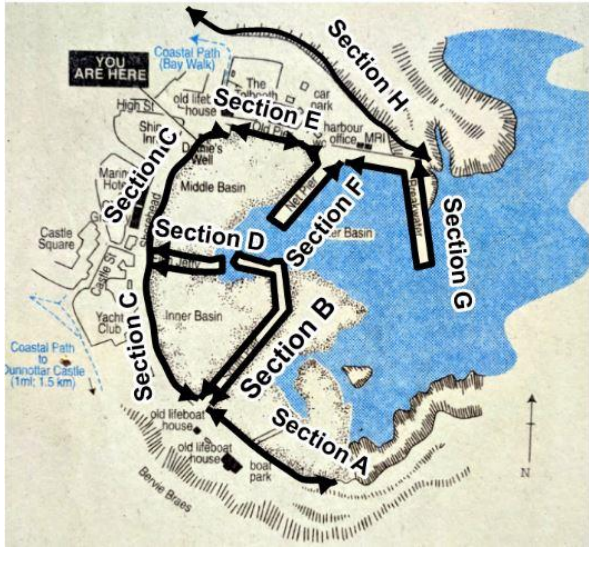


1. General information

Location Plan:		Stonehaven harbour Assessment Date: 15/05/2018	
	Exam Type:	Detailed	
	Complete Survey:	Yes	
	Structure Ref:	1	
	OS Ref:	387867 , 785378	
	Survey Unit:	N/A	
	Governing SMP2:	N/A	
	SMP2 Policy Unit:	N/A	
	SMP2 Policy:	N/A	
<p>NOTE: This document has been prepared as an Asset Condition Survey Report for Aberdeenshire Council. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.</p>			

1.1. Type of structure and general description (to include key components and materials)

Stonehaven Harbour is located at the southern end of Stonehaven Bay, connecting to the coastal defences in the north and tying into the natural cliff headland in the south. The defence has been split into 8 sections correlating to a change in structure type and to match the local naming convention.

- Section A - A rock armour revetment fronting the old lifeboat house and Bervie Braes cliff-line to the south.
- Section B - South Pier - A masonry harbour arm, with a seaward facing wall, landward facing mooring, and sheet piled roundhead.
- Section C - Shorehead - A sloped masonry quay wall, running along shorehead road.
- Section D - Fish Jetty - A masonry jetty separating the inner and middle basins, with a sheet piled roundhead.
- Section E - Old Pier - A masonry quay face running along Old Pier road.
- Section F - Net Pier - A masonry pier with two-sided moorings and a sheet piled roundhead.
- Section G - Breakwater - A concrete harbour breakwater arm with landward facing moorings.
- Section H - A rock armour revetment fronting the Stonehaven Harbour Office.

1.2. Summary of condition and critical defects

Section A has defects that could significantly reduce performance of the asset and warrant further investigation. Sections B, C, D, E, F, G and H are considered to be in fair condition with some defects that could potentially reduce performance of the assets. The defects that are believed to be significant and require immediate attention are as follows:

Section A:

- The rock armour units are expelled and undersized and the access path is in poor condition with missing planks.

Section B:

- There are signs of voiding behind the blockwork on the seaward and quay face.
- The sheet piles are heavily corroded with some complete loss of section through the piles.
- Corroded ladders.

Section C:

- The toe is undermined along the seaward face for approximately 30m.
- Several drainage points possibly need flap valves.

Section D:

- There are signs of undermining scour on the toe of the quay face.
- The sheet piles are heavily corroded with some complete loss of section through the piles.
- Corroded ladders.

Section E:

- No significant defects - cracking on slipway.

Section F:

- There are signs of undermining scour on the toe of the quay face.
- There are anchor plates missing from the sheet piles.

Section G:

- There is exposed reinforcement corroding due to cover loss.

Section H:

- The rock armour protecting the harbour appeared overly steep and could be subject to collapse under extreme wave loads.

1.3. Access considerations

Third party/adjacent landowner permissions:	The harbour is open to public access, however an area of the breakwater arm is fenced off and requires private access through the Survitec Survival Craft Marine Training Academy.
Nearest public highway:	A957
Local guidance:	A complete survey requires a low tide to examine the harbour in full detail. Boat access is required if survey of the seaward face of the breakwater and south pier is required.
Tide state during survey:	Spring (Low)
Equipment required for access and examinations:	High-Vis, life jackets.

2. Structure information

Defence Hierarchy	Type	Sub Types	Elements	Material Type
Section A	Defence	Embankment	Rock armour	Rock (undersized, non-uniform, expelled rock armour)
	Defence	Embankment	Access strip	Slipway (uneven, damaged)
	Defence	Embankment	Splash wall	Masonry/ Concrete capping (dilapidated, damaged)
Section B	Defence	Quay	Seaward face	Masonry (voiding, open joints)
	Defence	Quay	Quay face	Masonry (small cracks, open joints)
	Defence	Quay	Capping	Masonry (cracking and spalling of buttress elements, weathering of repairs)
	Defence	Quay	Piling	Steel (corroded piles, missing anchors)
	Defence	Quay	Deck	Concrete (insufficient handrailing)
Section C	Defence	Wall	Access strip	Concrete (cracking and loss of concrete, algae growth)
	Defence	Wall	Exposed face	Masonry (undermining scour, cracking, loose blockwork)
	Defence	Wall	Capping wall	Mix of concrete and masonry units (cracks, spalling and honeycombing of concrete)
Section D	Defence	Quay	Sheet piling	Steel (corroded piles and ladder)
	Defence	Quay	Quay face	Masonry (undermining scour, delaminated surfacing)
	Defence	Quay	Deck	Cobbles (Insufficient handrailing)
Section E	Defence	Wall	Access strip	Concrete (extensive cracking)
	Defence	Wall	Exposed face	Masonry (no major defects)
Section F	Defence	Quay	Sheet piling	Steel (holes in piles, missing anchor plates)

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	Defence	Quay	Quay face	Masonry (undermining scour on toe, cracking, delaminated concrete repairs)
	Defence	Quay	Deck	Concrete (displaced timber beam, insufficient handrailing)
Section G	Defence	Quay	Capping	Concrete (delaminating repairs, open joints)
	Defence	Quay	Seaward face	Concrete (cracking of concrete, exposed steel corroding, corroded / damaged handrails)
	Defence	Quay	Face protection	N/A
	Defence	Quay	Deck	Concrete (insufficient handrailing, damaged surfacing)
	Defence	Quay	Quay face	Concrete (undermining scour, cracking, spalling and delaminating concrete)
Section H	Defence	Embankment	Rock armour	Rock armour (undersized, overly steep, narrow crest)
	Defence	Embankment	Splash wall	Masonry (missing blockwork)

Approx. defence length (m):	900m		
Approx. co-ordinates from:	387627 , 785605	To:	387854 , 785220
As built drawing available:	No		
Linked to other Asset Types:	The defence ties into the council owned coastal defences in the north.		
Infrastructure protected:	The harbour protects the old town area of Stonehaven from coastal erosion and coastal flooding, it also protects harbour infrastructure (harbour masters office, survival craft marine training centre and multiple amenity features).		
Assets type and ownership that the defence ties into at either end:	The defence ties into the natural cliff-line to the south and the rock armour coastal protection to the north, both under local council ownership.		

2.1 Topographic level information

Section A	Value	Method of calculation
Crest level of primary defence (mAOD)	5.323	Laser Scan
Toe level of primary defence (mAOD)	0.476	Laser Scan
Approx. defence height above beach (m)	4.886	Laser Scan
Upper beach level (mAOD)	N/A	N/A
Lower beach level (mAOD)	N/A	N/A
Approx. total beach height (m)	N/A	N/A
Beach crest width (m)	N/A	N/A
Approx. beach gradient (1 in ...)	N/A	N/A
Beach Cross Sectional Area (m2)	N/A	N/A
Beach composition	N/A	N/A

Section B	Value	Method of calculation
Crest level of primary defence (mAOD)	6.043	Laser scan
Toe level of primary defence (mAOD)	0.526	Laser scan
Approx. defence height above beach (m)	5.506	Laser scan
Upper beach level (mAOD)	N/A	N/A
Lower beach level (mAOD)	N/A	N/A
Approx. total beach height (m)	N/A	N/A
Beach crest width (m)	N/A	N/A
Approx. beach gradient (1 in ...)	N/A	N/A
Beach Cross Sectional Area (m2)	N/A	N/A
Beach composition	N/A	N/A

Section C	Value	Method of calculation
Crest level of primary defence (mAOD)	5.053	Laser scan
Toe level of primary defence (mAOD)	1.432	Laser scan
Approx. defence height above beach (m)	2.68	Laser scan
Upper beach level (mAOD)	N/A	N/A
Lower beach level (mAOD)	N/A	N/A
Approx. total beach height (m)	N/A	N/A
Beach crest width (m)	N/A	N/A
Approx. beach gradient (1 in ...)	N/A	N/A
Beach Cross Sectional Area (m2)	N/A	N/A
Beach composition	N/A	N/A

Section D	Value	Method of calculation
Crest level of primary defence (mAOD)	3.849	Laser scan
Toe level of primary defence (mAOD)	0.345	Laser scan
Approx. defence height above beach (m)	3.945	Laser scan
Upper beach level (mAOD)	N/A	N/A
Lower beach level (mAOD)	N/A	N/A
Approx. total beach height (m)	N/A	N/A
Beach crest width (m)	N/A	N/A
Approx. beach gradient (1 in ...)	N/A	N/A
Beach Cross Sectional Area (m2)	N/A	N/A
Beach composition	N/A	N/A

Section E	Value	Method of calculation
Crest level of primary defence (mAOD)	3.890	Laser scan
Toe level of primary defence (mAOD)	2.080	Laser scan
Approx. defence height above beach (m)	2.609	Laser scan
Upper beach level (mAOD)	N/A	N/A
Lower beach level (mAOD)	N/A	N/A
Approx. total beach height (m)	N/A	N/A
Beach crest width (m)	N/A	N/A
Approx. beach gradient (1 in ...)	N/A	N/A
Beach Cross Sectional Area (m2)	N/A	N/A
Beach composition	N/A	N/A

Section F	Value	Method of calculation
Crest level of primary defence (mAOD)	4.089	Laser scan
Toe level of primary defence (mAOD)	0.608	Laser Scan
Approx. defence height above beach (m)	2.525	Laser Scan
Upper beach level (mAOD)	N/A	N/A
Lower beach level (mAOD)	N/A	N/A
Approx. total beach height (m)	N/A	N/A
Beach crest width (m)	N/A	N/A
Approx. beach gradient (1 in ...)	N/A	N/A
Beach Cross Sectional Area (m2)	N/A	N/A
Beach composition	N/A	N/A

Section G	Value	Method of calculation
Crest level of primary defence (mAOD)	7.437	Laser scan
Toe level of primary defence (mAOD)	0.646	Laser Scan
Approx. defence height above beach (m)	3.276	Laser Scan
Upper beach level (mAOD)	N/A	N/A
Lower beach level (mAOD)	N/A	N/A
Approx. total beach height (m)	N/A	N/A
Beach crest width (m)	N/A	N/A
Approx. beach gradient (1 in ...)	N/A	N/A
Beach Cross Sectional Area (m2)	N/A	N/A
Beach composition	N/A	N/A

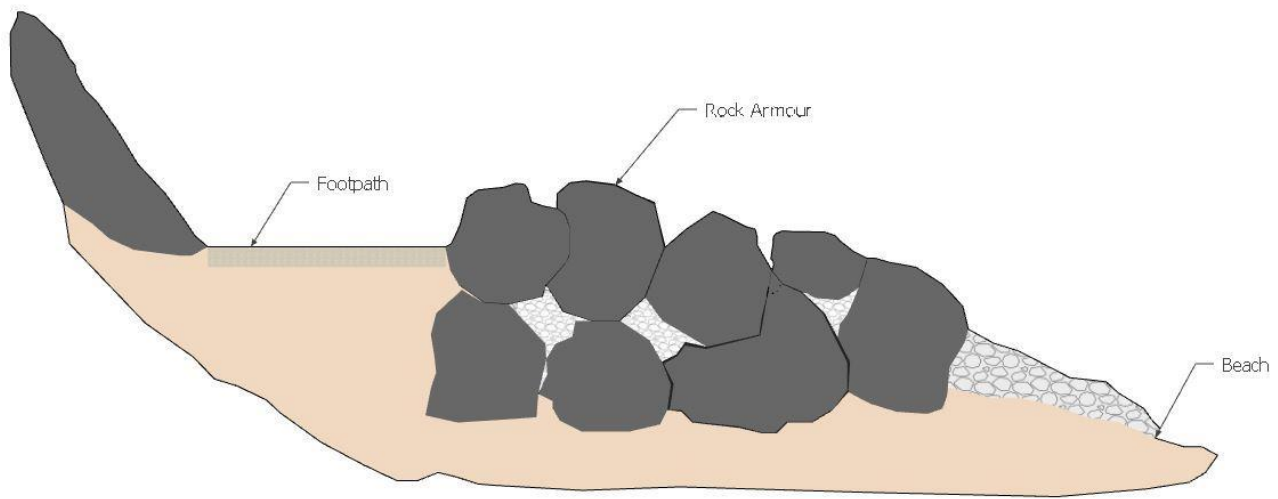
Section H	Value	Method of calculation
Crest level of primary defence (mAOD)	6.016	Laser Scan
Toe level of primary defence (mAOD)	0.663	Laser Scan
Approx. defence height above beach (m)	6.00	Laser Scan
Upper beach level (mAOD)	N/A	N/A
Lower beach level (mAOD)	N/A	N/A
Approx. total beach height (m)	N/A	N/A
Beach crest width (m)	N/A	N/A
Approx. beach gradient (1 in ...)	N/A	N/A
Beach Cross Sectional Area (m2)	N/A	N/A
Beach composition	N/A	N/A

Asset site sketch

Plan:

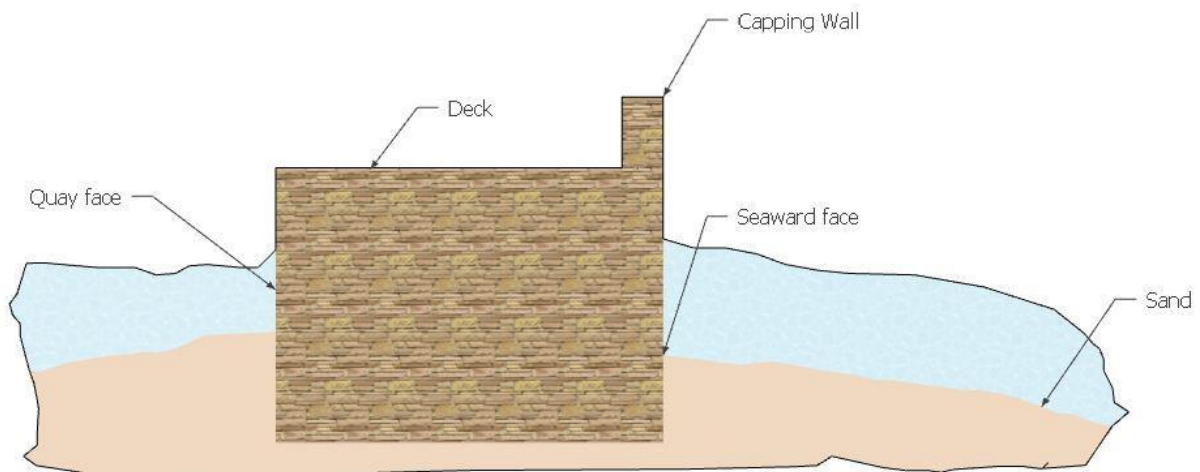


Sketch: Section A



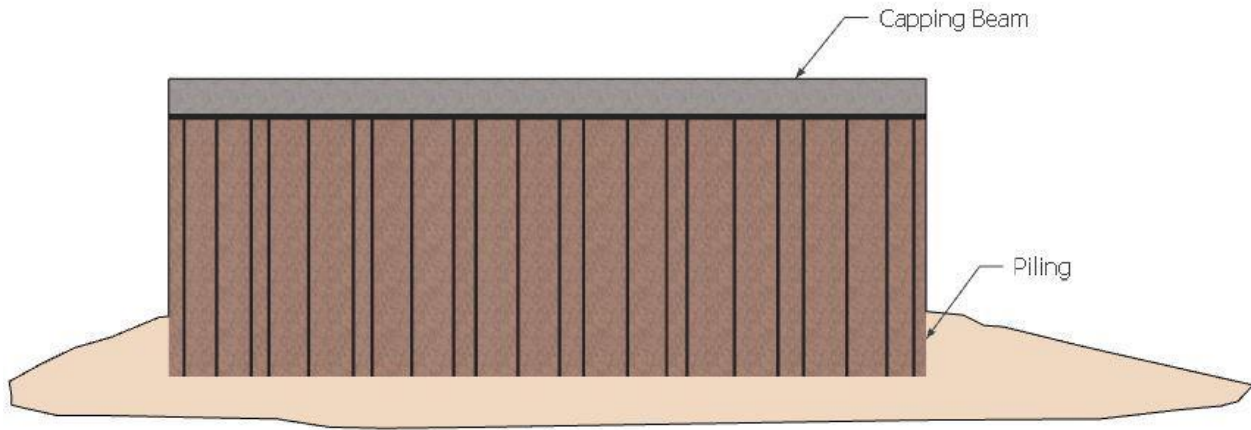
Stonehaven Harbour Section A
Rock Armour

Sketch: Section B



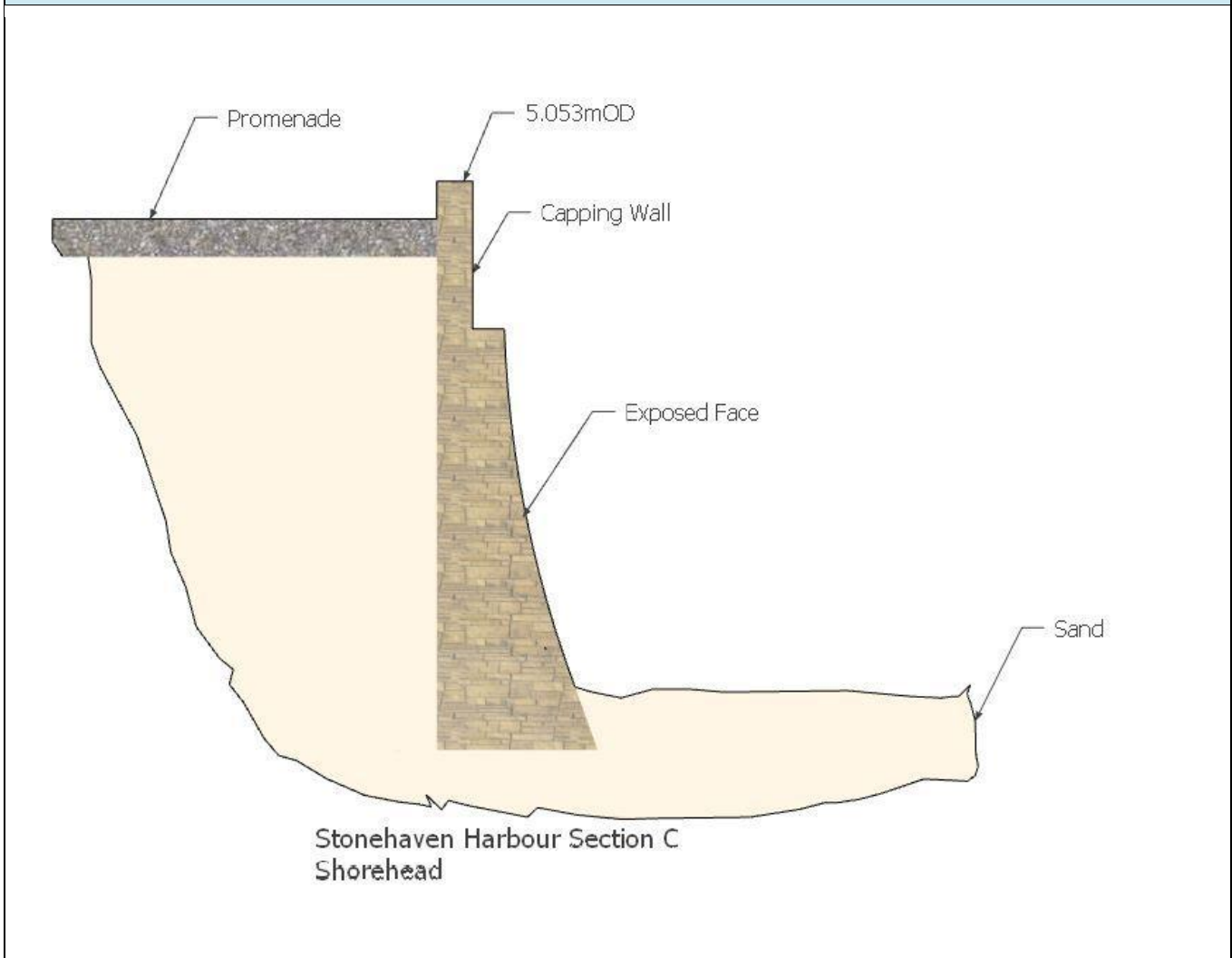
Stonehaven Harbour Section B
South Pier

Sketch: Section B - Piling

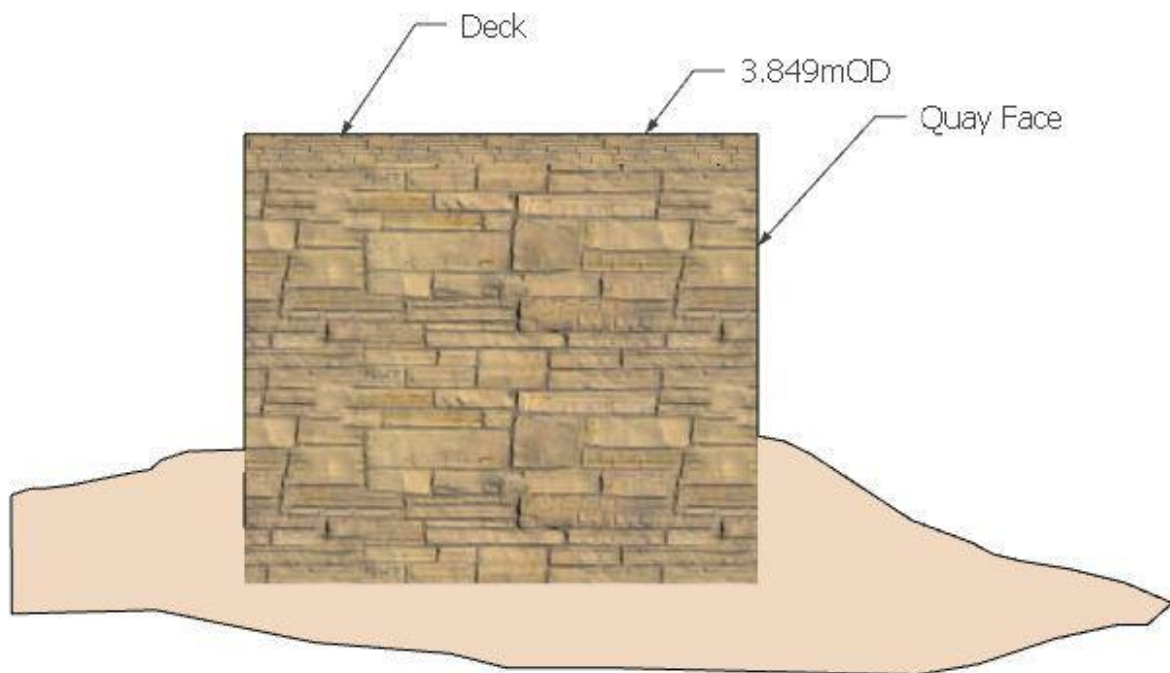


Stonehaven Harbour Section B
South Pier (Piling)

Sketch: Section C

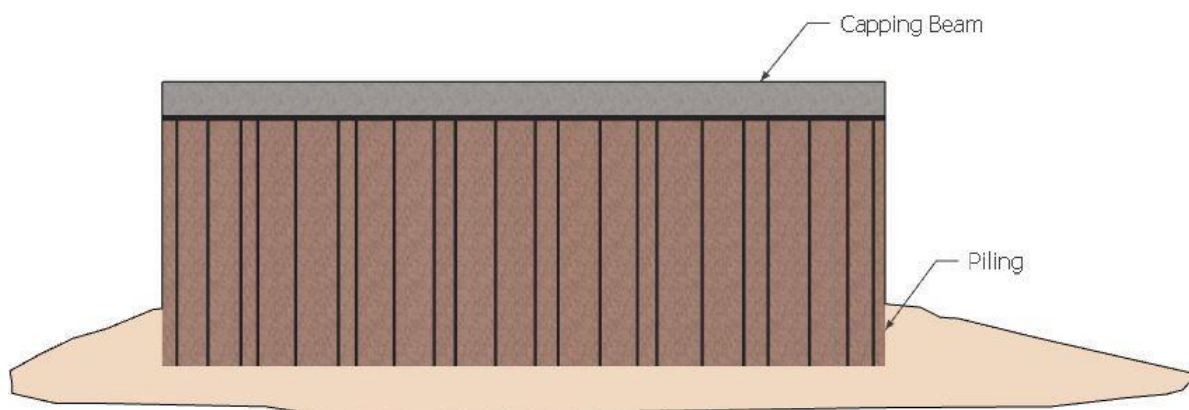


Sketch: Section D



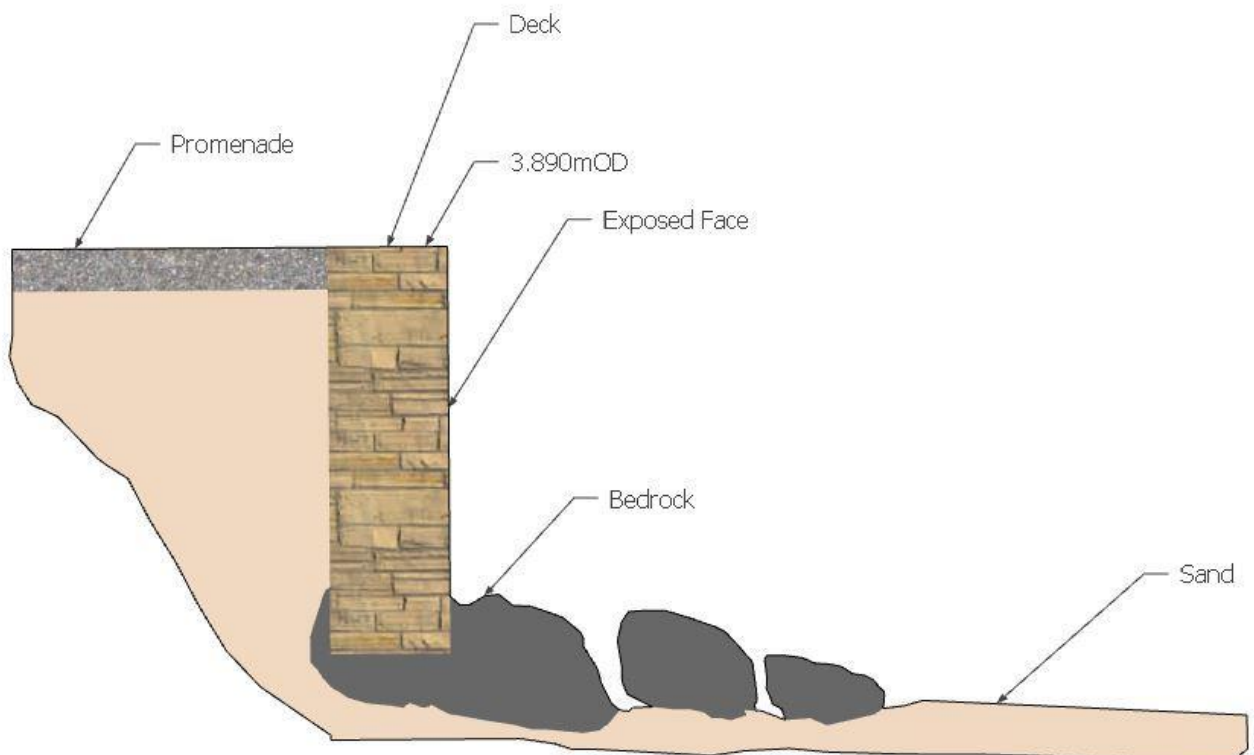
Stonehaven Harbour Section D
Fish Jetty

Sketch: Section D - Piling



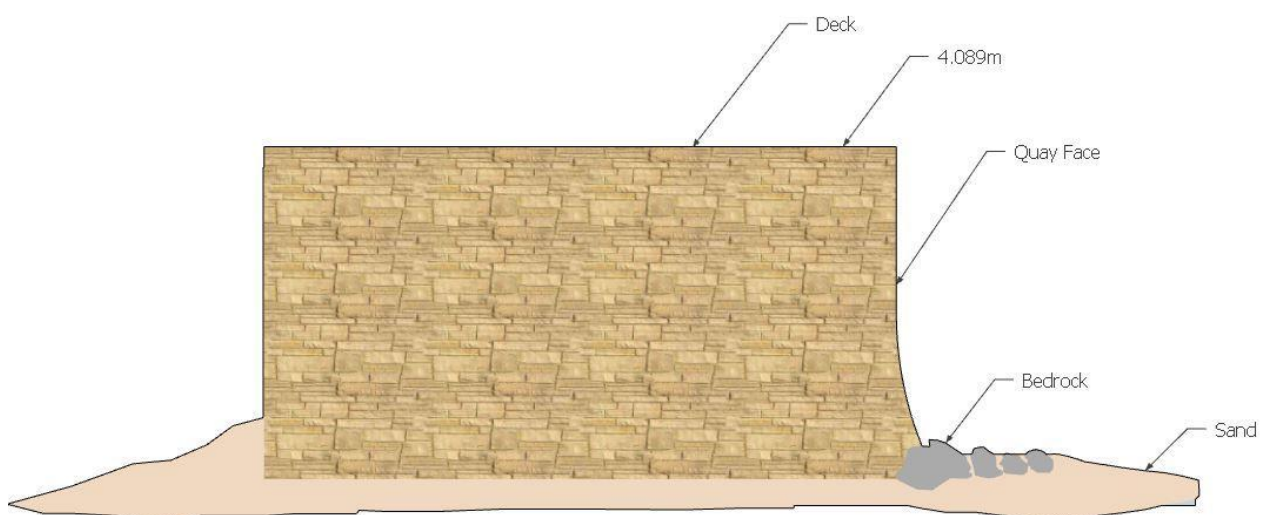
Stonehaven Harbour Section D
Fish Jetty (Piling)

Sketch: Section E



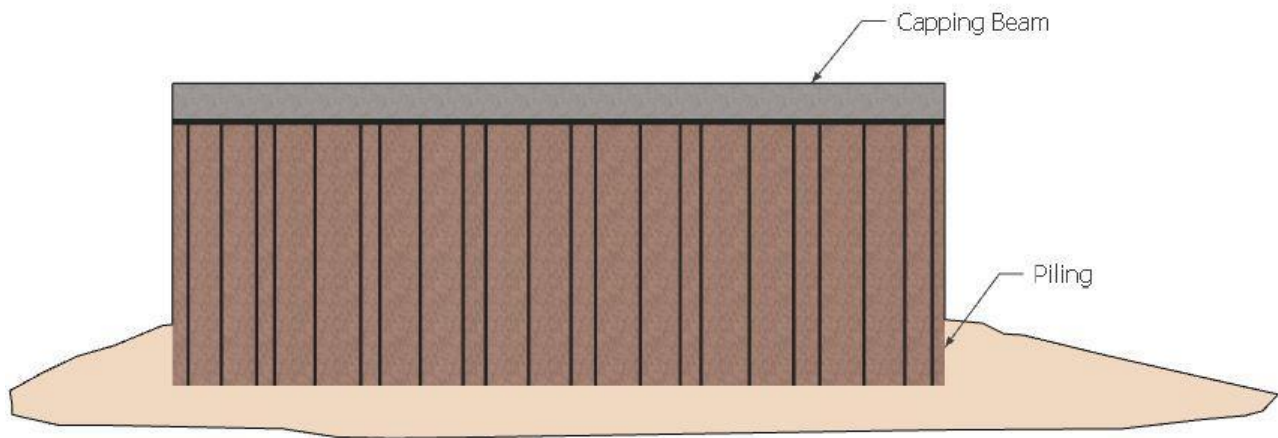
Stonehaven Harbour Section E
Old Pier

Sketch: Section F



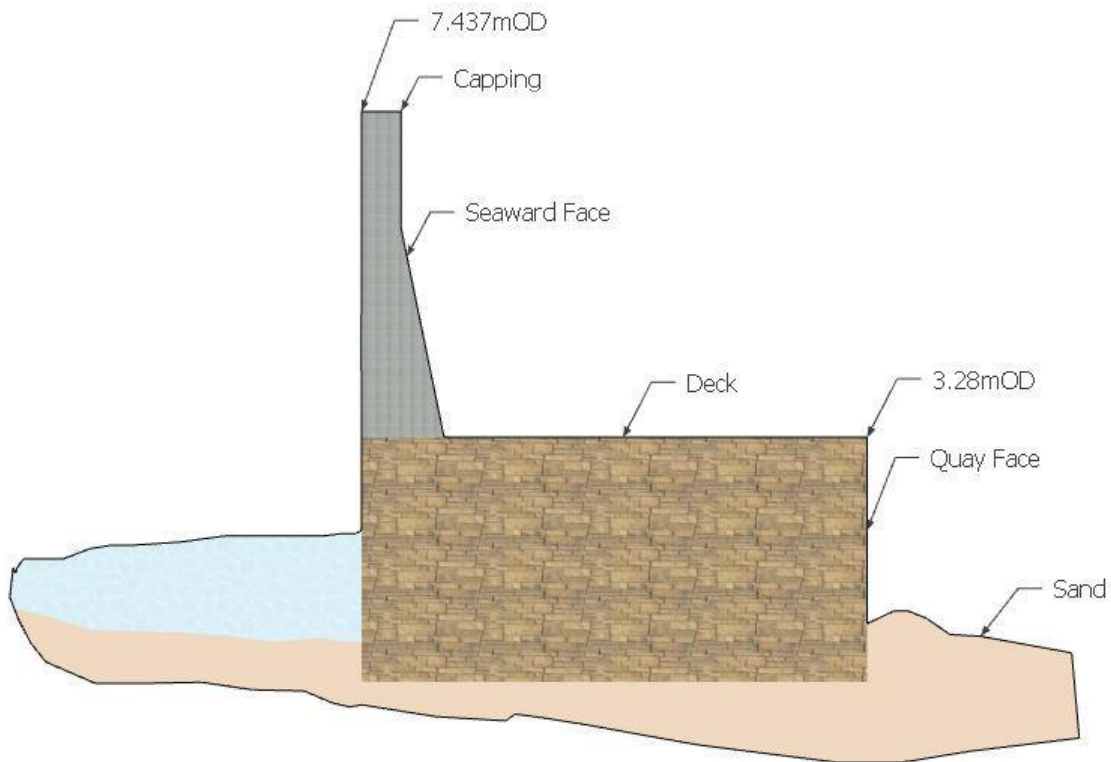
Stonehaven Harbour Section F
Net Pier

Sketch: Section F - Piling



Stonehaven Harbour Section F
Old Pier (Piling)

Sketch: Section G



Stonehaven Harbour Section G
Breakwater

3. Visual Condition Survey

3.1 Section A

Main Asset

The main asset is broken down into its constituent parts (elements) and assigned a condition score. This condition score of each element is weighted according to its importance in the functioning of the defence.

Sub-Type	Elements	Attributes and General Notes	Condition Grade	Weighting (1-9)	Overall (CG x W)
Embankment	Rock armour	Rock (undersized, non-uniform, expelled rock armour)	4	7	28
Embankment	Access strip	Slipway (uneven, damaged)	3	5	15
Embankment	Splash wall	Masonry/ Concrete capping (dilapidated, damaged)	4	4	16
Sum				16	59
Overall condition score Grade*					4

*Sum of (Weightings x Condition Grades) / (Sum of Weightings)

Unless a weighting of 9 is given for any element, in which case, the condition of this element should be taken as the overall condition grade.

3.2 Section B

Main Asset

The main asset is broken down into its constituent parts (elements) and assigned a condition score. This condition score of each element is weighted according to its importance in the functioning of the defence.

Sub-Type	Elements	Attributes and General Notes	Condition Grade	Weighting (1-9)	Overall (CG x W)
Quay	Seaward face	Masonry (voiding, open joints)	3	9	27
Quay	Quay face	Masonry (small cracks, open joints)	3	7	21
Quay	Capping	Masonry (cracking and spalling of buttress elements, weathering of repairs)	4	7	28
Quay	Piling	Steel (corroded piles, missing anchors)	4	8	32
Quay	Deck	Concrete (insufficient handrailing)	3	5	15
Sum				36	123
Overall condition score Grade*					3

*Sum of (Weightings x Condition Grades) / (Sum of Weightings)

Unless a weighting of 9 is given for any element, in which case, the condition of this element should be taken as the overall condition grade.

3.3 Section C

Main Asset

The main asset is broken down into its constituent parts (elements) and assigned a condition score. This condition score of each element is weighted according to its importance in the functioning of the defence.

Sub-Type	Elements	Attributes and General Notes	Condition Grade	Weighting (1-9)	Overall (CG x W)
Wall	Access strip	Concrete (cracking and loss of concrete, algae growth)	3	5	15
Wall	Exposed face	Masonry (undermining scour, cracking, loose blockwork)	4	7	28
Wall	Capping wall	Mix of concrete and masonry units (cracks, spalling and honeycombing of concrete)	3	7	21
Sum				19	64
Overall condition score Grade*					3

*Sum of (Weightings x Condition Grades) / (Sum of Weightings)

Unless a weighting of 9 is given for any element, in which case, the condition of this element should be taken as the overall condition grade.

3.4 Section D

Main Asset

The main asset is broken down into its constituent parts (elements) and assigned a condition score. This condition score of each element is weighted according to its importance in the functioning of the defence.

Sub-Type	Elements	Attributes and General Notes	Condition Grade	Weighting (1-9)	Overall (CG x W)
Quay	Sheet piling	Steel (corroded piles and ladder)	4	8	32
Quay	Quay face	Masonry (undermining scour, delaminated surfacing)	3	7	21
Quay	Deck	Cobbles (Insufficient handrailing)	3	5	15
Sum				20	68
Overall condition score Grade*					3

*Sum of (Weightings x Condition Grades) / (Sum of Weightings)

Unless a weighting of 9 is given for any element, in which case, the condition of this element should be taken as the overall condition grade.

3.5 Section E

Main Asset

The main asset is broken down into its constituent parts (elements) and assigned a condition score. This condition score of each element is weighted according to its importance in the functioning of the defence.

Sub-Type	Elements	Attributes and General Notes	Condition Grade	Weighting (1-9)	Overall (CG x W)
Wall	Access strip	Concrete (extensive cracking)	3	5	15
Wall	Exposed face	Masonry (no major defects)	3	7	21
Sum				12	36
Overall condition score Grade*					3

*Sum of (Weightings x Condition Grades) / (Sum of Weightings)

Unless a weighting of 9 is given for any element, in which case, the condition of this element should be taken as the overall condition grade.

3.6 Section F

Main Asset

The main asset is broken down into its constituent parts (elements) and assigned a condition score. This condition score of each element is weighted according to its importance in the functioning of the defence.

Sub-Type	Elements	Attributes and General Notes	Condition Grade	Weighting (1-9)	Overall (CG x W)
Quay	Quay face	Masonry (undermining scour on toe, cracking, delaminated concrete repairs)	3	7	21
Quay	Deck	Concrete (displaced timber beam, insufficient handrailing)	3	5	15
Quay	Sheet piling	Steel (holes in piles, missing anchor plates)	4	8	32
Sum				20	68
Overall condition score Grade*					3

*Sum of (Weightings x Condition Grades) / (Sum of Weightings)

Unless a weighting of 9 is given for any element, in which case, the condition of this element should be taken as the overall condition grade.

3.7 Section G

Main Asset

The main asset is broken down into its constituent parts (elements) and assigned a condition score. This condition score of each element is weighted according to its importance in the functioning of the defence.

Sub-Type	Elements	Attributes and General Notes	Condition Grade	Weighting (1-9)	Overall (CG x W)
Quay	Capping	Concrete (delaminating repairs, open joints)	3	7	21
Quay	Seaward face	Concrete (cracking of concrete, exposed steel corroding, corroded / damaged handrails)	3	9	27
Quay	Deck	Concrete (insufficient handrailing, damaged surfacing)	3	5	15
Quay	Quay face	Concrete (undermining scour, cracking, spalling and delaminating concrete)	3	7	21
Sum				28	84
Overall condition score Grade*					3

*Sum of (Weightings x Condition Grades) / (Sum of Weightings)

Unless a weighting of 9 is given for any element, in which case, the condition of this element should be taken as the overall condition grade.

3.8 Section H

Main Asset

The main asset is broken down into its constituent parts (elements) and assigned a condition score. This condition score of each element is weighted according to its importance in the functioning of the defence.

Sub-Type	Elements	Attributes and General Notes	Condition Grade	Weighting (1-9)	Overall (CG x W)
Embankment	Rock armour	Rock armour (undersized, overly steep, narrow crest)	3	8	24
Embankment	Splash wall	Masonry (missing blockwork)	3	7	21
Sum				15	45
Overall condition score Grade*					3

*Sum of (Weightings x Condition Grades) / (Sum of Weightings)

Unless a weighting of 9 is given for any element, in which case, the condition of this element should be taken as the overall condition grade.

3.9 Asset condition grade summary

	Section A	Section B	Section C	Section D	Section E	Section F	Section G	Section H
Target condition grade	2	2	2	2	2	2	2	2
Overall surveyed condition grade	4	3	3	3	3	3	3	3
Total time taken to reach CG1	0	0	0	0	0	0	0	0
Total time taken to reach CG2	0	0	0	0	0	0	0	0
Total time taken to reach CG3	0	0	0	0	0	0	0	0
Total time taken to reach CG4	0	15 years	15 years	15 years	15 years	15 years	15 years	20 years
Total time taken to reach CG5	10 years	30 years	30 years	30 years	30 years	30 years	30 years	30 years

3.10 Additional information

General description and effect of any coastal erosion noted:	None noted.
General description and effect of any wave overtopping noted:	None observed. Anecdotal evidence suggests that severe wave overtopping occurs over the outer harbour breakwater arm, lower but more severe volumes of wave overtopping occur along shorehead road but are still considered significant.
General description and effect of any longshore / cross-shore sediment transport noted:	None noted.

4. Identification of defects and recommendations

4.1. Main asset defect register

Defect Ref No.	Defect Location (NGR)	Sub Type	Element	Photo Ref	Defect Description	Recommendations	Defect Priority
D1	387852, 785224	Embankment	Rock armour	102	Nonuniform rock armour profile, insufficient protection to timber footbridge.	Consider re-profiling rock armour slope with existing and new rock.	19
D2	387848, 785228	Embankment	Rock armour	103	Undersized rock armour.	Consider rebuilding rock armour revetment with suitably sized armourstone, extending the protection to the harbour arm.	13
D3	387851, 785224	Embankment	Rock armour	104, 187	Expelled rock armour, also present on slipway blocking access.	Remove armour blocking slipway; replace armourstone back into profile.	13
D4	387833, 785234	Embankment	Rock armour	105	Poorly placed and non-interlocking rock profile.	Consider rebuilding rock armour revetment with suitably sized armourstone, extending the protection to the harbour arm.	13
D5	387804, 785235	Embankment	Access strip	106	Open joints between granite blocks.	Repoint open joints between blocks.	26
D6	387829, 785212	Embankment	Rock armour	107	Poor condition of rock armour crest, too narrow under design guidance and provides insufficient protection to the timber walkway.	Consider rebuilding rock armour revetment with suitably sized armourstone, extending the protection to the harbour arm.	27
D7	387804, 785225	Embankment	Access strip	108, 188	Health and Safety - Uneven and damaged access path, with missing planking.	Consider replacing access path.	5
D8	387786, 785236	Embankment	Rock armour	109	Insufficient rock armour protection at tie-in with harbour arm.	Consider rebuilding rock armour revetment with suitably sized armourstone, extending the protection to the harbour arm.	20
D9	387756, 785248	Embankment	Splash wall	110, 189, 221	General dilapidation and damaged capping repairs.	Reface concrete repairs.	10
D10	387759, 785270	Quay	Seaward face	111	Open joints.	Repoint open joints.	21

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Defect Ref No.	Defect Location (NGR)	Sub Type	Element	Photo Ref	Defect Description	Recommendations	Defect Priority
D11	387783, 785305	Quay	Seaward face	112, 190	Voiding behind seaward face.	Repoint and injection grout voids.	1
D12	387788, 785311	Quay	Capping	113, 192	Open joints.	Repoint open joints.	11
D13	387747, 785276	Quay	Quay face	114, 191, 224	Small cracks in masonry blocks.	Monitor cracking and consider repointing repairs.	12
D14	387748, 785290	Quay	Quay face	168	Open joints.	Repoint open joints.	11
D15	387771, 785306	Quay	Deck	115	Dilapidated tarmac surface.	Consider resurfacing concrete repairs.	28
D16	387780, 785310	Quay	Capping	116	Weathering of repairs.	Monitor and consider replacing weathered blockwork.	11
D17	387788, 785318	Quay	Capping	117, 194, 223	Corroding piping in masonry joints.	Remove old corroded piping and repoint joints.	15
D18	387797, 785330	Quay	Capping	118	Cracking and spalling concrete rendering throughout section.	Breakout and replace concrete rendering.	20
D19	387811, 785353	Quay	Capping	119, 193, 222	Spalling, cracking and honeycombing of buttress elements of the wall.	Reface concrete repairs.	7
D20	387813, 785400	Quay	Capping	120	Settlement of the wall.	As part of annual inspection, monitor wall for signs of movement.	3
D21	387776, 785404	Quay	Sheet piling	121	Corrosion of sheet piles.	Monitor and consider options for replacing the sheet pile structure.	4
D22	387776, 785404	Quay	Sheet piling	122, 216	Health and Safety - Heavily corroded ladder.	Replace the ladder.	2
D23	387774, 785404	Quay	Sheet piling	123	Capping beam cracked.	Repoint crack.	13

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Defect Ref No.	Defect Location (NGR)	Sub Type	Element	Photo Ref	Defect Description	Recommendations	Defect Priority
D24	387774, 785404	Quay	Deck	124	Insufficient hand railing.	Consider installing handrails.	29
D25	387774, 785404	Quay	Deck	125	Loose handrailing.	Fix loose handrailing.	23
D26	387808, 785391	Quay	Quay face	126, 213	Weathering of blockwork.	Monitor and consider surfacing repairs to weathered blockwork.	14
D27	387808, 785391	Quay	Quay face	127, 212	Corroded ladder.	Replace ladder.	9
D28	387732, 785287	Wall	Access strip	128	Cracking and loss of concrete on the slipway.	Reface concrete repairs.	24
D29	387729, 785289	Wall	Exposed face	129, 195	Cracking of pointing along the entire length and loose blockwork.	Repoint cracks.	11
D30	387731, 785288	Wall	Access strip	130	Health and Safety - algae growth on slipway.	Remove vegetation to avoid slipping hazards.	22
D31	387712, 785307	Wall	Exposed face	131, 197, 226	Missing flap valve.	Consider installing a flap valve.	30
D32	387711, 785310	Wall	Exposed face	132, 196, 225, 233	Undermining scour of exposed face approximately 10m.	Consider options for installing scour protection for the seawall. Monitor wall for signs of settlement and further deterioration.	1
D33	387697, 785353	Wall	Exposed face	133	Undermining scour of exposed face approximately 2m long.	Consider scour protection of the toe. Monitor wall for signs of settlement and further deterioration.	2
D34	387696, 785373	Wall	Exposed face	134	Sealant material missing between blockwork.	Replace missing sealant material.	11
D35	387697, 785384	Wall	Exposed face	135	Possibly blocked outfall.	Unblock outfall, consider installing flap valve.	16

COASTAL ASSET CONDITION SURVEY REPORT

Defect Ref No.	Defect Location (NGR)	Sub Type	Element	Photo Ref	Defect Description	Recommendations	Defect Priority
D36	387733, 785392	Quay	Deck	136	H&S Insufficient handrailing around the landing quay roundhead.	Consider installing handrails.	29
D37	387763, 785395	Quay	Piling	137	Corrosion of sheet piles.	Monitor and consider options for repairing/replacing the sheet pile structure.	4
D38	387763, 785395	Quay	Piling	138	Chipping of capping beam.	Consider repairing damaged concrete.	16
D39	387761, 785403	Quay	Piling	139	Missing sheet pile tie-back anchors.	Monitor and consider options for repairing/replacing the sheet pile structure.	5
D40	387694, 785406	Wall	Exposed face	140	Dilapidated concrete repairs exposing open joints in old masonry blockwork of the exposed face and the crest.	Reface concrete repairs.	12
D41	387690, 785409	Wall	Capping wall	141, 198	Large horizontal cracks in capping wall. Cracking also visible on landward side.	Repoint cracks and monitor for further movement.	15
D42	N/A	Wall	Capping wall	144	Spalling and honeycombing concrete approximately 10m long.	Reface concrete repairs.	17
D43	387713, 785410	Quay	Quay face	174, 215	Health and Safety - Corroded and loose ladder.	Replace ladder.	9
D44	387709, 785406	Quay	Quay face	142	Delaminating concrete repairs.	Reface concrete repairs.	14
D45	387703, 785408	Quay	Quay face	143	Approximately 1m x 0.3 m scour.	Extend concrete toe beneath scour depth.	2
D46	387699, 785411	Wall	Exposed face	145, 199	Delaminating repairs on toe and potential for undermining scour, approximately 30m.	Consider scour protection of the toe. Monitor wall for signs of settlement and further deterioration.	2
D47	387700, 785424	Wall	Exposed face	146, 200, 227, 234	Voiding behind the structure. Approximately 1m deep behind the structure in 5 locations.	Fill voids. Monitor wall for signs of settlement and further deterioration.	1

COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Sub Type	Element	Photo Ref	Defect Description	Recommendations	Defect Priority
D48	387708, 785452	Wall	Capping wall	147, 201	Drainage points on capping wall may need flap valves.	Consider installing flap valves.	30
D49	387730, 785490	Wall	Capping wall	148, 202	Open joints between blockwork.	Repoint open joints.	7
D50	387744, 785510	Wall	Access strip	149, 203	Extensive cracking on slipway.	Repoint cracks and patch repair damaged concrete.	10
D51	387750, 785511	Wall	Access strip	150, 204	Cracking on side of slipway.	Repoint cracks and patch repair damaged concrete.	17
D52	387829, 785499	Quay	Quay face	151, 205	Longitudinal cracks approximately 8m.	Repoint cracks and monitor structure for signs of movement.	13
D53	387831, 785502	Quay	Quay face	152	Long cracks approximately 3m.	Repoint cracks.	13
D54	387839, 785489	Quay	Deck	153	Health and Safety - insufficient handrailing.	Consider installing handrails.	29
D55	387812, 785431	Quay	Deck	154	Displaced timber beam.	Replace beam.	24
D56	N/A	Quay	Quay face	173	Delaminated concrete repairs along harbour face.	Reface concrete repairs.	12
D57	387805, 785441	Quay	Quay face	155	Health and Safety - Algae and seaweed growth on steps. Slipping hazard.	Remove algae and seaweed to prevent slipping hazards.	19
D58	387892, 785492	Quay	Capping	156	Delaminating concrete repairs.	Reface concrete.	25
D59	387883, 785494	Quay	Capping	157	Open joints.	Repoint open joints.	13
D60	387894, 785492	Quay	Capping	158	Missing element, exposed pipe.	Replace missing block.	18

COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Sub Type	Element	Photo Ref	Defect Description	Recommendations	Defect Priority
D61	387919, 785479	Quay	Seaward face	159, 206	Stains from corroding reinforcement.	Breakout damaged area of concrete, remove and replace corroded reinforcement as required and reform concrete structure.	6
D62	387922, 785484	Quay	Seaward face	160, 207, 228	Cracking of concrete.	Repoint cracks.	9
D63	387931, 785440	Quay	Seaward face	161, 208	Cracking of walls. Repairs displaced.	Reface concrete repairs.	8
D64	387937, 785422	Quay	Seaward face	162	Damage of concrete around pipe.	Patch repair damaged concrete.	8
D65	387940, 785406	Quay	Seaward face	163, 209, 229	Exposed steel corroding.	Breakout damaged area of concrete, remove and replace corroded reinforcement as required and reform concrete structure.	5
D66	387944, 785403	Quay	Seaward face	164	Corroded handrails.	Consider replacing corroded handrails.	18
D67	387927, 785422	Quay	Seaward face	165, 210	Health and Safety - Damaged handrailing around stepped access.	Replace damaged handrails.	7
D68	387921, 785482	Quay	Deck	166, 211	Insufficient handrailing	Consider installing handrails.	29
D69	387902, 785489	Quay	Deck	167	Damaged surfacing of deck.	Resurface concrete.	31
D72	387778, 785397	Quay	Sheet piling	169, 214, 230, 235	Two holes in piles, approximately 0.3x0.1m and 0.3x0.3.	Monitor and consider options for replacing the sheet pile structure.	1
D73	387815, 785402	Quay	Sheet piling	170	6No. holes corroded through piles.	Monitor and consider options for repairing/replacing the sheet pile structure.	1
D74	387811, 785430	Quay	Sheet piling		General corrosion.	Monitor and consider options for repairing/replacing the sheet pile structure.	4

COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Sub Type	Element	Photo Ref	Defect Description	Recommendations	Defect Priority
D75	387811, 785401	Quay	Sheet piling	171	Missing sheet pile tie-back anchor plates.	Monitor and consider options for repairing/replacing the sheet pile structure.	5
D76	387813, 785400	Quay	Quay face	172	Delaminating concrete repairs .	Reface concrete repairs.	15
D77	387815, 785455	Quay	Quay face	175, 217	Undermining scour on old concrete toe repairs.	Install concrete protection beyond depth of scour. Monitor wall for signs of movement and further deterioration.	1
D78	387819, 785457	Quay	Quay face	176, 218	Loss of sealant material between blockwork.	Replace missing sealant material.	5
D79	387814, 785432	Quay	Seaward face	177	Protective apron possibly undermined - not long enough to provide protection to full wall length.	Consider repairing and extending concrete apron.	3
D80	387856, 785489	Quay	Quay face	180	Concrete cracking.	Repoint cracks.	14
D81	N/A	Quay	Quay face	178, 219, 231	Spalling, delaminating concrete.	Reface concrete repairs.	15
D82	387858, 785489	Quay	Quay face	179	Area of rock wall possibly undermined.	Monitor wall for signs of movement. Consider toe protection of the wall.	3
D83	387920, 785480	Quay	Quay face	181	Possible undermining scour.	Monitor wall for signs of movement. Consider toe protection of the wall.	3
D84	387874, 785492	Quay	Quay face	182	Undermining scour on the seaward facing side.	Provide scour protection on toe. Monitor wall for signs of movement and further deterioration.	1
D85	387654, 785600	Embankment	Rock armour	183, 220, 232	Undersized rock armour units.	Consider replacing rock armour with suitably sized units.	25
D86	387816, 785579	Embankment	Rock armour	186	Overly steep rock armour profile, at risk of collapse under extreme wave loading.	Consider reprofiling rock armour profile.	31

COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Sub Type	Element	Photo Ref	Defect Description	Recommendations	Defect Priority
D87	387833, 785560	Embankment	Splash wall	184	Blockwork missing.	Replace missing blockwork.	24
D88	387841, 785562	Embankment	Rock armour	185	Narrow rock armour crest width.	Consider increasing the width of the crest.	27

5. Health and safety check

Health and Safety Check (Defence - Section A)

	Y or N	Photo No.	Notes
Handrails			
Are handrails necessary?	N		
Are handrails present?	N		
Are handrails secured?	-		
Handrail construction material	-		
Are handrails corroded?	-		
Is handrail paint in good condition?	-		
Ladders / Steps			
Are ladders / steps necessary for access?	N		
Are ladder / steps present?	N		
Steps construction material	-		
Are steps in good condition?	-		
Are steps free of algae growth?	-		
Are ladders secured?	-		
Are ladders corroded?	-		
Is ladder paint in good condition?	-		
Ramps and walkways			The ramp has uneven surface and there are planks missing.
Are ramps and walkways necessary for access?	Y		
Are ramps and walkways present?	Y		
Ramp construction material			Timber
Are ramps in good condition?	N		
Are ramps free of algae growth?	Y		
Safety Harness Attachments			
Are attachments necessary for inspection?	N		
Are attachments present?	N		
Are attachments in good condition?	-		

Summary of health and safety items

There are planks missing from the pathway. It is recommended that they be replaced.

Health and Safety Check (Defence - Section B)

	Y or N	Photo No.	Notes
Handrails			Handrails suggested to be installed.
Are handrails necessary?	Y		
Are handrails present?	N		
Are handrails secured?	-		
Handrail construction material	-		
Are handrails corroded?	-		
Is handrail paint in good condition?	-		
Ladders / Steps			Corroded ladders.
Are ladders / steps necessary for access?	Y		
Are ladder / steps present?	Y		
Steps construction material			-
Are steps in good condition?	N		
Are steps free of algae growth?	N		
Are ladders secured?	N		
Are ladders corroded?	Y		
Is ladder paint in good condition?	N		
Ramps and walkways			
Are ramps and walkways necessary for access?	N		
Are ramps and walkways present?	N		
Ramp construction material	-		
Are ramps in good condition?	-		
Are ramps free of algae growth?	-		
Safety Harness Attachments			
Are attachments necessary for inspection?	N		
Are attachments present?	N		
Are attachments in good condition?	-		

Summary of health and safety items

The access ladders are corroded and there is insufficient handrailing on the deck.

Health and Safety Check (Defence - Section C)

	Y or N	Photo No.	Notes
Handrails			
Are handrails necessary?	Y		
Are handrails present?	N		
Are handrails secured?	-		
Handrail construction material	-		
Are handrails corroded?	-		
Is handrail paint in good condition?	-		
Ladders / Steps			
Are ladders / steps necessary for access?	N		
Are ladder / steps present?	N		
Steps construction material	-		
Are steps in good condition?	-		
Are steps free of algae growth?	-		
Are ladders secured?	-		
Are ladders corroded?	-		
Is ladder paint in good condition?	-		
Ramps and walkways			There is algae growth on top of the slipway.
Are ramps and walkways necessary for access?	Y		
Are ramps and walkways present?	Y		
Ramp construction material			Concrete
Are ramps in good condition?	N		
Are ramps free of algae growth?	N		
Safety Harness Attachments			
Are attachments necessary for inspection?	N		
Are attachments present?	N		
Are attachments in good condition?	-		

Summary of health and safety items

There is algae growth on the slipway causing slipping hazards.

Health and Safety Check (Defence - Section D)

	Y or N	Photo No.	Notes
Handrails			
Are handrails necessary?	N		
Are handrails present?	N		
Are handrails secured?	-		
Handrail construction material	-		
Are handrails corroded?	-		
Is handrail paint in good condition?	-		
Ladders / Steps			Corroded and loose ladders.
Are ladders / steps necessary for access?	Y		
Are ladder / steps present?	Y		
Steps construction material			-
Are steps in good condition?	N		
Are steps free of algae growth?	N		
Are ladders secured?	N		
Are ladders corroded?	Y		
Is ladder paint in good condition?	N		
Ramps and walkways			
Are ramps and walkways necessary for access?	N		
Are ramps and walkways present?	N		
Ramp construction material	-		
Are ramps in good condition?	-		
Are ramps free of algae growth?	-		
Safety Harness Attachments			
Are attachments necessary for inspection?	N		
Are attachments present?	N		
Are attachments in good condition?	-		

Summary of health and safety items

There are corroded and loose ladders and insufficient handrailing on the deck.

Health and Safety Check (Defence - Section E)

	Y or N	Photo No.	Notes
Handrails			
Are handrails necessary?	N		
Are handrails present?	N		
Are handrails secured?	-		
Handrail construction material	-		
Are handrails corroded?	-		
Is handrail paint in good condition?	-		
Ladders / Steps			
Are ladders / steps necessary for access?	N		
Are ladder / steps present?	N		
Steps construction material	-		
Are steps in good condition?	-		
Are steps free of algae growth?	-		
Are ladders secured?	-		
Are ladders corroded?	-		
Is ladder paint in good condition?	-		
Ramps and walkways			Some cracking present on top and on the side of the slipway.
Are ramps and walkways necessary for access?	Y		
Are ramps and walkways present?	Y		
Ramp construction material			Concrete
Are ramps in good condition?	N		
Are ramps free of algae growth?	N		
Safety Harness Attachments			
Are attachments necessary for inspection?	N		
Are attachments present?	N		
Are attachments in good condition?	-		

Summary of health and safety items

No summary details entered

Health and Safety Check (Defence - Section F)

	Y or N	Photo No.	Notes
Handrails			
Are handrails necessary?	Y		
Are handrails present?	N		
Are handrails secured?	-		
Handrail construction material	-		
Are handrails corroded?	-		
Is handrail paint in good condition?	-		
Ladders / Steps			Algae and seaweed growth on access steps.
Are ladders / steps necessary for access?	Y		
Are ladder / steps present?	Y		
Steps construction material			Concrete
Are steps in good condition?	N		
Are steps free of algae growth?	N		
Are ladders secured?	N		
Are ladders corroded?	N		
Is ladder paint in good condition?	N		
Ramps and walkways			
Are ramps and walkways necessary for access?	N		
Are ramps and walkways present?	N		
Ramp construction material	-		
Are ramps in good condition?	-		
Are ramps free of algae growth?	-		
Safety Harness Attachments			
Are attachments necessary for inspection?	N		
Are attachments present?	N		
Are attachments in good condition?	-		

Summary of health and safety items

There is insufficient handrailing on the deck

Health and Safety Check (Defence - Section G)

	Y or N	Photo No.	Notes
Handrails			The handrails around the stepped access are damaged and displaced.
Are handrails necessary?	Y		
Are handrails present?	Y		
Are handrails secured?	N		
Handrail construction material			Steel
Are handrails corroded?	Y		
Is handrail paint in good condition?	N		
Ladders / Steps			
Are ladders / steps necessary for access?	N		
Are ladder / steps present?	N		
Steps construction material	-		
Are steps in good condition?	-		
Are steps free of algae growth?	-		
Are ladders secured?	-		
Are ladders corroded?	-		
Is ladder paint in good condition?	-		
Ramps and walkways			
Are ramps and walkways necessary for access?	N		
Are ramps and walkways present?	N		
Ramp construction material	-		
Are ramps in good condition?	-		
Are ramps free of algae growth?	-		
Safety Harness Attachments			
Are attachments necessary for inspection?	N		
Are attachments present?	N		
Are attachments in good condition?	-		

Summary of health and safety items

The handrails are damaged around the stepped access.

Health and Safety Check (Defence - Section H)

	Y or N	Photo No.	Notes
Handrails			
Are handrails necessary?	N		
Are handrails present?	N		
Are handrails secured?	-		
Handrail construction material	-		
Are handrails corroded?	-		
Is handrail paint in good condition?	-		
Ladders / Steps			
Are ladders / steps necessary for access?	N		
Are ladder / steps present?	N		
Steps construction material	-		
Are steps in good condition?	-		
Are steps free of algae growth?	-		
Are ladders secured?	-		
Are ladders corroded?	-		
Is ladder paint in good condition?	-		
Ramps and walkways			
Are ramps and walkways necessary for access?	N		
Are ramps and walkways present?	N		
Ramp construction material	-		
Are ramps in good condition?	-		
Are ramps free of algae growth?	-		
Safety Harness Attachments			
Are attachments necessary for inspection?	N		
Are attachments present?	N		
Are attachments in good condition?	-		

Summary of health and safety items

No summary details entered

6. Asset assessment

6.1. Recommended works

Band A: Emergency works

Defect posing an immediate safety hazard. Immediate action required.

Defect Recommendation	Defect #
Remove armour blocking slipway; replace armourstone back into profile.	D3
Repoint and injection grout voids.	D11
Monitor and consider options for replacing the sheet pile structure.	D21
Remove vegetation to avoid slipping hazards.	D30
Consider options for installing scour protection for the seawall. Monitor wall for signs of settlement and further deterioration.	D32
Consider scour protection of the toe. Monitor wall for signs of settlement and further deterioration.	D33
Monitor and consider options for repairing/replacing the sheet pile structure.	D37
Monitor and consider options for repairing/replacing the sheet pile structure.	D39
Monitor and consider options for replacing the sheet pile structure.	D72
Monitor and consider options for repairing/replacing the sheet pile structure.	D73
Monitor and consider options for repairing/replacing the sheet pile structure.	D74
Monitor and consider options for repairing/replacing the sheet pile structure.	D75
Install concrete protection beyond depth of scour. Monitor wall for signs of movement and further deterioration.	D77
Monitor wall for signs of movement. Consider toe protection of the wall.	D82
Monitor wall for signs of movement. Consider toe protection of the wall.	D83
Provide scour protection on toe. Monitor wall for signs of movement and further deterioration.	D84

COASTAL ASSET CONDITION SURVEY REPORT

Band B: Urgent Works

Defect posing a potential safety hazard. Work recommended within 12 month period.

Defect Recommendation	Defect #
Consider replacing access path.	D7
Reface concrete repairs.	D9
Repoint open joints.	D10
Repoint open joints.	D12
Monitor cracking and consider repointing repairs.	D13
Repoint open joints.	D14
Consider resurfacing concrete repairs.	D15
Monitor and consider replacing weathered blockwork.	D16
Remove old corroded piping and repoint joints.	D17
Reface concrete repairs.	D19
Replace the ladder.	D22
Repoint crack.	D23
Fix loose handrailing.	D25
Reface concrete repairs.	D28
Repoint cracks.	D29
Replace missing sealant material.	D34
Unblock outfall, consider installing flap valve.	D35
Reface concrete repairs.	D40
Repoint cracks and monitor for further movement.	D41
Reface concrete repairs.	D42
Replace ladder.	D43
Reface concrete repairs.	D44
Extend concrete toe beneath scour depth.	D45
Consider scour protection of the toe. Monitor wall for signs of settlement and further deterioration.	D46
Fill voids. Monitor wall for signs of settlement and further deterioration.	D47
Repoint open joints.	D49
Repoint cracks and patch repair damaged concrete.	D50
Repoint cracks and patch repair damaged concrete.	D51
Repoint cracks and monitor structure for signs of movement.	D52
Repoint cracks.	D53

COASTAL ASSET CONDITION SURVEY REPORT

Reface concrete repairs.	D56
Remove algae and seaweed to prevent slipping hazards.	D57
Repoint open joints.	D59
Replace missing block.	D60
Breakout damaged area of concrete, remove and replace corroded reinforcement as required and reform concrete structure.	D61
Repoint cracks.	D62
Reface concrete repairs.	D63
Patch repair damaged concrete.	D64
Replace damaged handrails.	D67
Reface concrete repairs.	D76
Replace missing sealant material.	D78
Repoint cracks.	D80
Reface concrete repairs.	D81
Replace missing blockwork.	D87

COASTAL ASSET CONDITION SURVEY REPORT

Band C: Short-term remedial works

Defect posing a potential safety hazard. Work recommended within 12 to 30 month period.



Defect Recommendation	Defect #
Consider rebuilding rock armour revetment with suitably sized armourstone, extending the protection to the harbour arm.	D2
Consider rebuilding rock armour revetment with suitably sized armourstone, extending the protection to the harbour arm.	D4
Repoint open joints between blocks.	D5
Breakout and replace concrete rendering.	D18
Consider installing handrails.	D24
Monitor and consider surfacing repairs to weathered blockwork.	D26
Replace ladder.	D27
Consider installing a flap valve.	D31
Consider repairing damaged concrete.	D38
Consider installing flap valves.	D48
Consider installing handrails.	D54
Replace beam.	D55
Reface concrete.	D58
Breakout damaged area of concrete, remove and replace corroded reinforcement as required and reform concrete structure.	D65
Consider replacing corroded handrails.	D66
Consider installing handrails.	D68
Resurface concrete.	D69
Consider repairing and extending concrete apron.	D79

Band D: Long-term maintenance works

Defect resulting in long-term deterioration of structure or affecting performance. Work recommended within 30 to 48 month period.

Defect Recommendation	Defect #
Consider re-profiling rock armour slope with existing and new rock.	D1
Consider rebuilding rock armour revetment with suitably sized armourstone, extending the protection to the harbour arm.	D6
Consider rebuilding rock armour revetment with suitably sized armourstone, extending the protection to the harbour arm.	D8
As part of annual inspection, monitor wall for signs of movement.	D20
Consider installing handrails.	D36
Consider replacing rock armour with suitably sized units.	D85
Consider reprofiling rock armour profile.	D86
Consider increasing the width of the crest.	D88

6.2. Report sign-off

Prepared and Completed by:	Johan Skanberg-Tippen BSc, MSc (Eng)
Signed:	
Date:	17/05/2018
Checked and Approved by:	Graham Kenn CEng, MICE, C.WEM, CIWEM – Technical Director – Coastal Engineering
Signed:	
Date:	05/07/2018

Appendix 1 – Photographs

Section Photos

Section A

Description: Viewer Section A (looking northwest).
Asset Type: Defence
Sub Type: Embankment
Elements: Rock armour, access strip and splash wall.

Photo number: 1



Section B

Description: View of Section B (looking north)
Asset Type: Defence
Sub Type: Quay
Elements: Seaward face, Quay face, capping, piling, deck.

Photo number: 2



Section B

Description: View of Section B (looking north)
Asset Type: Defence
Sub Type: Quay
Elements: Seaward face, Quay face, capping, piling, deck.
Photo number: 10



Section B

Description: View of Section B (looking north)
Asset Type: Defence
Sub Type: Quay
Elements: Seaward face, Quay face, capping, piling, deck.
Photo number: 12



Section B

Description: View of Section B (looking north)
Asset Type: Defence
Sub Type: Quay
Elements: Seaward face, Quay face, capping, piling, deck.
Photo number: 14



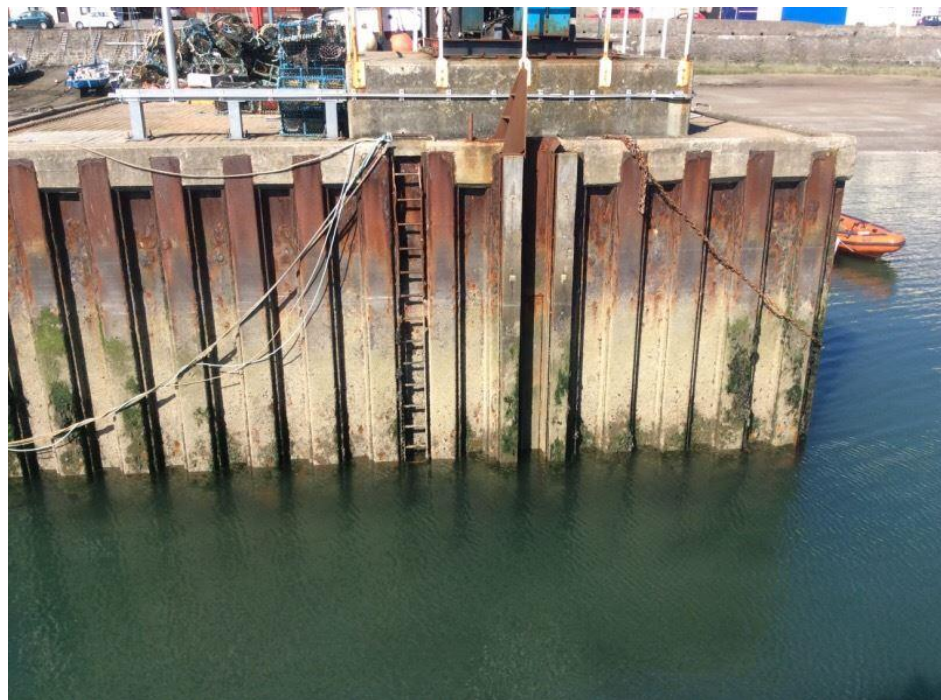
Section C

Description: View of Section C (looking north)
Asset Type: Defence
Sub Type: Wall
Elements: Access strip, exposed face, capping wall.
Photo number: 4



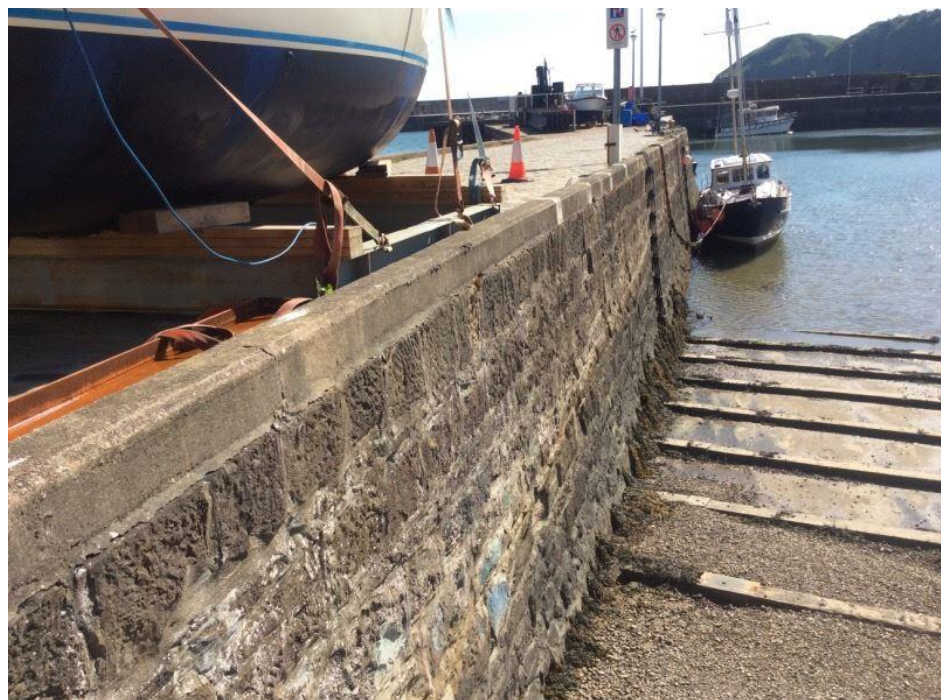
Section D

Description: View of Section D (looking west)
Asset Type: Defence
Sub Type: Quay
Elements: Sheet piling, quay face, deck.
Photo number: 3



Section D

Description: View of Section D (looking west)
Asset Type: Defence
Sub Type: Quay
Elements: Sheet piling, quay face, deck.
Photo number: 9



Section D
Description: View of Section D (looking west)
Asset Type: Defence
Sub Type: Quay
Elements: Sheet piling, quay face, deck.
Photo number: 13



Section E
Description: View of Section E (looking north)
Asset Type: Defence
Sub Type: Wall
Elements: Access strip, exposed face.
Photo number: 5



Section F

Description: View of Section F (looking north)
Asset Type: Defence
Sub Type: Quay
Elements: Quay face, deck, sheet piling.
Photo number: 7



Section F

Description: View of Section F (looking north)
Asset Type: Defence
Sub Type: Quay
Elements: Quay face, deck, sheet piling.
Photo number: 11



Section G
Description: View of Section G (looking east)
Asset Type: Defence
Sub Type: Quay
Elements: Capping, seaward face, deck, quay face.
Photo number: 6



Section H
Description: View of Section H (looking northwest)
Asset Type: Defence
Sub Type: Embankment
Elements: Rock armour, splash wall.
Photo number: 8

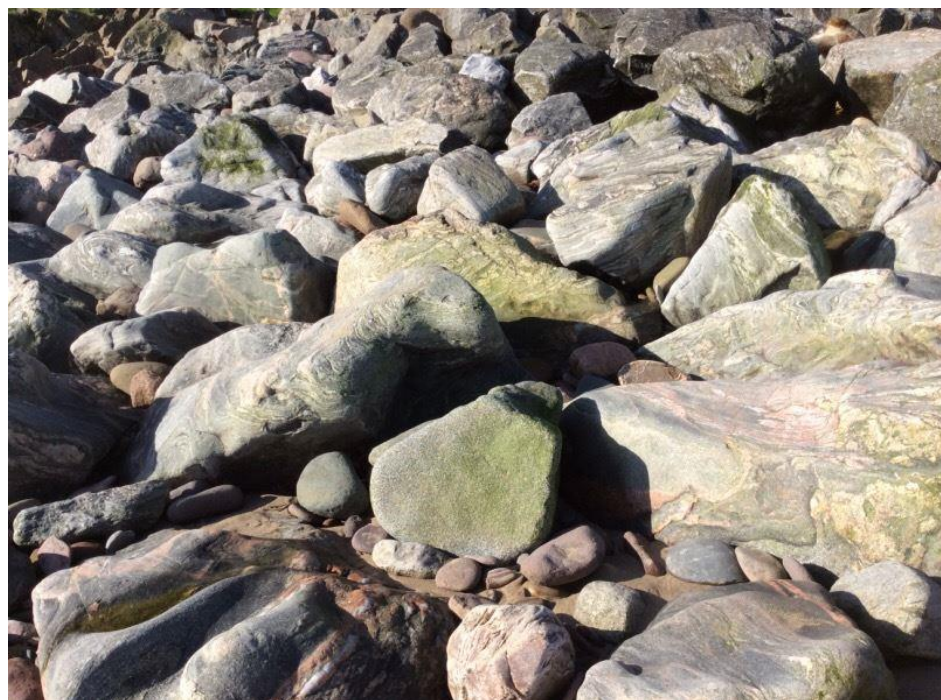


Defect Photos

Section A
Rock armour
Defect Ref: D1
Description: D1 -
Nonuniform rock armour
profile, insufficient
protection to timber
footbridge.
Photo number: 102



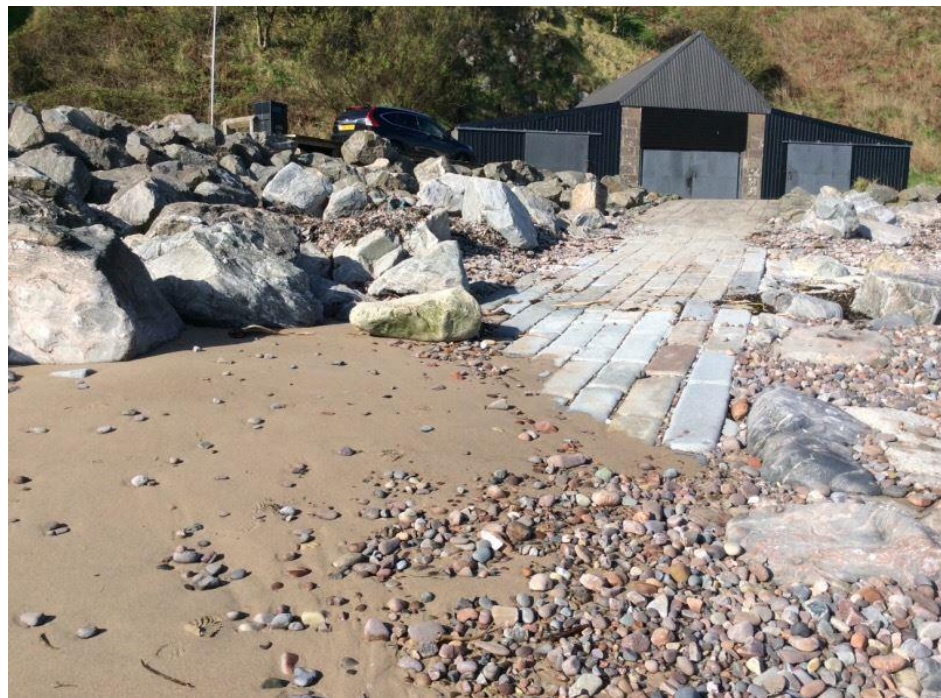
Section A
Rock armour
Defect Ref: D2
Description: D2 -
Undersized rock armour.
Photo number: 103



Section A
Rock armour
Defect Ref: D3
Description: D3 -
Expelled rock armour,
also present on slipway
blocking access.
Photo number: 104



Section A
Rock armour
Defect Ref: D3
Description: D3 -
Expelled rock armour,
also present on slipway
blocking access.
Photo number: 187



Section A
Rock armour
Defect Ref: D4
Description: D4 - Poorly placed and non-interlocking rock profile.
Photo number: 105



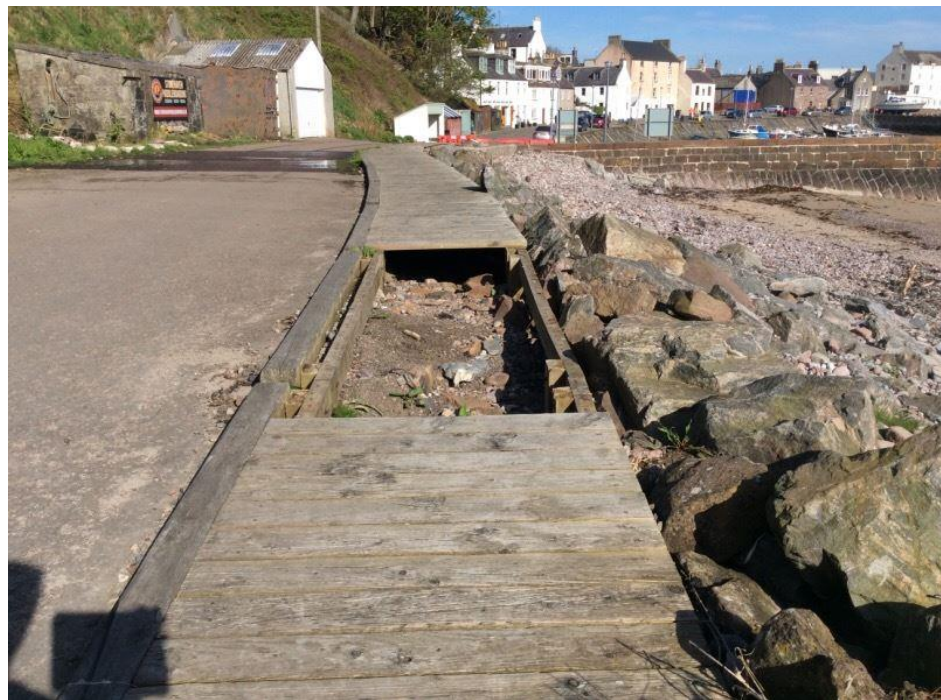
Section A
Access strip
Defect Ref: D5
Description: D5 - Open joints between granite blocks.
Photo number: 106



Section A
Rock armour
Defect Ref: D6
Description: D6 - Poor condition of rock armour crest, too narrow under design guidance and provides insufficient protection to the timber walkway.
Photo number: 107



Section A
Access strip
Defect Ref: D7
Description: D7 - H&S uneven and damaged access path, with missing planking.
Photo number: 108



Section A
Access strip
Defect Ref: D7
Description: D7 - H&S uneven and damaged access path, with missing planking.
Photo number: 188



Section A
Rock armour
Defect Ref: D8
Description: D8 - Insufficient rock armour protection at tie-in with harbour arm.
Photo number: 109



Section A
Splash wall
Defect Ref: D9
Description: D9 -
General dilapidation and
damaged capping repairs
Photo number: 110



Section A
Splash wall
Defect Ref: D9
Description: D9 -
General dilapidation and
damaged capping repairs
Photo number: 189



Section A
Splash wall
Defect Ref: D9
Description: D9 -
General dilapidation and
damaged capping repairs
Photo number: 221



Section B
Seaward face
Defect Ref: D10
Description: D10 - Open
joints.
Photo number: 111



Section B
Seaward face
Defect Ref: D11
Description: D11 -
Voiding behind seaward
face
Photo number: 112



Section B
Seaward face
Defect Ref: D11
Description: D11 -
Voiding behind seaward
face
Photo number: 190



Section B
Capping
Defect Ref: D12
Description: D12 - Open joints
Photo number: 113



Section B
Capping
Defect Ref: D12
Description: D12 - Open joints
Photo number: 192



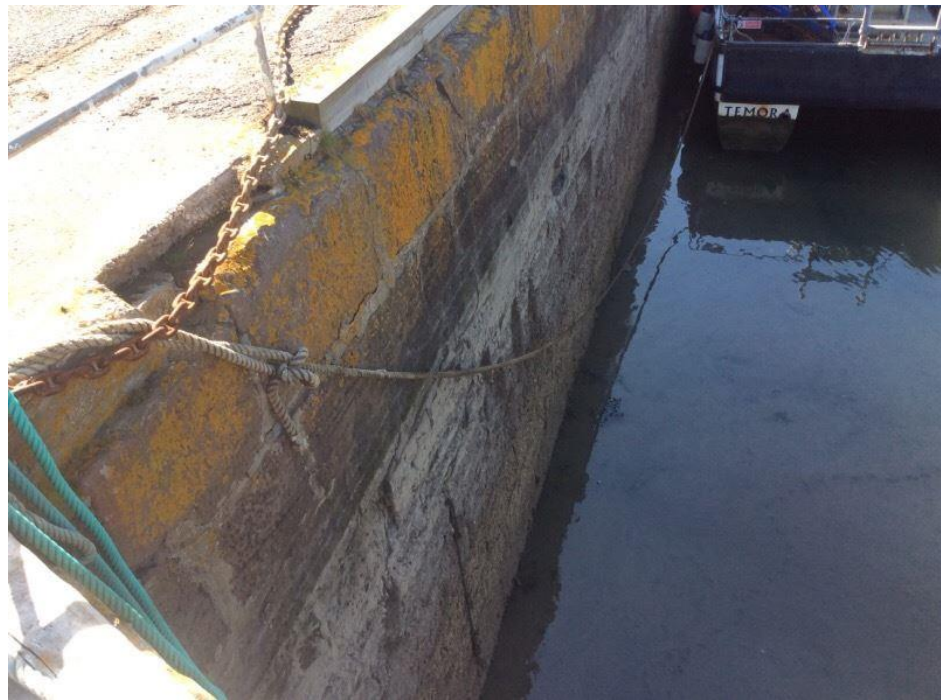
Section B
Quay face
Defect Ref: D13
Description: D13 -
Small cracks of masonry
blocks.
Photo number: 114



Section B
Quay face
Defect Ref: D13
Description: D13 -
Small cracks of masonry
blocks.
Photo number: 191



Section B
Quay face
Defect Ref: D13
Description: D13 -
Small cracks of masonry
blocks.
Photo number: 224



Section B
Quay face
Defect Ref: D14
Description: D14 - Open
joints.
Photo number: 168



Section B
Deck
Defect Ref: D15
Description: D15 -
Dilapidated tarmac
surface.
Photo number: 115



Section B
Capping
Defect Ref: D16
Description: D16 -
Weathering of repairs
Photo number: 116



Section B
Capping
Defect Ref: D17
Description: D17 -
Corroding piping joints.
Photo number: 117



Section B
Capping
Defect Ref: D17
Description: D17 -
Corroding piping joints.
Photo number: 194



Section B
Capping
Defect Ref: D17
Description: D17 -
Corroding piping joints.
Photo number: 223



Section B
Capping
Defect Ref: D18
Description: D18 -
Cracking and spalling of
concrete rendering
throughout section.
Photo number: 118



Section B
Capping
Defect Ref: D19
Description: D19 - Spalling, cracking and honeycombing of buttress elements of the wall.
Photo number: 119



Section B
Capping
Defect Ref: D19
Description: D19 - Spalling, cracking and honeycombing of buttress elements of the wall.
Photo number: 193



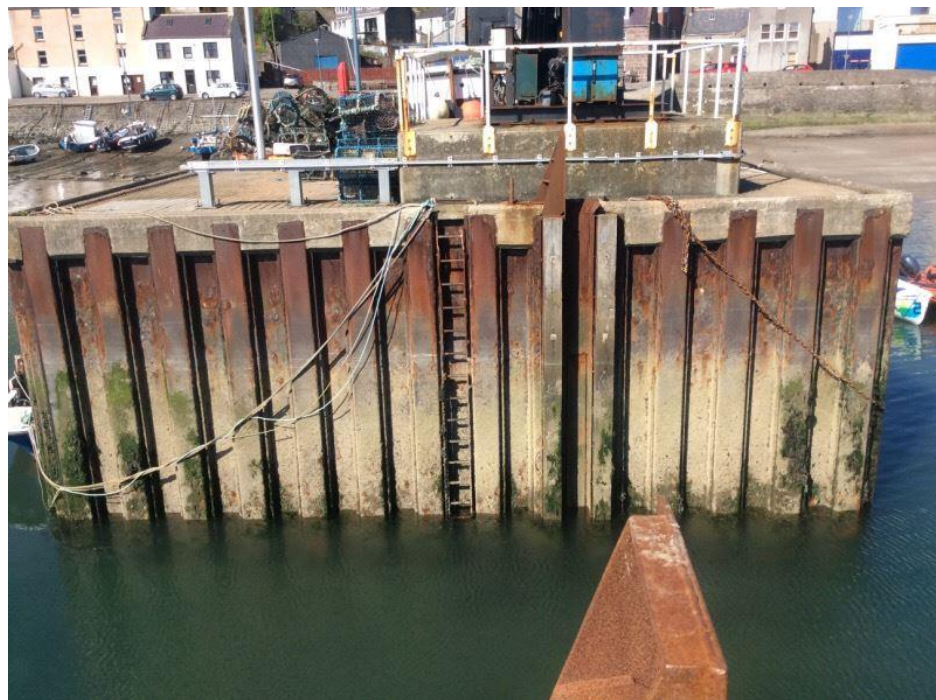
Section B
Capping
Defect Ref: D19
Description: D19 - Spalling, cracking and honeycombing of buttress elements of the wall.
Photo number: 222



Section B
Capping
Defect Ref: D20
Description: D20 - Settlement of the wall.
Photo number: 120



Section D
Sheet piling
Defect Ref: D21
Description: D21 -
Corrosion of sheet piles.
Photo number: 121



Section D
Sheet piling
Defect Ref: D22
Description: D22 -
Health and Safety -
Heavily corroded ladder.
Photo number: 122



Section D
Sheet piling
Defect Ref: D22
Description: D22 -
Health and Safety -
Heavily corroded ladder.
Photo number: 216



Section D
Sheet piling
Defect Ref: D23
Description: D23 -
Capping beam cracked.
Photo number: 123



Section B
Deck
Defect Ref: D24
Description: D24 -
Insufficient hand railing
Photo number: 124



Section B
Deck
Defect Ref: D25
Description: D25 -
Loose handrailing
Photo number: 125



Section B
Quay face
Defect Ref: D26
Description: D26 -
Weathering of blockwork.
Photo number: 126



Section B
Quay face
Defect Ref: D26
Description: D26 -
Weathering of blockwork.
Photo number: 213



Section B
Quay face
Defect Ref: D27
Description: D27 -
Corroded ladder
Photo number: 127



Section B
Quay face
Defect Ref: D27
Description: D27 -
Corroded ladder
Photo number: 212



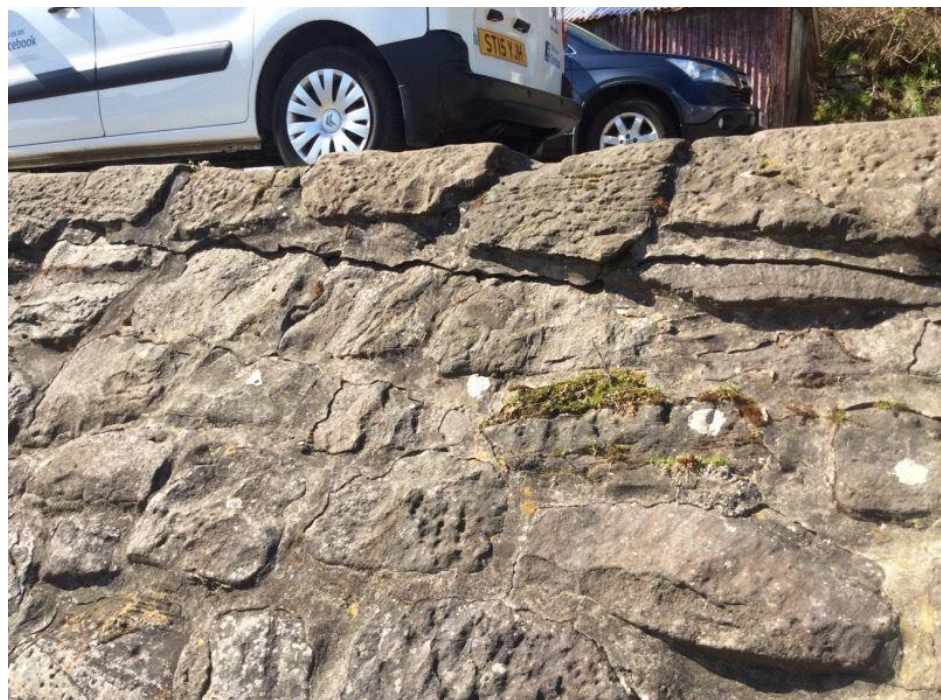
Section C
Access strip
Defect Ref: D28
Description: D28 -
Cracking and loss of
concrete on the slipway
Photo number: 128



Section C
Exposed face
Defect Ref: D29
Description: D29 -
Cracking of pointing
along the entire length
and loose blockwork.
Photo number: 129



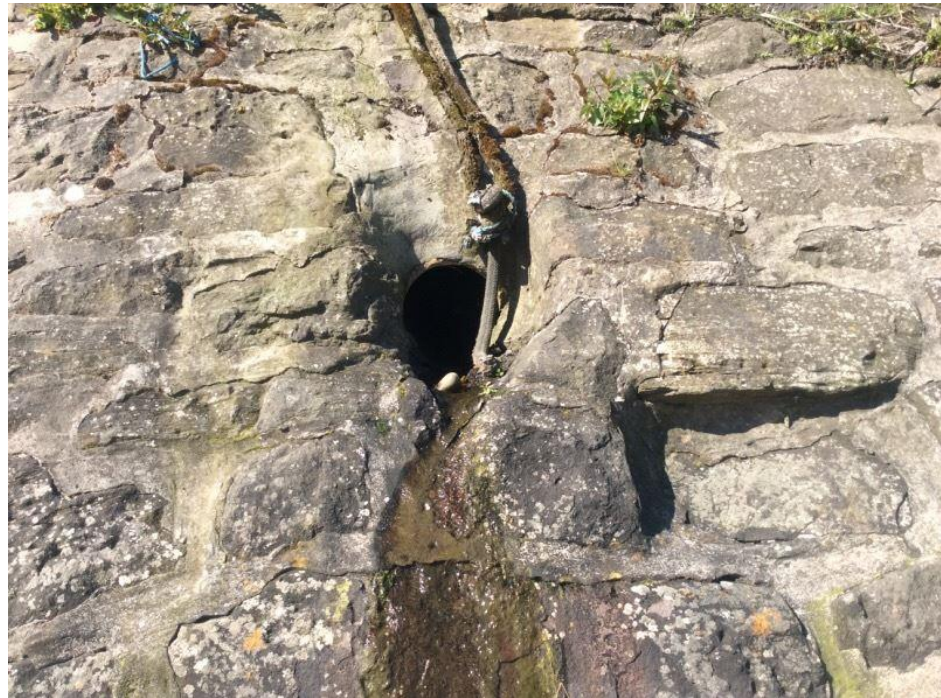
Section C
Exposed face
Defect Ref: D29
Description: D29 -
Cracking of pointing
along the entire length
and loose blockwork.
Photo number: 195



Section C
Access strip
Defect Ref: D30
Description: D30 -
Algae growth on slipway
Photo number: 130



Section C
Exposed face
Defect Ref: D31
Description: D31 -
Missing flap valve
Photo number: 131



Section C
Exposed face
Defect Ref: D31
Description: D31 -
Missing flap valve
Photo number: 197



Section C
Exposed face
Defect Ref: D31
Description: D31 -
Missing flap valve
Photo number: 226



Section C
Exposed face
Defect Ref: D32
Description: D32 -
Undermining scour of
exposed face
approximately 10m
Photo number: 132



Section C
Exposed face
Defect Ref: D32
Description: D32 -
Undermining scour of
exposed face
approximately 10m
Photo number: 196



Section C
Exposed face
Defect Ref: D32
Description: D32 -
Undermining scour of
exposed face
approximately 10m
Photo number: 225



Section C
Exposed face
Defect Ref: D32
Description: D32 -
Undermining scour of
exposed face
approximately 10m
Photo number: 233



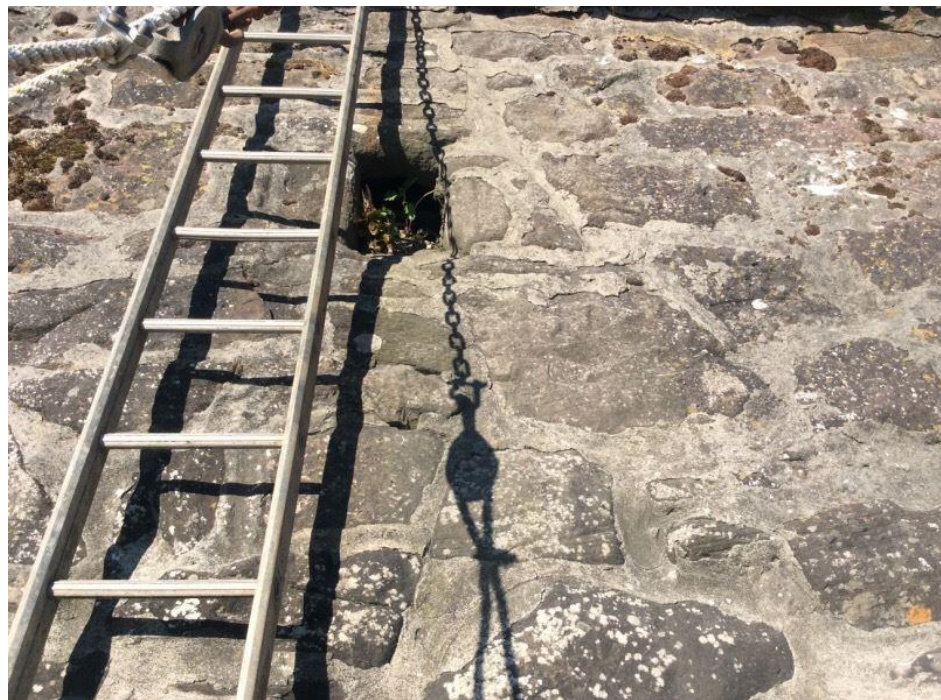
Section C
Exposed face
Defect Ref: D33
Description: D33 -
Undermining scour of
exposed face
approximately 2m long.
Photo number: 133



Section C
Exposed face
Defect Ref: D34
Description: D34 - Open joints
Photo number: 134



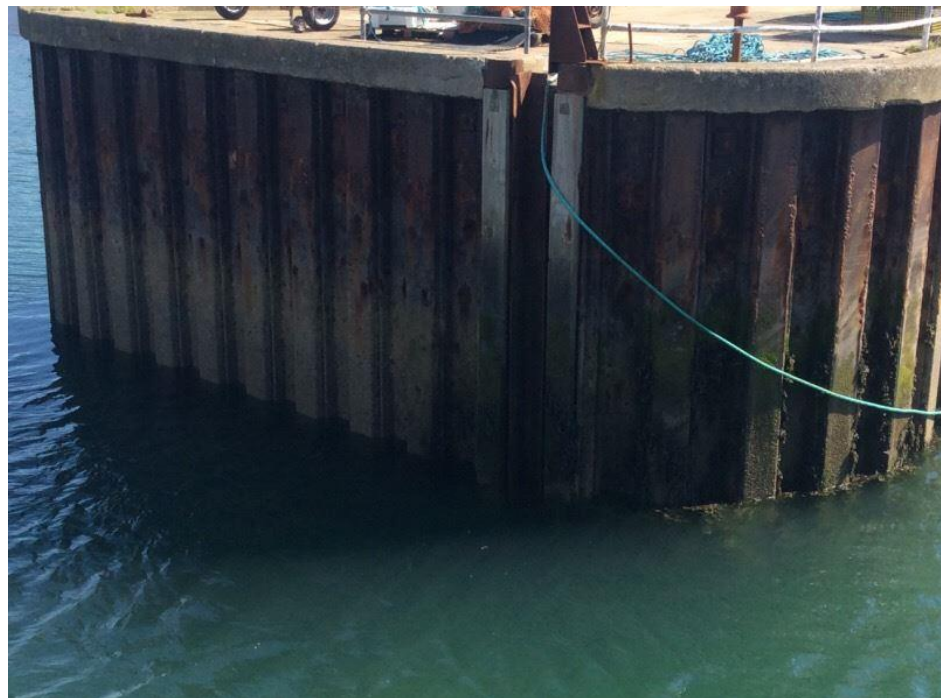
Section C
Exposed face
Defect Ref: D35
Description: D35 - Possibly blocked outfall.
Photo number: 135



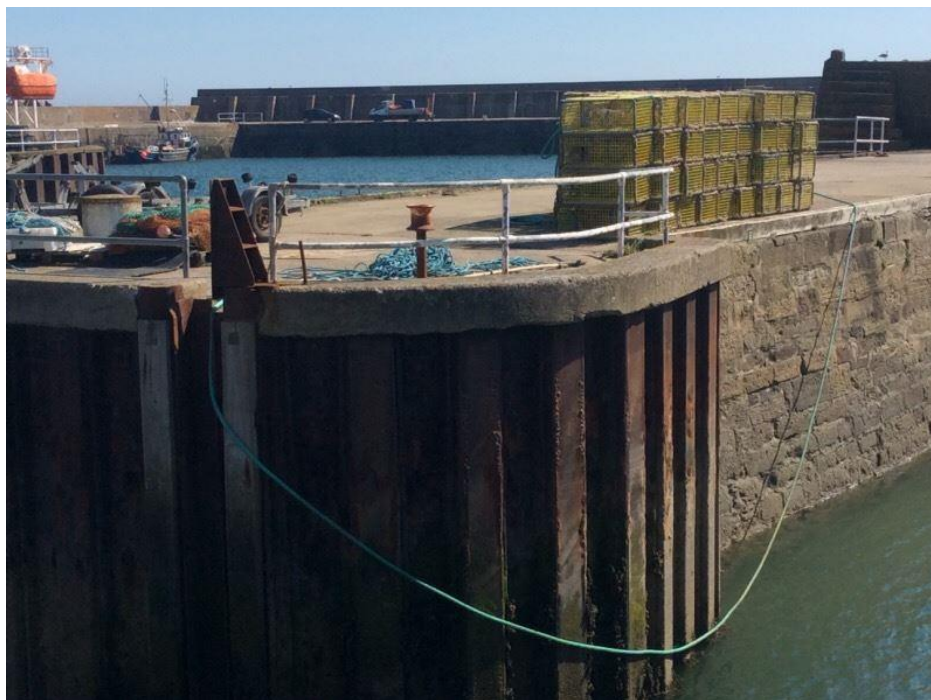
Section D
Deck
Defect Ref: D36
Description: D36 - H&S
Insufficient handrailing.
Photo number: 136



Section B
Piling
Defect Ref: D37
Description: D37 -
Corrosion of sheet piles.
Photo number: 137



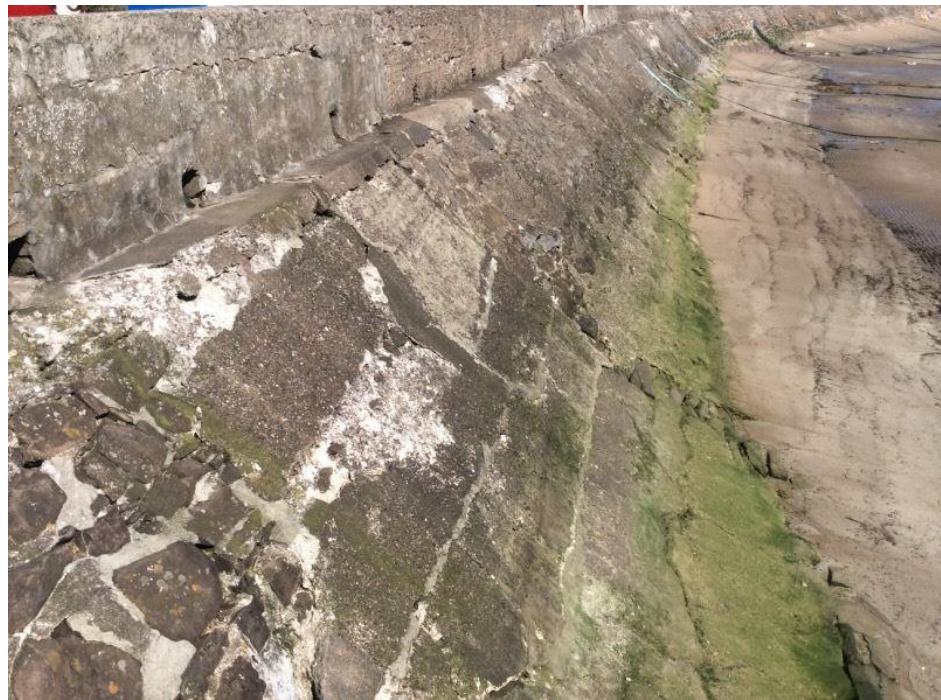
Section B
Piling
Defect Ref: D38
Description: D38 -
Chipping of capping
beam.
Photo number: 138



Section B
Piling
Defect Ref: D39
Description: D39 -
Missing anchors
Photo number: 139



Section C
Exposed face
Defect Ref: D40
Description: D40 - Dilapidated concrete repairs exposing open joints in old masonry blockwork of the exposed face and the crest.
Photo number: 140



Section C
Capping wall
Defect Ref: D41
Description: D41 - Large horizontal cracks. Cracking also visible on landward side
Photo number: 141



Section C
Capping wall
Defect Ref: D41
Description: D41 -
Large horizontal cracks.
Cracking also visible on
landward side
Photo number: 198



Section C
Capping wall
Defect Ref: D42
Description: D42 -
Spalling and
honeycombing of
concrete approx. 10m
Photo number: 144



Section D
Quay face
Defect Ref: D43
Description: D43 -
Health and Safety -
Corroded and loose
ladder.
Photo number: 174



Section D
Quay face
Defect Ref: D43
Description: D43 -
Health and Safety -
Corroded and loose
ladder.
Photo number: 215



Section D
Quay face
Defect Ref: D44
Description: D44 -
Delaminated surfacing
Photo number: 142



Section D
Quay face
Defect Ref: D45
Description: D45 -
Approximately 1m x 0.3
m scour.
Photo number: 143



Section C
Exposed face
Defect Ref: D46
Description: D46 -
Delaminating repairs on
toe and potential for
undermining scour,
approximately 30m.
Photo number: 145



Section C
Exposed face
Defect Ref: D46
Description: D46 -
Delaminating repairs on
toe and potential for
undermining scour,
approximately 30m.
Photo number: 199



Section C
Exposed face
Defect Ref: D47
Description: D47 -
Voiding behind the
structure. Approximately
1m behind the structure
in 5 locations.
Photo number: 146



Section C
Exposed face
Defect Ref: D47
Description: D47 -
Voiding behind the
structure. Approximately
1m behind the structure
in 5 locations.
Photo number: 200



Section C
Exposed face
Defect Ref: D47
Description: D47 -
Voiding behind the
structure. Approximately
1m behind the structure
in 5 locations.
Photo number: 227



Section C
Exposed face
Defect Ref: D47
Description: D47 -
Voiding behind the
structure. Approximately
1m behind the structure
in 5 locations.
Photo number: 234



Section C
Capping wall
Defect Ref: D48
Description: D48 -
Drainage points on
capping wall may need
flap valves
Photo number: 147



Section C
Capping wall
Defect Ref: D48
Description: D48 -
Drainage points on
capping wall may need
flap valves
Photo number: 201



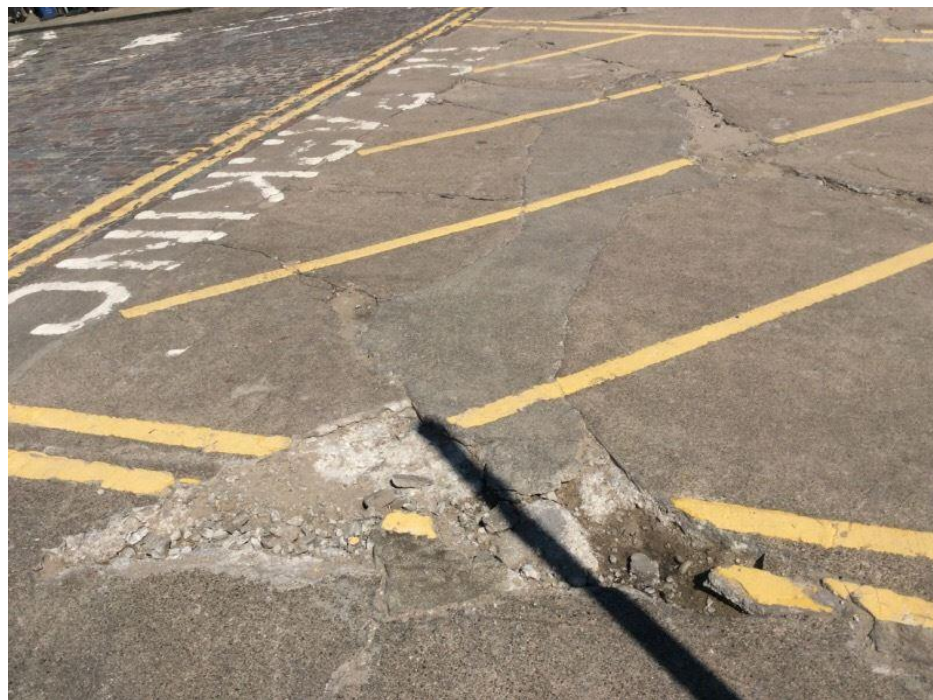
Section C
Capping wall
Defect Ref: D49
Description: D49 - Open joints
Photo number: 148



Section C
Capping wall
Defect Ref: D49
Description: D49 - Open joints
Photo number: 202



Section E
Access strip
Defect Ref: D50
Description: D50 -
Extensive cracking on
slipway
Photo number: 149



Section E
Access strip
Defect Ref: D50
Description: D50 -
Extensive cracking on
slipway
Photo number: 203



Section E
Access strip
Defect Ref: D51
Description: D51 -
Cracking on side of
slipway.
Photo number: 150



Section E
Access strip
Defect Ref: D51
Description: D51 -
Cracking on side of
slipway.
Photo number: 204



Section F
Quay face
Defect Ref: D52
Description: D52 -
Longitudinal cracks
approximately 8m.
Photo number: 151



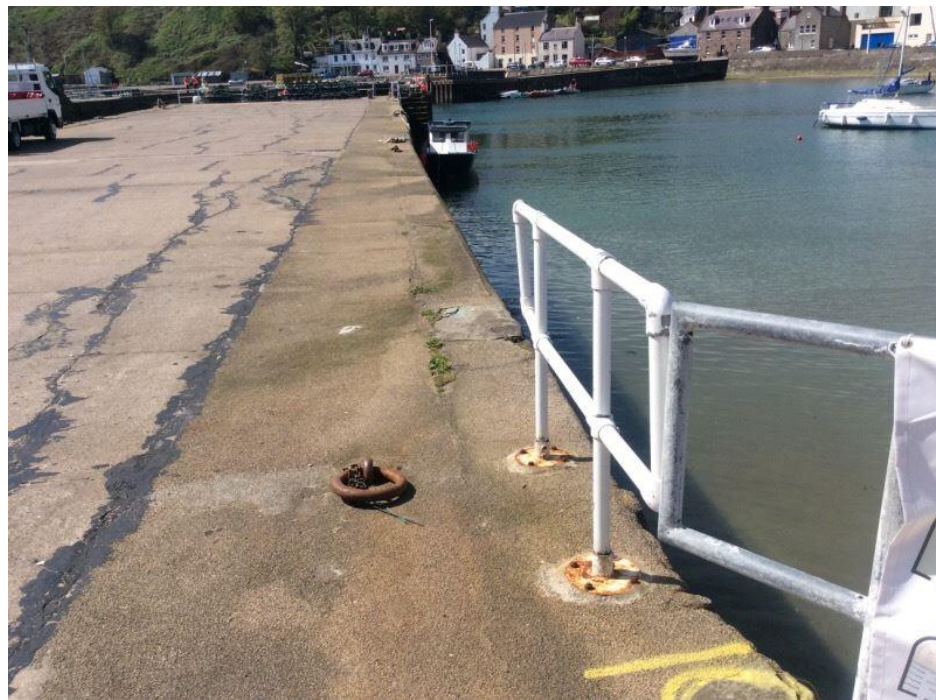
Section F
Quay face
Defect Ref: D52
Description: D52 -
Longitudinal cracks
approximately 8m.
Photo number: 205



Section F
Quay face
Defect Ref: D53
Description: D53 - Long cracks approximately 3m
Photo number: 152



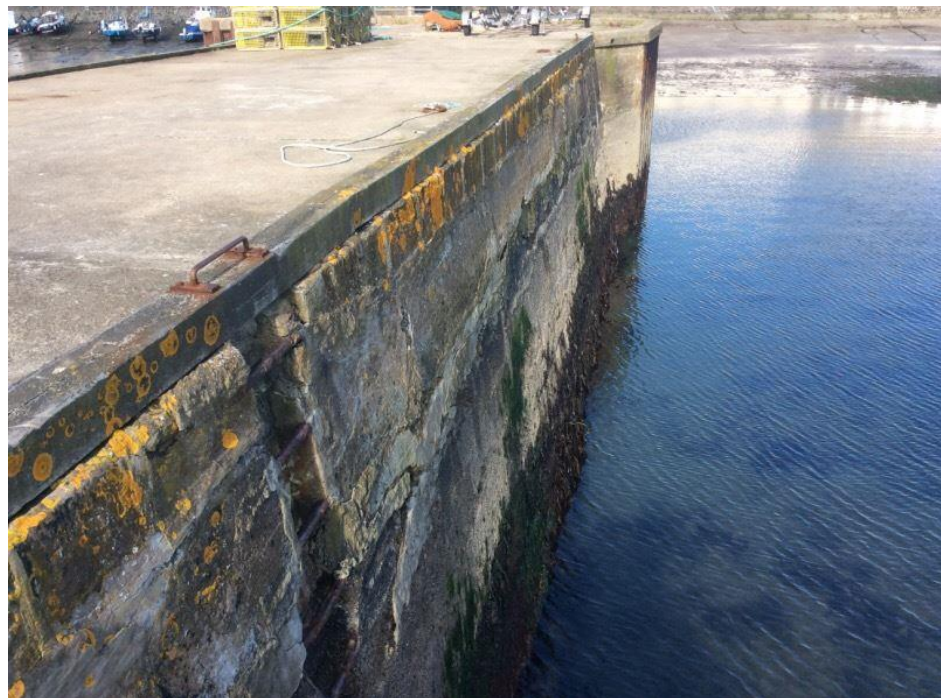
Section F
Deck
Defect Ref: D54
Description: D54 - H&S insufficient handrailing
Photo number: 153



Section F
Deck
Defect Ref: D55
Description: D55 -
Displaced timber beam.
Photo number: 154



Section B
Quay face
Defect Ref: D56
Description: D56 -
Delaminated concrete
repairs along harbour
face.
Photo number: 173



Section F
Quay face
Defect Ref: D57
Description: D57- Algae and seaweed growth on steps. Slipping hazard.
Photo number: 155



Section G
Capping
Defect Ref: D58
Description: D58 - Delaminating concrete repairs
Photo number: 156



Section G
Capping
Defect Ref: D59
Description: D59 - Open joints
Photo number: 157



Section G
Capping
Defect Ref: D60
Description: D60 - Missing element, exposed pipe.
Photo number: 158



Section G
Seaward face
Defect Ref: D61
Description: D61 -
Stains of corroding
reinforcement.
Photo number: 159



Section G
Seaward face
Defect Ref: D61
Description: D61 -
Stains of corroding
reinforcement.
Photo number: 206



Section G
Seaward face
Defect Ref: D62
Description: D62 -
Cracking of concrete
Photo number: 160



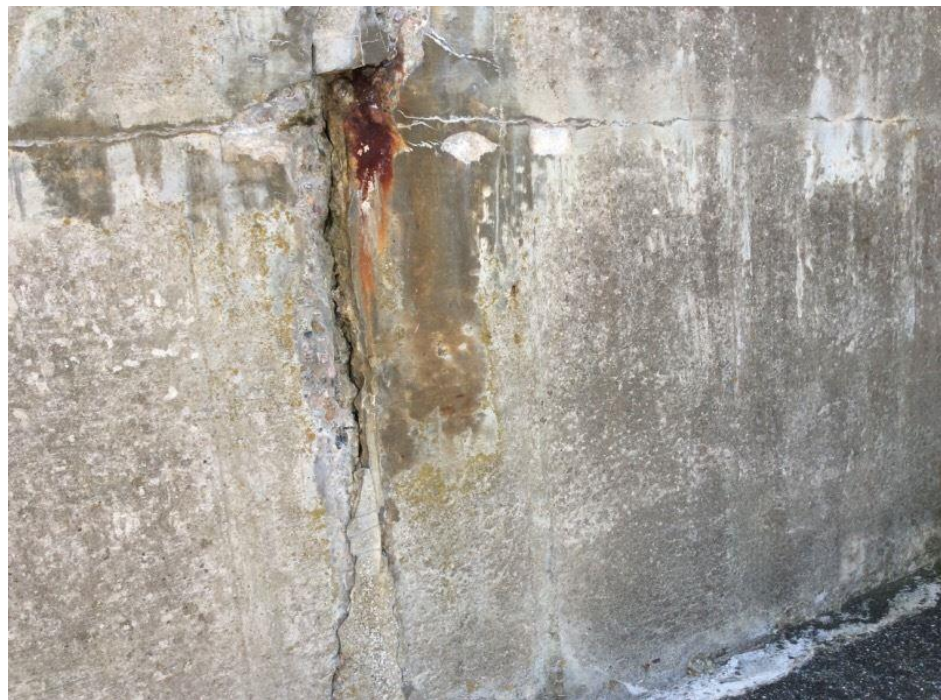
Section G
Seaward face
Defect Ref: D62
Description: D62 -
Cracking of concrete
Photo number: 207



Section G
Seaward face
Defect Ref: D62
Description: D62 -
Cracking of concrete
Photo number: 228



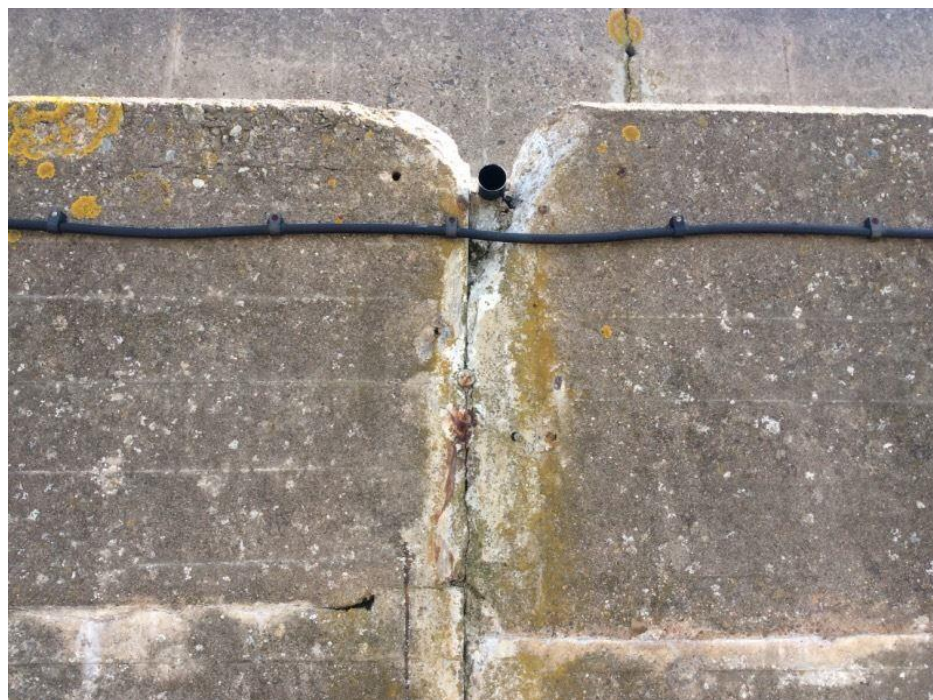
Section G
Seaward face
Defect Ref: D63
Description: D63 -
Cracking of walls.
Repairs coming off.
Photo number: 161



Section G
Seaward face
Defect Ref: D63
Description: D63 -
Cracking of walls.
Repairs coming off.
Photo number: 208



Section G
Seaward face
Defect Ref: D64
Description: D64 -
Damage of concrete
around pipe.
Photo number: 162



Section G
Seaward face
Defect Ref: D65
Description: D65 -
Exposed steel corroding.
Photo number: 163



Section G
Seaward face
Defect Ref: D65
Description: D65 -
Exposed steel corroding.
Photo number: 209



Section G
Seaward face
Defect Ref: D65
Description: D65 -
Exposed steel corroding.
Photo number: 229



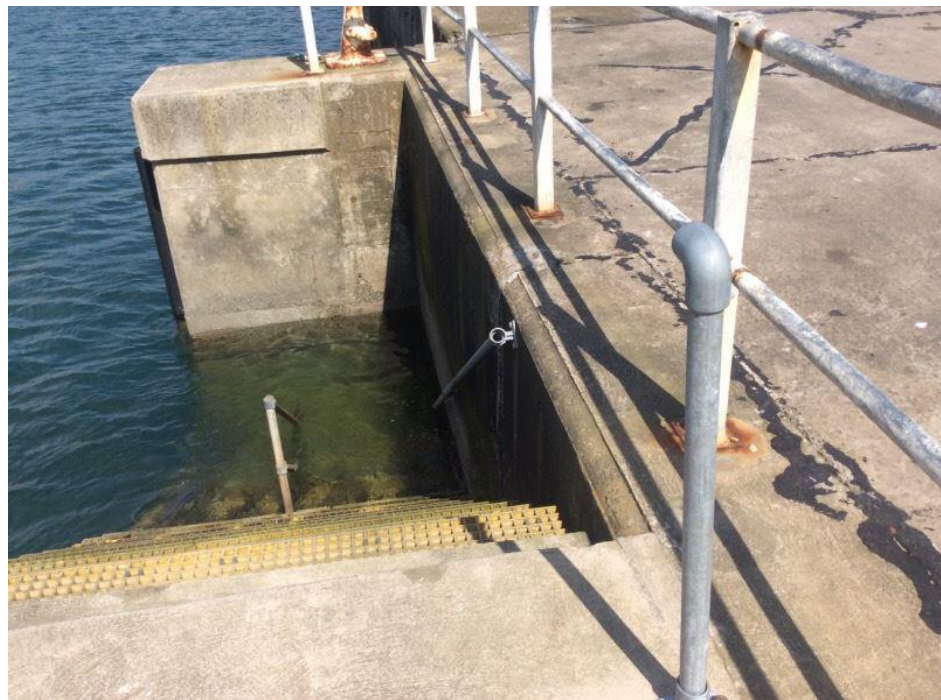
Section G
Seaward face
Defect Ref: D66
Description: D66 -
Corroded handrails
Photo number: 164



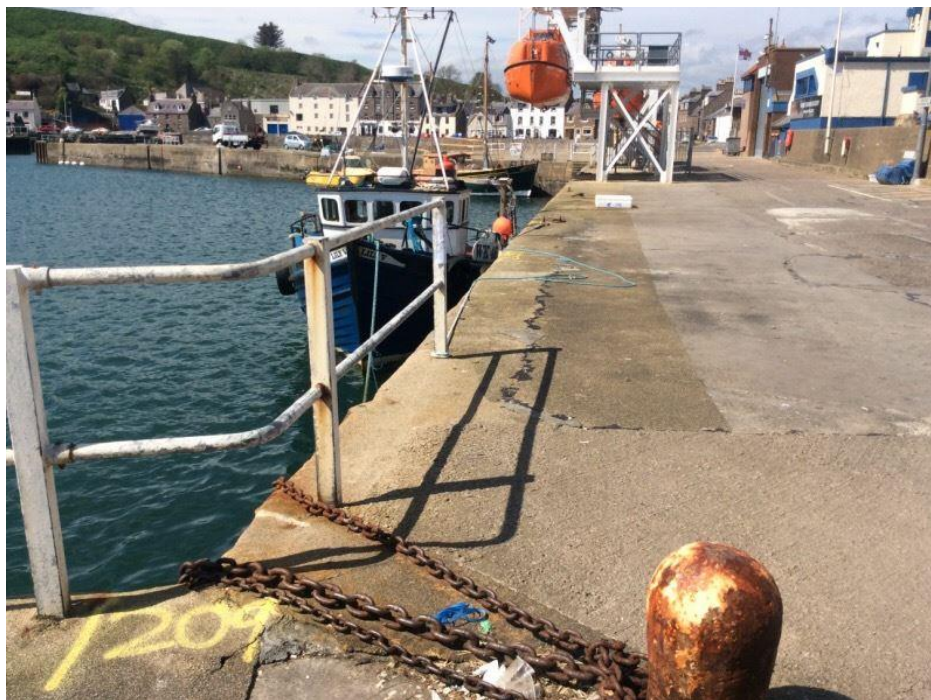
Section G
Seaward face
Defect Ref: D67
Description: D67 -
Health and Safety -
Damaged handrailing
around stepped access.
Photo number: 165



Section G
Seaward face
Defect Ref: D67
Description: D67 -
Health and Safety -
Damaged handrailing
around stepped access.
Photo number: 210



Section G
Deck
Defect Ref: D68
Description: D68 -
Insufficient handrailing
Photo number: 166



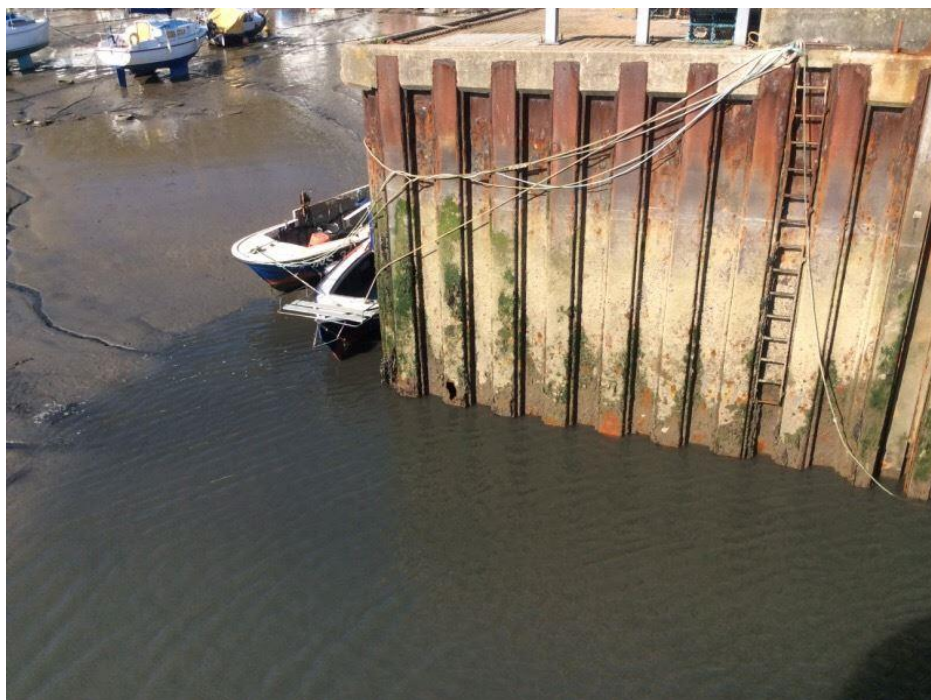
Section G
Deck
Defect Ref: D68
Description: D68 -
Insufficient handrailing
Photo number: 211



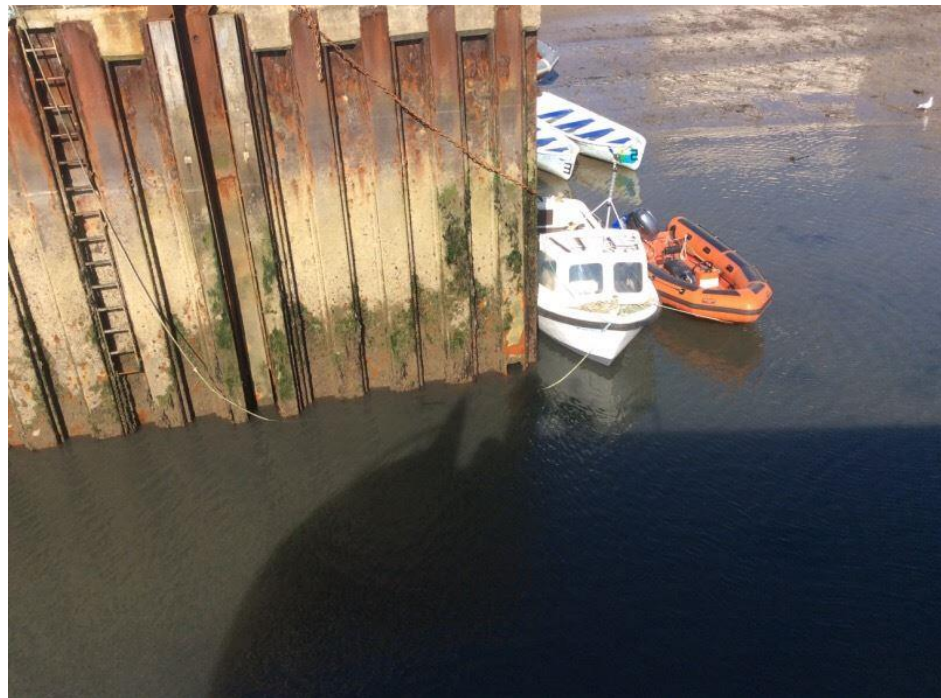
Section G
Deck
Defect Ref: D69
Description: D69 -
Damaged surfacing of
deck
Photo number: 167



Section D
Sheet piling
Defect Ref: D72
Description: D72 - Two
holes in piles,
approximately 0.3x0.1m
and 0.3x0.3
Photo number: 169



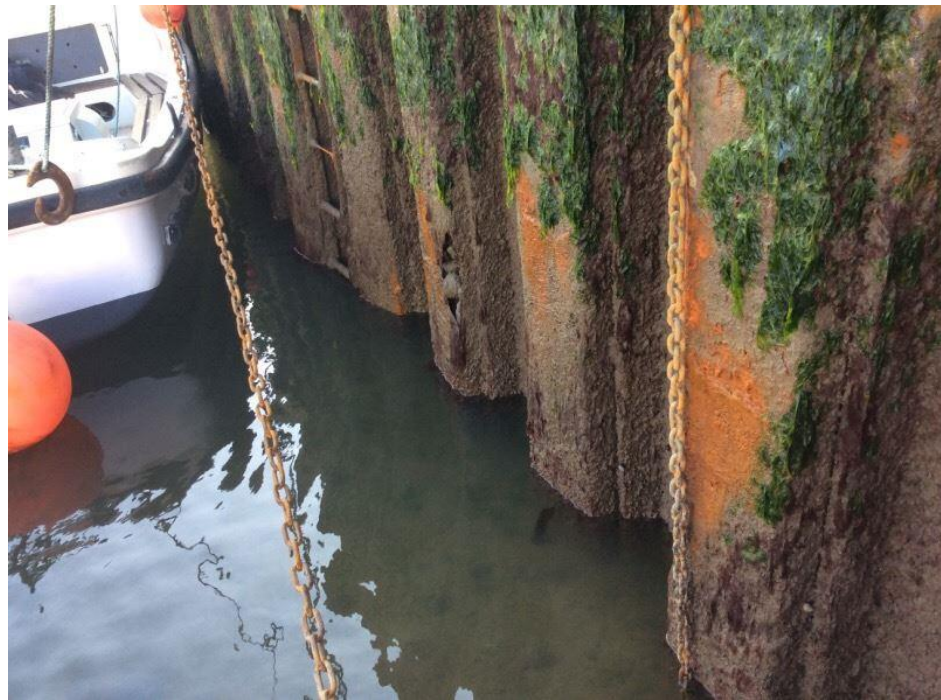
Section D
Sheet piling
Defect Ref: D72
Description: D72 - Two holes in piles, approximately 0.3x0.1m and 0.3x0.3
Photo number: 214



Section D
Sheet piling
Defect Ref: D72
Description: D72 - Two holes in piles, approximately 0.3x0.1m and 0.3x0.3
Photo number: 230



Section D
Sheet piling
Defect Ref: D72
Description: D72 - Two holes in piles, approximately 0.3x0.1m and 0.3x0.3
Photo number: 235



Section F
Sheet piling
Defect Ref: D73
Description: D73 - 6 no of holes corroded through piles.
Photo number: 170



Section F
Sheet piling
Defect Ref: D75
Description: D75 -
Missing anchor plates.
Photo number: 171



Section F
Quay face
Defect Ref: D76
Description: D76 -
Delaminating concrete
repairs
Photo number: 172



Section F
Quay face
Defect Ref: D77
Description: D77 -
Undermining scour on
toe of old concrete toe
repairs.
Photo number: 175



Section F
Quay face
Defect Ref: D77
Description: D77 -
Undermining scour on
toe of old concrete toe
repairs.
Photo number: 217



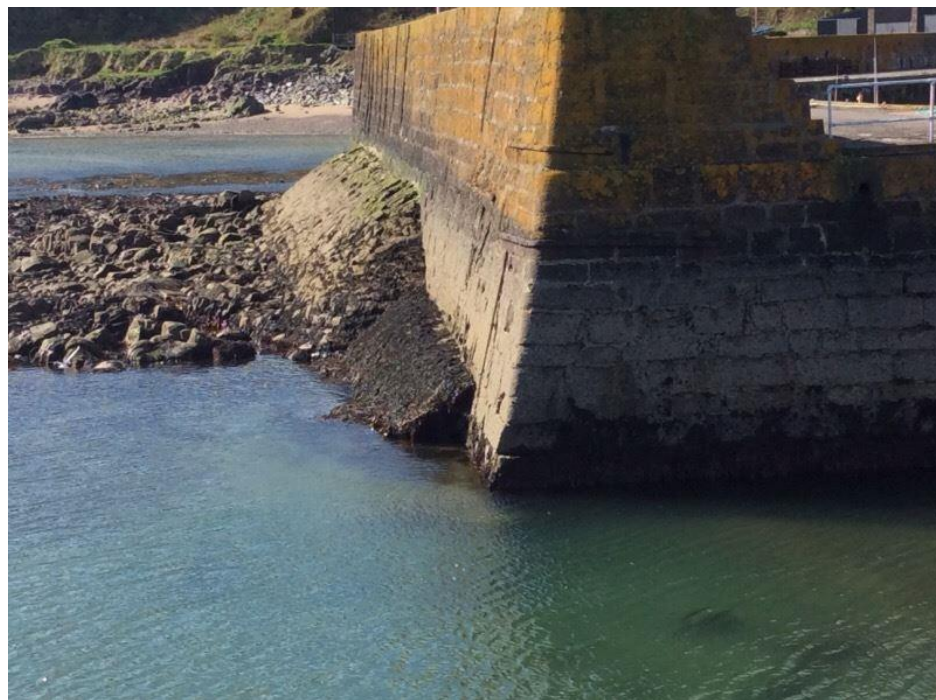
Section F
Quay face
Defect Ref: D78
Description: D78 - Open joints
Photo number: 176



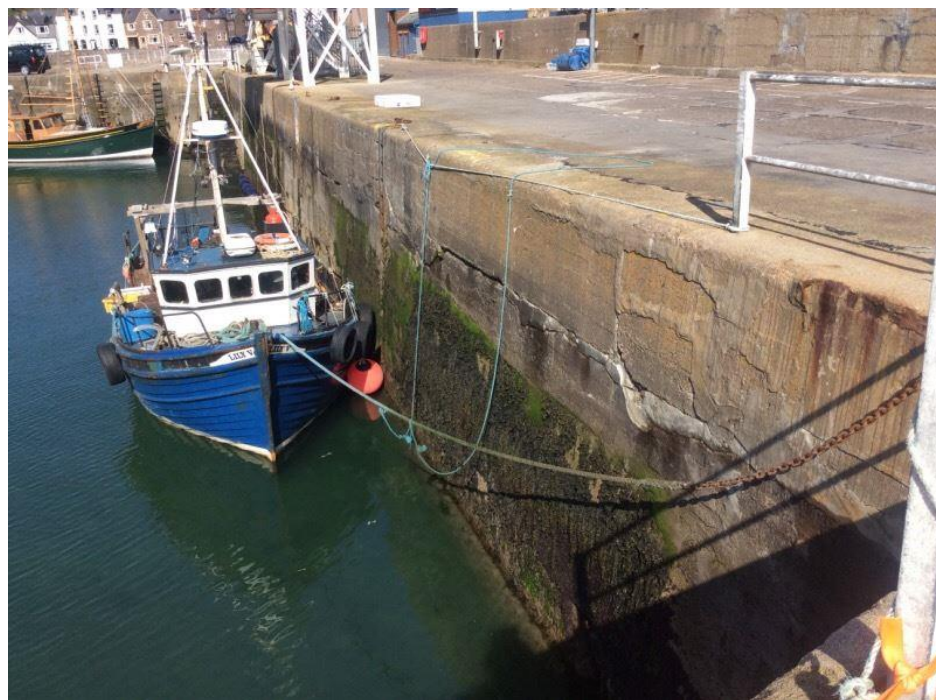
Section F
Quay face
Defect Ref: D78
Description: D78 - Open joints
Photo number: 218



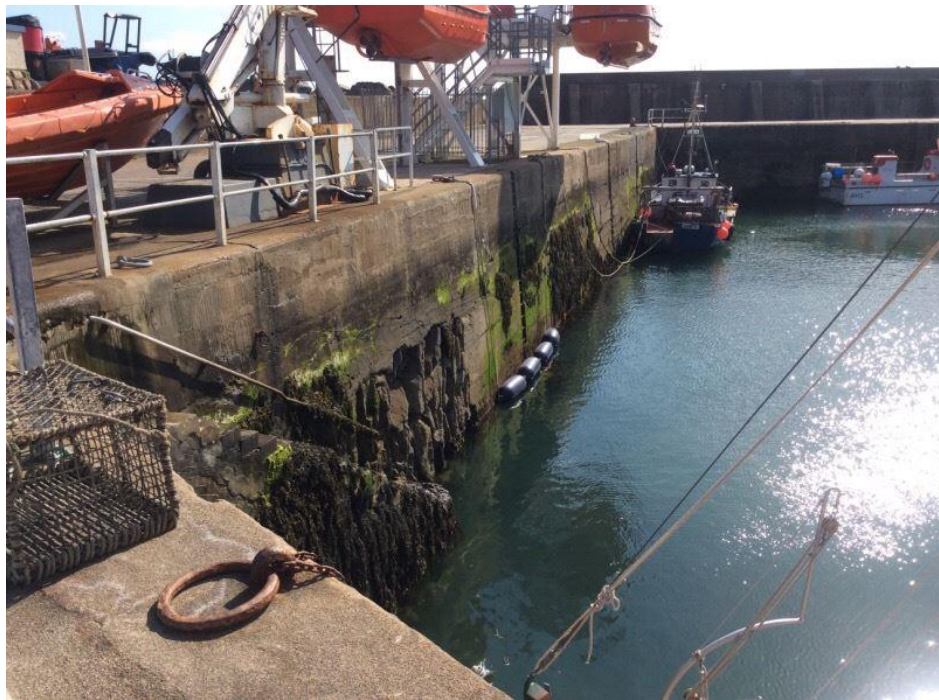
Section B
Seaward face
Defect Ref: D79
Description: D79 -
Protective apron possibly
undermined - not long
enough to provide
protection to that face
Photo number: 177



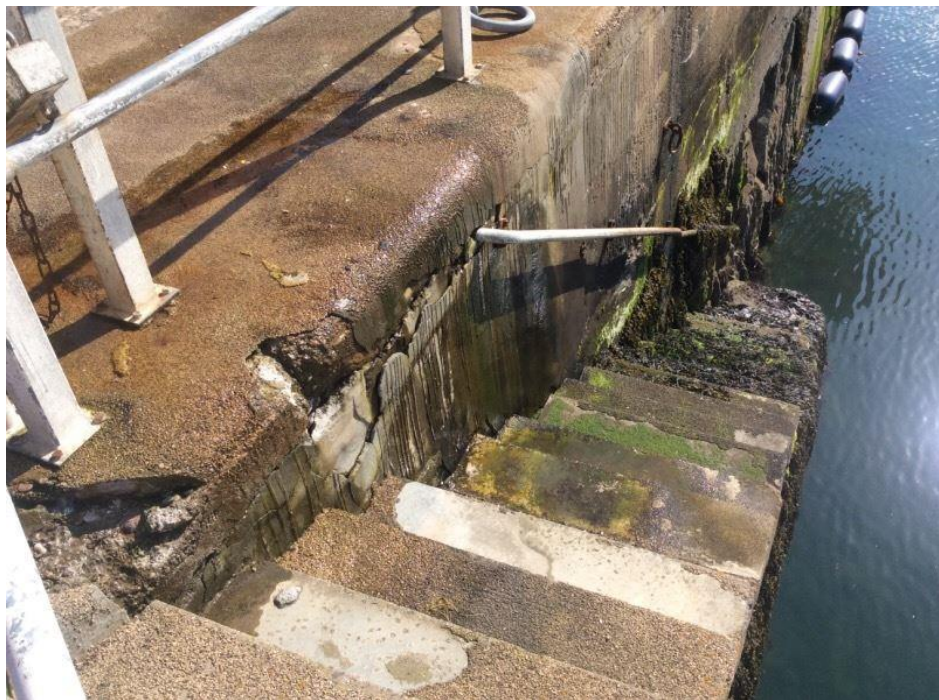
Section G
Quay face
Defect Ref: D80
Description: D80 -
concrete cracking
Photo number: 180



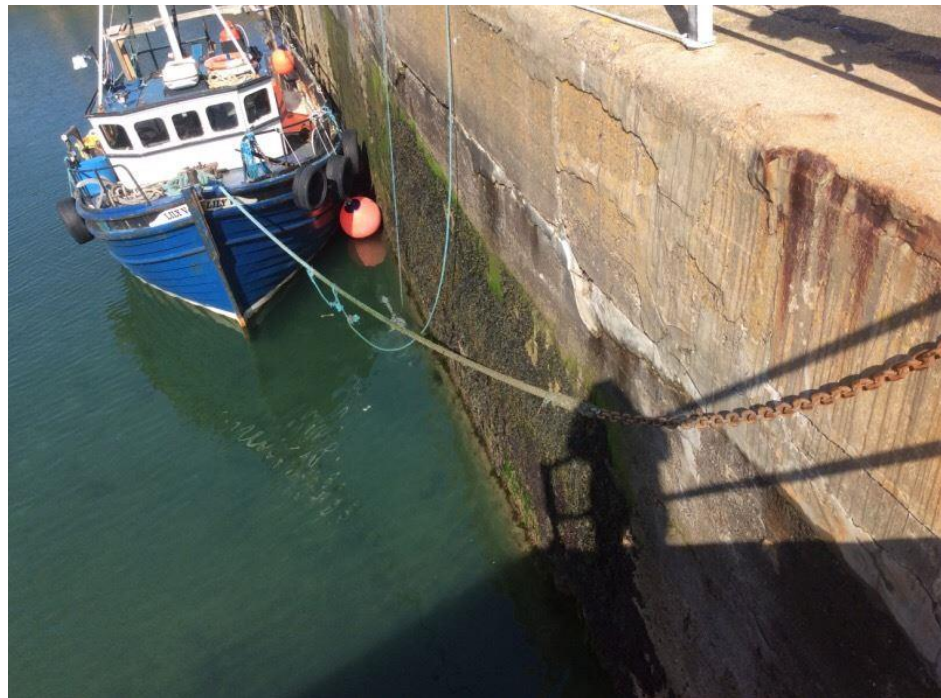
Section G
Quay face
Defect Ref: D81
Description: D81 -
Spalling , delaminating
concrete
Photo number: 178



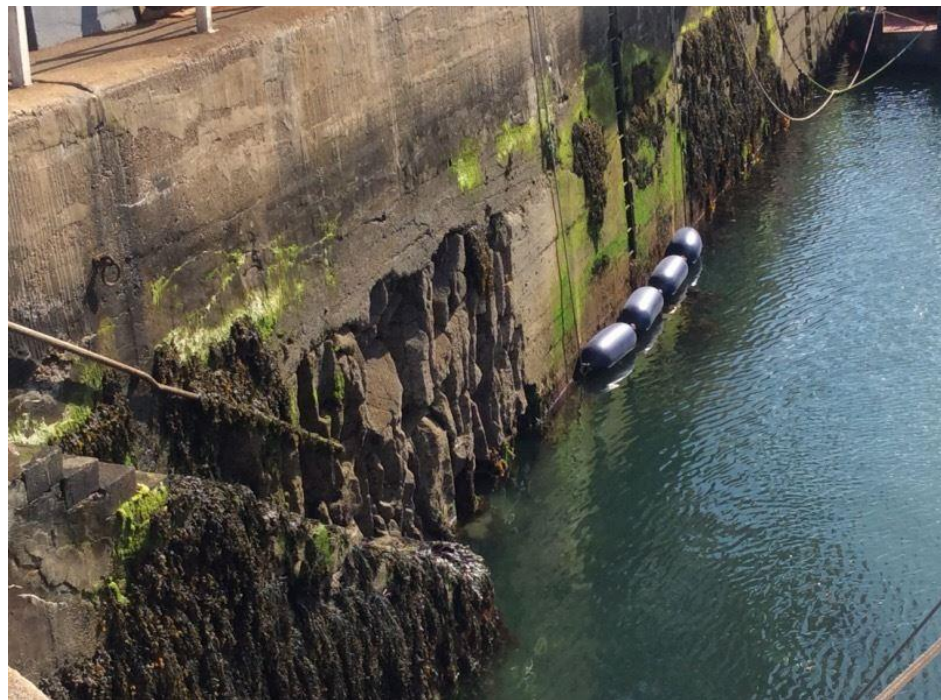
Section G
Quay face
Defect Ref: D81
Description: D81 -
Spalling , delaminating
concrete
Photo number: 219



Section G
Quay face
Defect Ref: D81
Description: D81 -
Spalling , delaminating
concrete
Photo number: 231



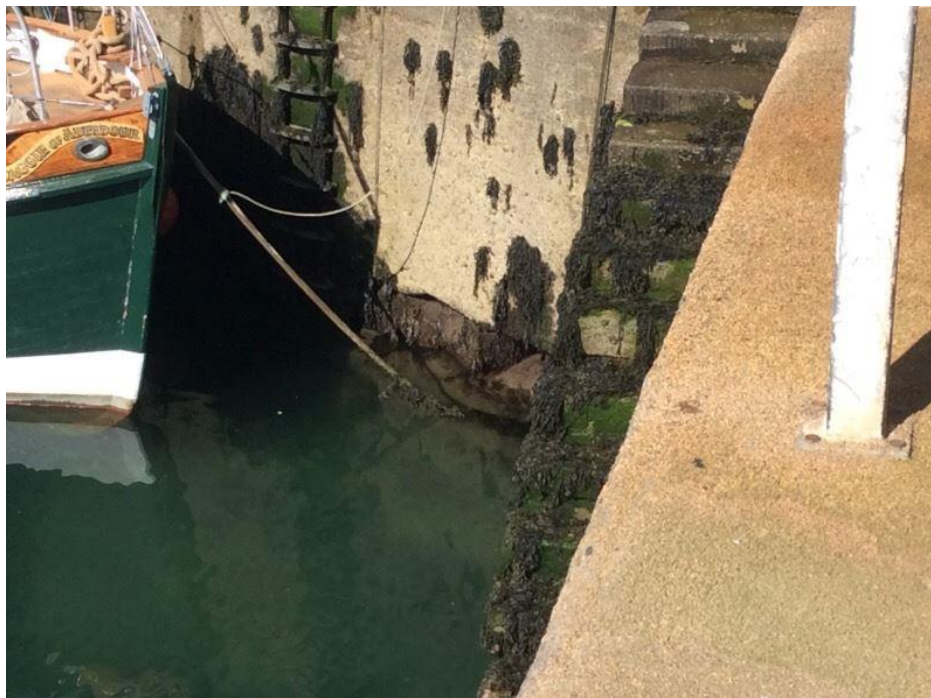
Section G
Quay face
Defect Ref: D82
Description: D82 - Area
of protection rock
possible undermined.
Photo number: 179



Section G
Quay face
Defect Ref: D83
Description: D83 -
Possible undermining
scour.
Photo number: 181



Section F
Quay face
Defect Ref: D84
Description: D84 -
Undermining scour on
the seaward facing side
Photo number: 182



Section H
Rock armour
Defect Ref: D85
Description: D85 -
Undersized rock armour
units
Photo number: 183



Section H
Rock armour
Defect Ref: D85
Description: D85 -
Undersized rock armour
units
Photo number: 220



Section H
Rock armour
Defect Ref: D85
Description: D85 -
Undersized rock armour
units
Photo number: 232



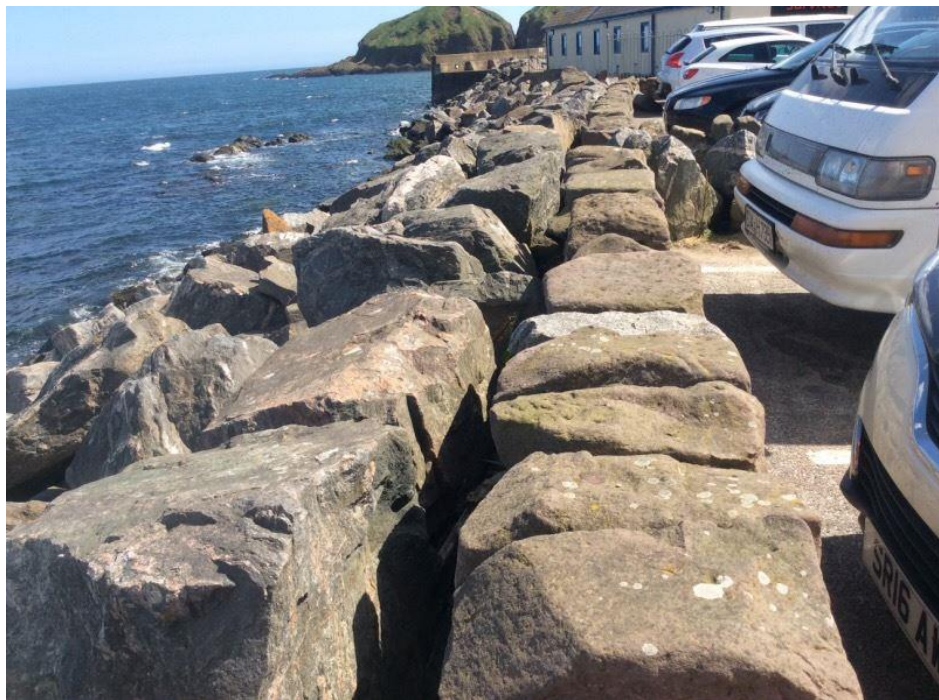
Section H
Rock armour
Defect Ref: D86
Description: D86 -
Overly steep rock armour
profile
Photo number: 186



Section H
Splash wall
Defect Ref: D87
Description: D87 -
Blockwork missing
Photo number: 184



Section H
Rock armour
Defect Ref: D88
Description: D88 -
Narrow rock armour crest
width
Photo number: 185



Appendix 2 – Asset descriptors

Asset Type	Sub Type	Element	
Defence	Wall	Exposed face	
		Landward face	
		Crest	
		Berm	
		Channel side	
		Landward toe	
		Capping wall	
		Access strip	
		Core	
		Drainage ditch	
		Seaward toe	
		Rock armour	
		Embankment	Exposed face
			Landward face
	Crest		
	Berm		
	Channel side		
	Landward toe		
	Access strip		
	Splash deck		
	Splash wall		
	Seaward toe		
	Rock armour		
	Piling		
	Gabions		
	Quay		Quay face
		Deck	
		Capping	
		Piling	
		Planking	
		Stem	
		Roundhead	
		Sheet piling	
		Seaward face	
		Face protection	
		Dune	Stabilised zone
	Active zone		
	Cliff	Seaward face	
		Cliff top	
		Seaward toe	
		Face protection	
Drainage			

Asset Type	Sub Type	Element
Beach Structure	Groyne	Crest
		Left face
		Right face
		Piling
		Planking
		Waling
		Roundhead
		Fishtail
		Stem
		Sheet piling
		Capping beam
	Breakwater	Crest
		Seaward face
		Landward face
		Sheet piling
		Bedding layer
		Face protection
		Roundhead
		Fishtail
		Capping beam
Waling		

Appendix 3 – EA Condition Grades

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2.0 Visual inspection condition grades

The condition grading and descriptions given below are the standards adopted by the Environment Agency. The five condition grades, ranging from ‘very good’ to ‘very poor’, remain as before. However, the descriptions have been redefined, compared to the previous versions of the Condition Assessment Manual, to reflect condition according to flood defence performance.

2.1 General assessment

Grade	Rating	Description
1	Very Good	Cosmetic defects that will have no effect on performance
2	Good	Minor defects that will not reduce the overall performance of the asset
3	Fair	Defects that could reduce performance of the asset
4	Poor	Defects that would significantly reduce the performance of the asset. Further investigation needed
5	Very Poor	Severe defects resulting in complete performance failure