CIV//140/73C Issue 2	Steel Piles
NR/L3/CIV/151 Issue 6	Engineering Assurance of Standard Designs and Details for Building and Civil Engineering Works
NR/L3/CIV/162 Issue 2	Platform Extensions
NR/L3/INI/CP0044 Issue 5	Planning and managing construction work,
NR/L3/INI/CP0063 Issue 1	Piling Adjacent to the Running Line
NR/SP/TRK/036 Issue 2	Gauge capability certification
RT/ENGP/06 Issue 2	Buildings, Stations and Depots Engineering Policy

1.3.2.11 NETWORK RAIL MODEL CLAUSES

NR/L3/CIV/140/....	Title	Applies
10	General	✓
21	Aerial Survey	
22	Land and Trackwork Surveys	
23	Structural Repair Survey	✓
25	Presentation of Survey Data and Information	✓
30 - 35	General Requirements for Ground Investigation	✓
40	Demolition and Site Clearance	✓
50	General Requirements for Earthworks and Excavations	✓
51	Excavations	✓
52	Earthworks	✓
53	Grouting and Lime Stabilisation of Embankments	

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70	General Requirements for Piling	
71	Precast Concrete Piles	
72	Cast In Place Piles	
73	Steel Piles	
74	Timber Piles	
75	Testing Piles	
76	General Requirements for Embedded Retaining Walls	
77	Diaphragm Walls	
78	Embedded Retaining Walls Constructed Using Bored Concrete Piles	
79	Sheet Pile Walls	
80	Structural Concrete	✓
83	Structural Concrete Repairs	✓
85	Concrete for Ancillary Purposes	
93	Structural Steelwork Repairs	
100	Bearings	
110	General Requirements for Waterproofing Underline Bridges	
111	Tightly Bonded Systems for Underline Bridges	
112	Loose-Laid Systems for Underline Bridges	
113	Waterproofing for Road Carrying Bridges	
114	Tanking	
120	General Requirements for Bridge Installation Methods and Temporary Works	
121	Bridge Installation by Sliding or Rolling	
122	Bridge Installation by Large Capacity Crane	
123	Bridge Installation Using Self Propelled Lifting Vehicles	
124	Temporary Works – Tunnel Constructed Using Shield	
125	Bridge Installation by Thrust Boring	
126	Temporary Bridges	
130	General Requirement for Inspection of New Steelwork, Precast Concrete, Protective Treatment and Waterproofing	
150	Brickwork, Blockwork and Masonry	✓
153	Brickwork and Masonry Repairs	✓
160	General Requirements for Structural Timber	
160GN	Guidance Note for Structural Timber	

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161	Design Requirements for Structure Timber	
162	Workmanship for Structural Timber	
163	Maintenance and Repair	
164	Timber Preservation and Fire Protection	
170	General Requirements for Protective Treatment	
171	Maintenance Coating Works	
172	Protective Coating of New Structural Steelwork	
173	Protective Coating of Existing Structural Steelwork and Ironwork	
174	Protective Coating of Timber Surfaces	
175	Protective Coating of Concrete and Masonry Surfaces	✓
176	Protective Coating Systems	✓
180	General Requirements for Building and Structure Drainage	
185	Track Drainage	
190	External Service Ducts and Cable Troughing	
200	General Requirements for Roads and Pavings	
201C	Subgrade and Formation Works	
202	Road Pavements	
203	Kerbs, Footways and Paved Areas	
204	Traffic Signs and Road Markings	
230	General Requirements for Level Crossings	
231	Public Vehicular Level Crossings	
232	Occupation and Accommodation Level Crossings	
233	Footpath, Bridleway and Other Types of Level Crossings	
240	Fencing and Gates	
250 - 253	Landscaping - Preparation of Topsoil	✓
255	General Requirements for the Management of Lineside Vegetation	

1.4 VARIATIONS TO STANDARDS (WITH JUSTIFICATION)

None.

1.5 OTHER RELEVANT INFORMATION

Details of existing parts/elements of structures/services to be retained and incorporated into the Design

None.

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Unusual features

None.

Novel or unusual use of materials and/or structural components

None.

Details of capacity assessments (for example, pedestrian modelling)

Not applicable.

Designers' Risk Assessments

- 22166C/DRA-001 - A01 Designer's Risk Assessment

IDC

Not applicable.

Indicative description of the construction sequence

The concrete pour is to be undertaken following the suggested sequence of works:

- Security measures to be put in place and site compound set-up at land adjacent to the sea wall defence.
- Access arrangement to be put in place.
- Excavation to be carried out to pour the concrete foundation. Appropriate Temporary Works (i.e. excavation support) to be put in place depending of the depth of the rock level encountered.
- Timber formwork, including Diwidags to be installed as shown on the separate Temporary Works submission.
- Concrete foundation and sea wall block to be cast in situ in separate pours.
- Stainless steel Diwidags to be cut on site. Diwidags voids to be filled with mortar to provide the required concrete cover.
- Remove access arrangements and clear the site compound.
- Demobilise.

Specification of workmanship and materials

Element	Material	Notes
Concrete pours	Concrete C35/45	Density (wet) of 2500kg/m ³
16mm diwidags	Stainless Steel (grade 304 or 316)	

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1.6 REQUIREMENTS FOR OPERATION, INSPECTION, MAINTENANCE, REPAIR, RENEWAL OR REMOVAL INCLUDING SPECIAL ACCESS ARRANGEMENTS

To allow for successful completion of the works, there are multiple stakeholders with constraints and interfaces that will require consideration and action to satisfy them. These include but are not limited to the following:

- Land ownership: Several land ownership boundaries are surrounding the structure.
- Network Rail: Disruption to the railway to be kept to a minimum.
- Highway authority: Disruption to road network around the area
- Third party neighbours: Disruption to railway to be minimised, excessive noise to be avoided and disruption and visual disturbance to be kept to a minimum.

1.7 TEMPORARY WORKS

Temporary works that may be required for these works are highlighted, but not limited to the below:

- Temporary formwork
- Temporary excavation support
- Temporary lighting
- Temporary fencing
- Removal of obstructions

Additional temporary works designs outside the scope of this submission will be completed by the main Contractor. Form C will be prepared as required by NR/L2/CIV/003.

1.8 DETAILED DESIGN DRAWINGS AND MODELS

Drawing No	Description	Revision
22166C 001	St. Ishmael Permanent Works	B01

1.9 ACCOMPANYING DRAWINGS AND OTHER DOCUMENTS

Document No	Description	Revision
22166C/CAL	Sea Wall defence design	A01
22060C/DRA-001	Designer's Risk Assessment	A01

For drawings, refer to section 1.8 DETAILED DESIGN DRAWINGS AND MODELS

1.10 MATTERS THAT HAVE BEEN CONSIDERED IN THE DESIGN

1. So far as is reasonably practicable, the Asset affected will be safe in use when used in accordance with its intended purpose.

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2. Hazards are managed in accordance with requirements of the CDM Regulations and CSM regulations. Residual risks are documented in a Risk Register. Risks to both (a) health and safety during construction, maintenance, use, railway operations and (b) occupational health and safety, are as low as reasonably practicable or better.
3. The provisions for examination, maintenance and eventual renewal/removal are satisfactory.
4. The overall Design concept and the appearance of the infrastructure are appropriate for their purpose, location and site conditions.
5. Where the proposal includes the strengthening, partial renewal or removal of structures, the stability of the whole structure and all its parts/elements at all stages of the Works are addressed, including the long-term adequacy of the remaining parts/elements of the structure and supporting soil.
6. The effects of the proposals on existing infrastructure are adequately considered.
7. Arrangements for liaison and consultation with external bodies (such as Local Authorities, statutory undertakers, the British Transport Police, the Environmental Regulators and landowners) are satisfactory and the likely effects of the proposals on external organisations are addressed. Required Permissions/Approvals have been obtained to support the proposals.
8. The impact of the proposals on services and service routes is adequately investigated and appropriate mitigation measures have been agreed with the appropriate Authority and incorporated into the Design.
9. The effects on other rail engineering disciplines including track, gauging, signalling (including signal sighting), telecommunications, electrification, lighting, and other operational electrical and mechanical equipment have been satisfactorily considered and no interfaces have been identified which would negate the use of this FormG to NR/L2/CIV/003 clause 12.2.
- ~~10. Mining related risks have been assessed in the development of the proposed design and are considered to be acceptable, in accordance with NR/L2/CIV/191/MOD05.~~
11. The requirements/recommendations of Railway Group Standards and RIS, Network Rail standards and ~~Department for Transport Design Standards for Accessible Railway Stations~~ have been addressed and proposed variations from these standards are identified and justified.
- ~~12. The requirements of the Building Regulations are met and any planning conditions are met.~~
13. The proposed Design loadings are appropriate and any non-standard accidental loadings are correctly identified.
14. The requirements of NR/L2/CIV/003/F1990 to NR/L2/CIV/003/F1994 and NR/L2/CIV/003/F1997 have been considered and the selected options/choice recorded in this design.
15. The proposed Design standards and methods of Design are suitable.

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16. The GIR/GDR information presented in or referred to in this combined design submission FormG is appropriate for the detailed design and assumptions have been verified or measures for verification of assumptions have been incorporated in the detailed design.
17. A Geotechnical Design Report, which meets the requirements of BS EN 1997 and NR/L3/CIV/071 is available. This Report justifies the selection of the Geotechnical Design parameters and outlines any further work required for implementation.
18. A plan of geotechnical related construction supervision and monitoring (including details of items to be checked during construction or requiring maintenance or monitoring) have been incorporated in the detailed design and meet the requirements of BS EN 1997.
19. The Design complies with structure clearance and platform stepping distance requirements.
20. Important Design matters not covered by standards are identified.
21. The proposals are economical.
22. The proposed works will not compromise the structural robustness of any existing structures.
23. The proposals have considered requirements for environmental and sustainable development. The design has adequately considered the results and actions required from the Environmental and Social Appraisal and the Environmental and Social Management Plan, where required by NR/L2/ENV/015.
24. The selection of post-installed anchors in concrete and masonry meet the requirements of BS 8539.
25. All materials specified in the design of structures are compatible with the intended application and environment. This includes, but is not limited to:
 - fixing metallic structures to masonry with studs bonded with resin, grout or other chemical bonding products
 - fixing design is to current standards and guidance
 - design and installation comply with manufacturer's requirements, are compatible with substrate and includes appropriate verification testing
 - building fabric design and associated fixings are appropriate for the security risk and associated requirements
 - suitable and sufficient investigation, as far as reasonably practical, has been carried out to determine that materials to be used will be compatible.
 - Design calculations have been completed where applicable and checked in accordance with the Design Check Category.
26. The provision of this design on this FormG meets with the requirements of NR/L2/CIV/003 clause 12.2.
- ~~27. A completed IDC certificate has been provided with this design to comply with NR/L2/RSE/02009 clause 15.3~~
28. A Designers Risk Assessment has been provided with this design.

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29. The Permanent Works designer has outlined their proposed construction methodology and envisaged temporary works requirements in order to facilitate construction of the Permanent Works.
30. The Permanent Works designer has outlined their proposed construction methodology and envisaged temporary works requirements to comply with the Diversity Impact Assessment (DIA), e.g., provision of temporary structures such as accessible temporary footbridges
31. The provision of new assets has taken account of the effects on existing assets, such as effects on cuttings, embankments, other structures or GSM-R.
32. The design has adequately considered pedestrian flow, fire risk, means of escape and security requirements.
33. A specification of workmanship and materials has been provided with the detailed design submission.

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PART 2: DESIGNER'S SUBMISSION

I confirm:

1. that the criteria specified in NR/L2/CIV/003 have been considered and:
 - (a) this combined design submission Form G, incorporating Approval in Principle Design, Statement of Design Intent and Design and Check certificate, is submitted on behalf of *Crouch Waterfall, 15 Apex Court, Woodlands, Bradley Stoke, Bristol BS32 4JT.*
2. that reasonable professional skill and care have been used with the objective of checking that the Design:
 - (a) unless identified in 1.4, (i) the Design will comply with all relevant standards and will be delivered in accordance with the CR-T/Requirements documents and (ii) the deliverables identified within the CR-T/Requirements documents have been completed and submitted in support of this submission.
 - (b) complies with the design standards, codes and methods stated in **PART 1**.
 - (c) is accurately described by the drawings, models, schedules, performance, materials and workmanship specifications, list of matters that have been considered in the design and other documents in **PART 1**, that have been prepared for issue as Approved for Construction (AFC) pending the completion of **PART 5**, **PART 5A** and **PART 6** of this form
 - (d) incorporates any feedback from Network Rail on any pre-submission design development work

Signed	Title Associate
Name (print) Sergio Alarcon Gener	Date 22nd June 2022
To be signed by the Contractor's Responsible Engineer.	

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PART 3: CHECK

I certify that reasonable professional skill and care have been used in checking the Design identified in **PART 1** of this submission, with the objective of checking that the Design

- (a) complies with the Design standards, codes and methods and other requirements stated in **PART 1** of this submission.
- (c) was checked as stated in **PART 1** and has been carried out with the level of independence specified in **NR/L2/CIV/003**.

Signed 	Title Regional Director
Name (print) John Robertson	Date 22nd June 2022
To be signed by the Checker	

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PART 4: CONSTRUCTION ORGANISATION'S ACKNOWLEDGEMENT OF COMBINED SUBMISSION BY A SUB-CONTRACT DESIGNER

The organisation named in **PART 2** is engaged as a sub-contractor to the organisation stated below. I acknowledge this combined submission to Network Rail in support of our contract obligation for the provision of this design on behalf of *Dyer and Butler, Mead House, Station Road, Nursling, Southampton, SO16 0AH*.

I confirm that, unless stated in **PART 2**, the submission complies with the CR-T.

Signed	Title
Name (print)	Date
To be signed by the Contractor's Responsible Engineer appointed for the Construction phase	

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PART 5: PROJECT ENGINEER'S COMMENTS AND ACCEPTANCE ON BEHALF OF NETWORK RAIL

I have considered the combined design submission and confirm that the information specified in **NR/L2/CIV/003** and the CR-T/Requirements document is included in this submission. My comments on the submission are in the associated closed out DRN.

I have reviewed the combined submission and confirm that, unless stated in **PART 1**, it complies with the Asset Manager's requirements for this project as set out in the Requirements documents and CR-T.

I accept that, so far as can reasonably be ascertained from the information submitted, the relevant procedures for the Design and Design Check as specified in **NR/L2/CIV/003** have been followed properly.

I have considered the Design Check statement provided in accordance with 12.2 of **NR/L2/CIV/003** and confirm that the stated method of checking was suitable and that all criteria for the use of this FormG have been satisfied.

I confirm that the Design has been checked in accordance with **NR/L2/CIV/003** with the design check categories agreed with the DPE as listed in Part 1;

Signed	Title
Name (print)	Date
To be signed by the Project Engineer (Building and Civil Engineering)	

Signed	Title
Name (print)	Date
To be signed by other responsible person (if applicable) (Project Engineer (Building Services) for example)	

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PART 5A: SUPPLEMENTARY NETWORK RAIL REVIEWER ENDORSEMENT

Security, Emergency and Contingency Review

My comments on the submission are given below. Provided that these comments are addressed, I hereby endorse this combined design submission FormG submission of the above proposals regarding the security arrangements of railway infrastructure.

Signed _____	Title
Name (print)	Date
To be signed by the competent security role holder assigned to the project	

Station Pedestrian Capacity and Evacuation Review

My comments on the combined submission are given below. Provided that these comments are addressed, I hereby endorse this combined design submission FormG of the above proposals regarding Station capacity and evacuation.

Signed _____	Title
Name (print)	Date
To be signed by the Network Rail Capacity Engineer	

Fire Safety Review

My comments on the combined submission are given below. Provided that these comments are addressed, I hereby endorse this combined design submission FormG of the above proposals regarding Fire Safety.

Signed _____	Title
Name (print)	Date
To be signed by the Network Rail Fire Engineer	

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PART 6: ASSET MANAGER'S APPROVAL

I have considered the combined submission and confirm that the proposed-deviations to the CR-T are acceptable subject to any comments listed below being addressed prior to proceeding to Approved for Construction (AFC) Design as defined in NR/L2/RSE/02009. (Statement to be struck out where deviation from the Project Requirements is not being sought).

I have considered the combined design submission FormG and confirm that this is approved subject to the comments given below being addressed prior to proceeding to Approved for Construction (AFC) Design as defined in NR/L2/RSE/02009.

Signed	Title
Name (print)	Date
To be signed by the Asset Manager (Structures)	

Signed	Title
Name (print)	Date
To be signed by the Asset Manager (Geotechnical)	

Signed	Title
Name (print)	Date
To be signed by the Asset Manager (Drainage)	

Signed	Title
Name (print)	Date
To be signed by the Asset Manager (Buildings)	