

1. General information

Location Plan:		St. Ishmael Sea Wall	
		Assessment Date: 29/07/2020	
		CARRS Exam ID:	2960028
		Exam Type:	Detailed
		Complete Survey:	Yes
		Network Rail ELR:	SWM2
		Structure Reference:	237 15
		Mileage:	237m 330yds 15chs
		OS Ref:	236200 , 208300
		Operational Area:	West Wales
		Governing SMP2:	Three Rivers
		SMP2 Policy Unit:	14.8
		SMP2 Policy:	14.8: 2025 = hold the line; 2055 = hold the line; 2105 = hold the line

NOTE: This document has been prepared as an Asset Condition Survey Report for Network Rail. 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.

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

St. Ishmael Sea Wall is located south of Ferryside, and links to the asset Ferryside Rock Armour South. The defence is split into two sections, St. Ishmael Sea Wall A and B, corresponding to a change in major element type at 236182, 209245 (between Sections A and B):

- St. Ishmael Sea Wall A – The first section is a masonry sea wall with a concrete apron and rock armour toe protection. A concrete slipway is located on the southern end of the asset.
- St. Ishmael Sea Wall B – The second section is a rock armour embankment protecting a smaller continuation of the masonry sea wall seen in Section A.

The defence ties into a rock armour embankment, Ferryside Rock Armour North, on the high mileage end. The low mileage (southern) end of the defence ties into a rock armour and sand dune system, of unknown ownership.

1.2. Summary of condition and critical defects

Sections A and B are considered to be in fair condition without any critical defects. Those defects that require attention include:

- Health and safety: removal of algae on apron causing a slip hazard.
- The ownership of the adjacent asset on the southern end of the defence needs to be identified. The sand dune system appears to offer protection to the railway, but is showing some signs of erosion.
- Additional drainage is required to alleviate water pressure on the back of the sea wall. This pressure has been made apparent from several leakages on the lower face of the sea wall and further seepage found along the wall.
- Sections of the concrete apron have been replaced within recent years, the remaining older (and well worn) apron sections will also soon need replacing.

Between the 2014 and 2020 inspections weathering of masonry and vegetation growth have continued along with the identifying of additional failures in the masonry beneath the outfall and missing blocks from within the wall. Poor rock armour interlocking and small toe units have also been identified.

1.3. Access considerations

Network Rail access requirement:	No COSS
Third party/adjacent landowner permissions:	None necessary
Nearest public highway:	A484
Local guidance:	Access to the asset is available from either Ferryside Yacht Club, located 2km north of the start of the asset, or, at the track access point located at the southern end of the asset. There is a large intertidal foreshore that provides an adequate survey window to inspect the asset during a low to mid-stage of the tide.
Tide state during survey:	Not defined (Not defined)
Equipment required for access and examinations:	No COSS

2. Structure information

CERD Hierarchy	Asset Type	Major Elements	Minor Elements	Attributes
Section A	Defence	Wall	Parapet/Capping	Masonry
	Defence	Wall	Wall section	Masonry
	Defence	Wall	Wall Apron	Concrete
	Defence	Wall	Wall Armour	Rock
	Defence	Wall	Wall Armour	Rock
Section B	Defence	Embankment	Capping Wall	Masonry
	Defence	Embankment	Embankment Armour	Rock

General Description of Structure:			
Approx. defence length (m):	1400		
Approx. co-ordinates from:	236184 , 208196	to:	236352 , 209516
As built drawing available:	No		
Linked to other Asset Types:	Rock armour embankment (see Ferryside Rock Armour South).		
NR Infrastructure protected:	~1400m of SWM2 situated between 0-75m from the rear defence position.		
Assets type and ownership that the defence ties into at either end:	High mileage (northern) defence ties into the asset Ferryside Rock Armour South (rock armour embankment). Unknown ownership of sand dune system, low mileage (southern) tie.		

2.1. Topographic level information

	Defence (Section A)	Defence (Section B)
Track level (mAOD)	9.74 – 8.62	9.74 – 8.62
Crest level of primary defence (mAOD)	8.8	7.9
Toe level of primary defence (mAOD)	N/A	N/A
Approx. defence height above beach (m)	6.5	3.7
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 (1in ...)	N/A	N/A
Upper beach composition	N/A	N/A

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Lower beach composition	N/A	N/A
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2.2. Extreme sea level information

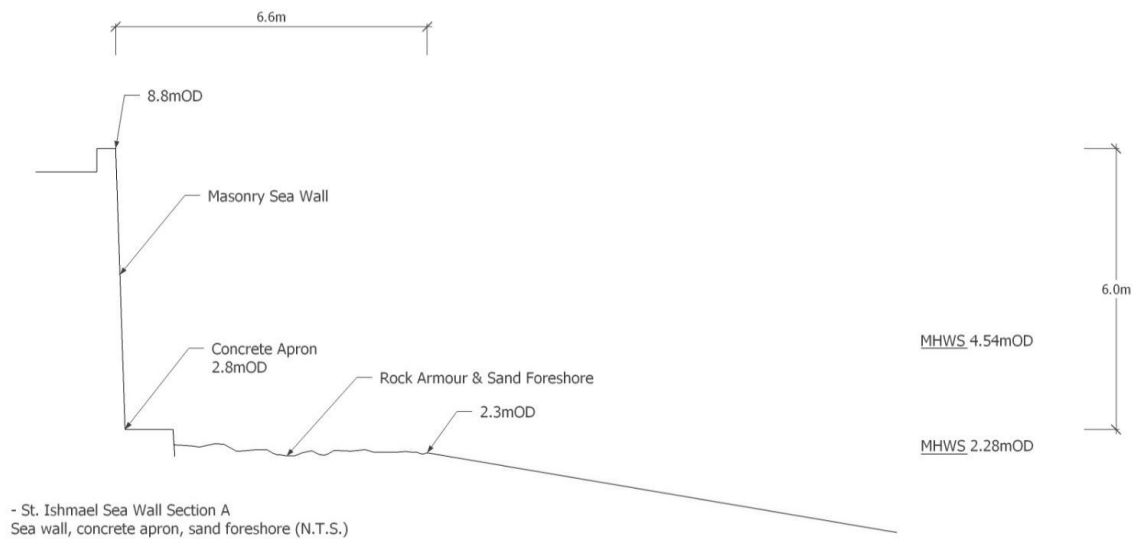
Return Period	Extreme sea level (mAOD)	Extreme sea level + climate change (mAOD)
1	5.030 (2013)	5.858 (2115)
5	5.210 (2013)	6.038 (2115)
10	5.290 (2013)	6.118 (2115)
20	5.360 (2013)	6.188 (2115)
50	5.460 (2013)	6.288 (2115)
100	5.540 (2013)	6.368 (2115)
200	5.610 (2013)	6.438 (2115)

3. Asset site sketch

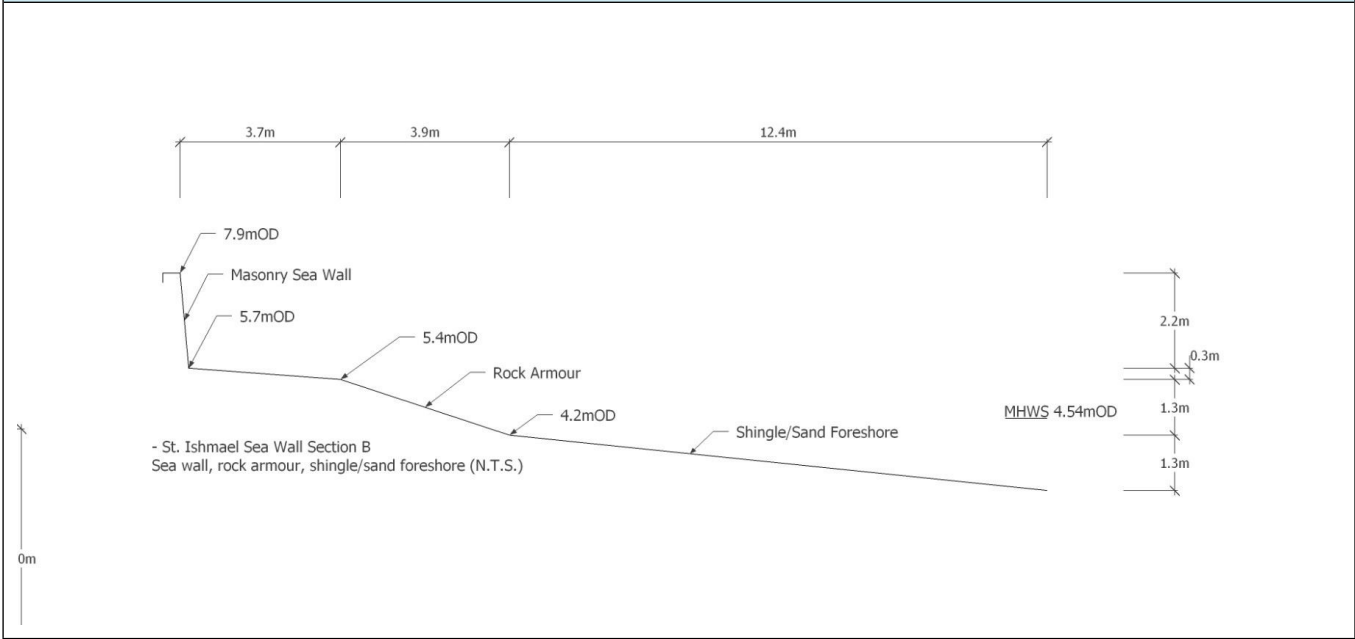
Plan



Sketch



Sketch



4. Visual Condition Survey

Visual Condition Survey (Defence - Section A) Major Element - Wall

Minor Elements	Photo No.	Attributes and General Notes	Condition Grade	Weighting (1-9)	Overall (CG x W)
Parapet/Capping		Masonry (Masonry (block cracking, open joints, minor damage to wall and joint material).).	3	7	21
Wall section		Masonry (Masonry (block cracking, open joints, minor damage to wall and joint material, water drainage through minor holes in structure).).	3	6	18
Wall Apron		Concrete (Concrete (spalling, cracking, water drainage through minor holes in structure).).	3	8	24
Wall Armour		Rock (Rock (settlement, scour, some undersized armour units).).	3	8	24
Wall Armour	22	Rock (Rock armour (new addition from 2020 inspection, some poor interlocking and undersized units).).	3	8	24
Sum (W)				37	
Sum (CG x W)					111
Overall Asset Grade	Sum of (Weight x Condition Grades) divided by sum of weightings. Unless weighting of 9 for any element, then condition grade is used.		3		

Visual Condition Survey (Defence - Section B) Major Element - Embankment

Minor Elements	Photo No.	Attributes and General Notes	Condition Grade	Weighting (1-9)	Overall (CG x W)
Capping Wall		Masonry (Masonry (Slight brick displacement, mortar loss, joint cracking)).	3	7	21
Embankment Armour		Rock (Rock (armour units have settled, voids infilled with sand, displaced units, minor settlement)).	3	6	18
Sum (W)				13	
Sum (CG x W)					39
Overall Asset Grade	Sum of (Weight x Condition Grades) divided by sum of weightings. Unless weighting of 9 for any element, then condition grade is used.		3		

4.1. Asset condition grade summary

	Defence (Section A)	Defence (Section B)
Target condition grade	2	2
Overall surveyed condition grade	3	3
Total time taken to reach CG1	N/A	N/A
Total time taken to reach CG2	N/A	N/A
Total time taken to reach CG3	N/A	N/A
Total time taken to reach CG4	30	17
Total time taken to reach CG5	45	25

4.2. Additional information

General description and effect of any coastal erosion noted:	Worn blockwork structure implies erosion processes are in operation.
General description and effect of any wave overtopping noted:	No noted effects during inspection.
General description and effect of any longshore / cross-shore sediment transport noted:	Possible accretion is observed on the southernmost end of the sea wall, where there is an absence of rock armour at the toe of the concrete access ramp.

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5. Identification of defects and recommendations

Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHWS	Defect Description	Recommendations	Defect Priority
D1	236200, 208300	Wall	Parapet/Capping	23, 24, 43	1	1	1	True	Adjacent asset of unknown ownership protecting the railway. Some sections have minimal coastal protection and appear vulnerable. No change between 2014 and 2020 inspections.	Identify ownership and management of adjacent asset. Inspect, monitor and consider adopting asset.	3
D2	236200, 208300	Wall	Parapet/Capping	25, 26, 46, 47	2	3	6	True	Open joints, if left unrepaired further deterioration is expected. No change between 2014 and 2020 inspections.	Repoint missing and worn mortar between masonry units.	5
D3	236192, 208210	Embankment	Capping Wall	27, 48	2	3	6	False	Cracks in capping beam, if left unrepaired further deterioration is expected. No change between 2014 and 2020 inspections.	Replace capping beam.	7
D4	236187, 208259	Wall	Wall section	28, 49	2	2	4	True	Spalling concrete access ramp. No change between 2014 and 2020 inspections.	Monitor and consider repairing damaged and exposed sections.	9
D5	236200, 208300	Wall	Wall section	29, 52	2	2	4	True	Erosion of masonry. Long term deterioration of the structure, further exposing joints. Between 2014 and 2020, a minor increase in weathering of the masonry has been observed.	Monitor the deterioration of masonry blocks as part of annual maintenance plan.	8

COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHWS	Defect Description	Recommendations	Defect Priority
D6	236152, 208434	Wall	Wall Apron	30, 55	2	2	4	True	Sections of the concrete apron are showing signs of significant deterioration. No change between 2014 and 2020 inspections.	Consider replacing apron sections.	4
D7	236150, 208447	Wall	Wall Apron	31, 56, 57	4	4	16	True	Drainage flow passing under apron. Between 2014 and 2020, a large increase in drainage flow under the apron was observed (1m by 300*300).	Repair and fill damaged apron. Provide additional drainage in the base of the wall.	2
D8	236144, 208474	Wall	Wall Apron	32, 58	1	2	2	True	Loss of cement from concrete apron face, exposed fibre reinforcement. Between 2014 and 2020, the fibre has become more visible (minor).	Monitor and consider re-facing apron.	9
D9	236142, 208480	Wall	Wall section	33, 59	1	2	2	True	High pressure water draining through voids in sea wall. Between 2014 and 2020 the voids were repaired and visible water drainage was no longer present during the 2020 inspection.	Provide additional drainage capacity through the wall if none present with repair.	11

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Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHWS	Defect Description	Recommendations	Defect Priority
D10	236130, 208520	Wall	Wall section	34	2	2	4	True	Erosion at the connection between the sea wall and natural rock foundation. No change between 2014 and 2020, potentially due to protection afforded by rock armour in front of apron.	Repoint missing and worn mortar between masonry units.	5
D11	236112, 208623	Wall	Wall Apron	35	2	3	6	True	Large fractures in concrete apron. No change between 2014 and 2020, potentially due to protection afforded by rock armour in front of apron.	Consider replacing apron sections.	5
D12	236106, 208664	Wall	Wall Apron	36	5	4	20	True	Large accumulations of algae growing on wall apron. No change between 2014 and 2020, potentially due to protection afforded by rock armour in front of apron.	Remove by environmentally friendly methods such as pressure washing.	1
D13	236200, 208300	Wall	Wall section	38, 63	2	2	4	True	Erosion of the natural rock forming part of the sea wall. No change between 2014 and 2020 inspections.	Monitor and replace with a masonry or concrete face when it is no longer an effective defence.	10
D14	236189, 209256	Wall	Wall section	39, 65, 66, 67	1	2	2	True	Poor tie-in with natural rock foundations. Between 2014 and 2020 the material has continued to separate from the foundations.	Repoint missing and worn mortar between masonry and natural foundation. Consider replacing tie in.	5

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Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHWS	Defect Description	Recommendations	Defect Priority
D15	N/A	Embankment	Capping Wall	37, 68	2	2	4	False	Vegetation growth could weaken embankment pitching and cause localised structural damage. Between 2014 and 2020 minor increases in vegetation growth were observed.	Remove vegetation, and repair any damage caused.	6
D16	236200, 208300	Wall	Wall section	40, 64, 69	3	2	6	True	Open joints, if left unrepaired further deterioration of the wall is expected. No change between 2014 and 2020 inspections.	Repair missing and worn pointing and extend rock armour protection.	4
D17	236150, 208447	Wall	Wall Armour	41, 70	1	2	2	True	Slope recession and poor tie-in. No change between 2014 and 2020 inspections (section B).	Monitor erosion rate, and if significant provide an additional armour detail.	8
D18	236286, 209391	Wall	Wall Armour	42, 71	3	2	6	True	Discontinuous rock armour/unprotected wall. No change between 2014 and 2020 inspections.	Extend rock armour protection.	4
D19	236187, 208207	Wall	Wall section	44, 45	2	2	4	True	New defect from 2020 inspection. Approx. 20mm cracks running vertically down wall beneath outfall pipe for approx. 3m of height. Possibly settlement cracking. If left unrepaired, further deterioration is expected.	Fill masonry cracks. Consider replacing masonry sections.	8

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Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHWS	Defect Description	Recommendations	Defect Priority
D20	236182, 208279	Wall	Wall section	50, 51	2	3	6	True	New defect from 2020 inspection. Missing block work approx. 500 by 500 by 250 deep. 2 blocks in area missing. If left unrepaired, further deterioration is expected.	Replace missing blockwork and pointing.	4
D21	N/A	Wall	Wall section	53, 54	1	2	2	True	New defect from 2020 inspection. Seepage through wall at 2 adjacent locations. If left unrepaired, further deterioration is expected.	Repair any failures/weaknesses in wall. Consider providing additional drainage at base of wall.	7
D22	236137, 208482	Wall	Wall section	60	2	3	6	True	New defect from 2020 inspection. Hole in wall 300 by 300. If left unrepaired, further deterioration is expected.	Replace missing blockwork and pointing.	4
D23	236113, 208525	Wall	Wall Armour	61	2	2	4	True	New defect from 2020 inspection. Poor interlock between rock units.	Consider replacing some armour units and repositioning to improve interlock.	6
D24	236115, 208528	Wall	Wall Armour	62	2	2	4	True	New defect from 2020 inspection. Small rock units present in armour toe.	Consider replacing armour toe units with larger variants.	6

6. Health and safety check

Health and Safety Check (Defence - Section A)		
		Photos and Notes
Handrails		
Are handrails necessary?	No	
Are handrails present?	No	
Are handrails secured?	-	
Handrail construction material	-	
Are handrails corroded?	-	
Is handrail paint in good condition?	-	
Ladders / Steps		
Are ladders / steps necessary for access?	No	
Are ladder / steps present?	No	
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?	Yes	
Are ramps and walkways present?	Yes	
Ramp construction material	Concrete	
Are ramps in good condition?	Yes	
Are ramps free of algae growth?	Yes	
Safety Harness Attachments		
Are attachments necessary for inspection?	No	
Are attachments present?	No	
Are attachments in good condition?	-	
Summary of health and safety items		

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Health and Safety Check (Defence - Section B)		
		Photos and Notes
Handrails		
Are handrails necessary?	No	
Are handrails present?	No	
Are handrails secured?	-	
Handrail construction material	-	
Are handrails corroded?	-	
Is handrail paint in good condition?	-	
Ladders / Steps		
Are ladders / steps necessary for access?	No	
Are ladder / steps present?	No	
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?	No	
Are ramps and walkways present?	No	
Ramp construction material	-	
Are ramps in good condition?	-	
Are ramps free of algae growth?	-	
Safety Harness Attachments		
Are attachments necessary for inspection?	No	
Are attachments present?	No	
Are attachments in good condition?	-	
Summary of health and safety items		

7. Asset Assessment

7.1. Recommended works

Band A: Emergency works (Defect posing an immediate safety hazard. Immediate action required.)

Defect Ref No.	Works Category	Recommendations	Recommended Closure Date	Latest Status
D12	Vegetation	Remove by environmentally friendly methods such as pressure washing.		Active Defect (Approved)

Band B: Short-term remedial works (Defect posing a potential safety hazard. Work recommended within 12 month period.)

Defect Ref No.	Works Category	Recommendations	Recommended Closure Date	Latest Status
D1	Other	Identify ownership and management of adjacent asset. Inspect, monitor and consider adopting asset.		Active Defect (Approved)
D5	Brickwork/Stone Repairs	Monitor the deterioration of masonry blocks as part of annual maintenance plan.		Active Defect (Approved)
D7	Water Control	Repair and fill damaged apron. Provide additional drainage in the base of the wall.		Active Defect (Approved)
D8	Concrete Repairs	Monitor and consider re-facing apron.		Active Defect (Approved)
D13	Other	Monitor and replace with a masonry or concrete face when it is no longer an effective defence.		Active Defect (Approved)
D17	Other	Monitor erosion rate, and if significant provide an additional armour detail.		Active Defect (Approved)

Band C: Medium-term remedial works (Defect posing a potential safety hazard. Work recommended within 12 to 30 month period.)

Defect Ref No.	Works Category	Recommendations	Recommended Closure Date	Latest Status
D2	Brickwork/Stone Repairs	Repoint missing and worn mortar between masonry units.		Active Defect (Approved)
D10	Other	Repoint missing and worn mortar between masonry units.		Active Defect (Approved)
D15	Vegetation	Remove vegetation, and repair any damage caused.		Active Defect (Approved)
D16	Brickwork/Stone Repairs	Repair missing and worn pointing and extend rock armour protection.		Active Defect (Approved)
D19	Brickwork/Stone Repairs	Fill masonry cracks. Consider replacing masonry sections.		Active Defect
D20	Brickwork/Stone Repairs	Replace missing blockwork and pointing.		Active Defect
D22	Brickwork/Stone Repairs	Replace missing blockwork and pointing.		Active Defect
D23	Other	Consider replacing some armour units and repositioning to improve interlock.		Active Defect
D24	Other	Consider replacing armour toe units with larger variants.		Active Defect

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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 Ref No.	Works Category	Recommendations	Recommended Closure Date	Latest Status
D3	Concrete Repairs	Replace capping beam.		Active Defect (Approved)
D4	Concrete Repairs	Monitor and consider repairing damaged and exposed sections.		Active Defect (Approved)
D6	Concrete Repairs	Consider replacing apron sections.		Active Defect (Approved)
D9	Water Control	Provide additional drainage capacity through the wall if none present with repair.		Active Defect (Approved)
D11	Concrete Repairs	Consider replacing apron sections.		Active Defect (Approved)
D14	Other	Repoint missing and worn mortar between masonry and natural foundation. Consider replacing tie in.		Active Defect (Approved)
D18	Other	Extend rock armour protection.		Active Defect (Approved)
D21	Concrete Repairs	Repair any failures/weaknesses in wall. Consider providing additional drainage at base of wall.		Active Defect

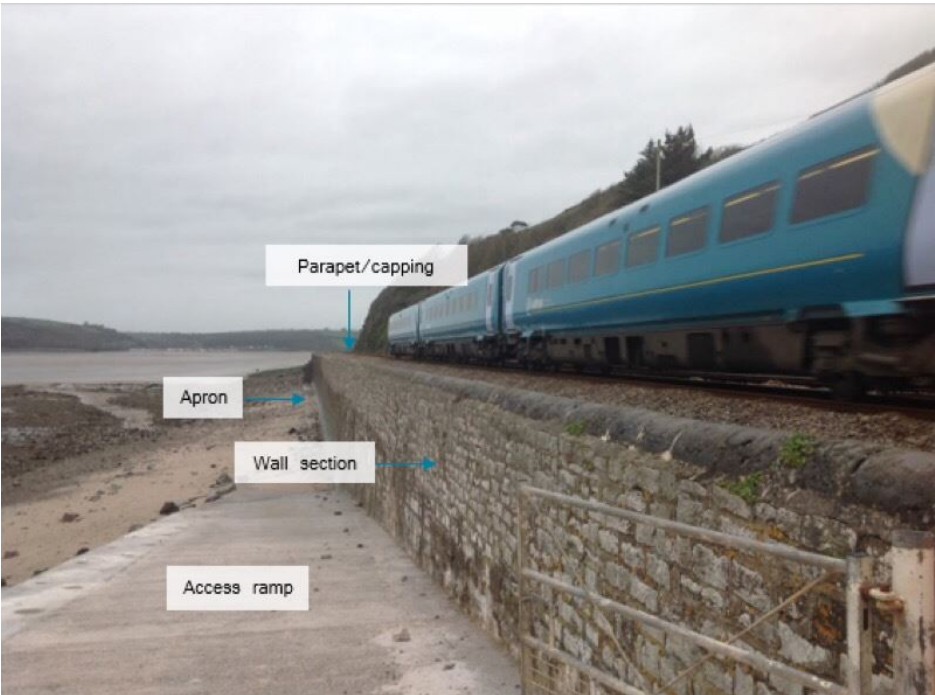
Appendix 1 – Photographs

Asset Structure Photos

Photo number: 1

No photo available

Section Photos	
Section A Photo number: 2	
Section A Photo number: 3	

Section A Photo number: 4	 This photograph shows a coastal railway track with a blue train. A concrete access ramp leads to a stone wall section. Labels with arrows point to the 'Apron' (the flat area before the wall), 'Wall section' (the stone wall itself), 'Parapet/capping' (the top of the wall), and 'Access ramp'.
Section A Photo number: 5	 This photograph shows a coastal railway track with a stone wall section. The wall is topped with a parapet/capping. The base of the wall is reinforced with rock armour. Labels with arrows point to the 'Wall section', 'Parapet/capping', and 'Rock armour'.

Section A
Photo number: 6



Section A
Photo number: 11

Date Taken:
29/07/2020 08:13



Section A
Photo number: 12

Date Taken:
29/07/2020 08:13



Section A
Photo number: 13

Date Taken:
29/07/2020 08:17



Section A
Photo number: 14

Date Taken:
29/07/2020 08:29



Section A
Photo number: 15

Date Taken:
29/07/2020 08:30



Section A
Photo number: 16

Date Taken:
29/07/2020 08:46



Section A
Photo number: 17

Date Taken:
29/07/2020 08:54



Section A
Photo number: 18

Date Taken:
29/07/2020 09:03



Section A
Photo number: 19

Date Taken:
29/07/2020 09:07



Section B Photo number: 10	 A wide-angle photograph of a coastal scene. In the foreground, there is a rocky beach with some green seaweed. To the left, a small body of water is visible. In the background, there are several buildings, including a yellow one and a grey one. A blue arrow points from the label 'Ferryside Rock Armour South' to a rocky area. A white dashed line and a label 'End of Section B' are positioned in the center of the image.
Section B Photo number: 7	 A photograph of a coastal scene showing a rocky beach and a body of water. In the background, there is a hillside with trees. Two labels, 'Section B' and 'Section A', are present with blue arrows pointing to specific areas on the beach and the hillside respectively.

Section B
Photo number: 8



Section B
Photo number: 9



Section B
Photo number: 20

Date Taken:
29/07/2020 09:29



Section B
Photo number: 21

Date Taken:
29/07/2020 09:29



Element Survey Photos

Section A
Wall Armour
Photo number: 22

Date Taken:
29/07/2020 08:52



Defect Photos

Section A Parapet/Capping

Defect Ref: D1

Description:

Adjacent asset of unknown ownership protecting the railway. Some sections have minimal coastal protection and appear vulnerable. No change between 2014 and 2020 inspections.

Photo number: 23



Section A Parapet/Capping

Defect Ref: D1

Description:

Adjacent asset of unknown ownership protecting the railway. Some sections have minimal coastal protection and appear vulnerable. No change between 2014 and 2020 inspections.

Photo number: 24



Section A
Parapet/Capping

Defect Ref: D1

Description:

Adjacent asset of unknown ownership protecting the railway. Some sections have minimal coastal protection and appear vulnerable. No change between 2014 and 2020 inspections.

Photo number: 43

Date Taken:

29/07/2020 08:18



Section A
Parapet/Capping

Defect Ref: D2

Description: Open joints, if left unrepaired further deterioration is expected. No change between 2014 and 2020 inspections.

Photo number: 25



Section A
Parapet/Capping
Defect Ref: D2
Description: Open joints, if left unrepaired further deterioration is expected. No change between 2014 and 2020 inspections.
Photo number: 26



Section A
Parapet/Capping
Defect Ref: D2
Description: Open joints, if left unrepaired further deterioration is expected. No change between 2014 and 2020 inspections.
Photo number: 46

Date Taken:
29/07/2020 08:24



Section A

Parapet/Capping

Defect Ref: D2

Description: Open joints, if left unrepaired further deterioration is expected. No change between 2014 and 2020 inspections.

Photo number: 47

Date Taken:

29/07/2020 08:24



Section B

Capping Wall

Defect Ref: D3

Description: Cracks in capping beam, if left unrepaired further deterioration is expected. No change between 2014 and 2020 inspections.

Photo number: 27



Section B

Capping Wall

Defect Ref: D3

Description: Cracks in capping beam, if left unrepaired further deterioration is expected. No change between 2014 and 2020 inspections.

Photo number: 48

Date Taken:

29/07/2020 08:28



Section A

Wall section

Defect Ref: D4

Description: Spalling concrete access ramp. No change between 2014 and 2020 inspections.

Photo number: 28



Section A
Wall section
Defect Ref: D4
Description: Spalling concrete access ramp. No change between 2014 and 2020 inspections.
Photo number: 49

Date Taken:
29/07/2020 08:33



Section A
Wall section
Defect Ref: D5
Description: Erosion of masonry. Long term deterioration of the structure, further exposing joints. Between 2014 and 2020, a minor increase in weathering of the masonry has been observed.
Photo number: 29



Section A
Wall section
Defect Ref: D5
Description: Erosion of masonry. Long term deterioration of the structure, further exposing joints. Between 2014 and 2020, a minor increase in weathering of the masonry has been observed.
Photo number: 52

Date Taken:
29/07/2020 08:37



Section A
Wall Apron
Defect Ref: D6
Description: Sections of the concrete apron are showing signs of significant deterioration. No change between 2014 and 2020 inspections.
Photo number: 30



Section A
Wall Apron
Defect Ref: D6
Description:
Sections of the concrete apron are showing signs of significant deterioration. No change between 2014 and 2020 inspections.
Photo number: 55

Date Taken:
29/07/2020 08:41



Section A
Wall Apron
Defect Ref: D7
Description:
Drainage flow passing under apron. Between 2014 and 2020, a large increase in drainage flow under the apron was observed (1m by 300*300).
Photo number: 31



Section A

Wall Apron

Defect Ref: D7

Description:

Drainage flow passing under apron. Between 2014 and 2020, a large increase in drainage flow under the apron was observed (1m by 300*300).

Photo number: 56

Date Taken:

29/07/2020 08:44



Section A

Wall Apron

Defect Ref: D7

Description:

Drainage flow passing under apron. Between 2014 and 2020, a large increase in drainage flow under the apron was observed (1m by 300*300).

Photo number: 57

Date Taken:

29/07/2020 08:44



Section A

Wall Apron

Defect Ref: D8

Description: Loss of cement from concrete apron face, exposed fibre reinforcement. Between 2014 and 2020, the fibre has become more visible (minor).

Photo number: 32



Section A

Wall Apron

Defect Ref: D8

Description: Loss of cement from concrete apron face, exposed fibre reinforcement. Between 2014 and 2020, the fibre has become more visible (minor).

Photo number: 58

Date Taken:

29/07/2020 08:45



Section A**Wall section****Defect Ref: D9**

Description: High pressure water draining through voids in sea wall. Between 2014 and 2020 the voids were repaired and visible water drainage was no longer present during the 2020 inspection.

Photo number: 33

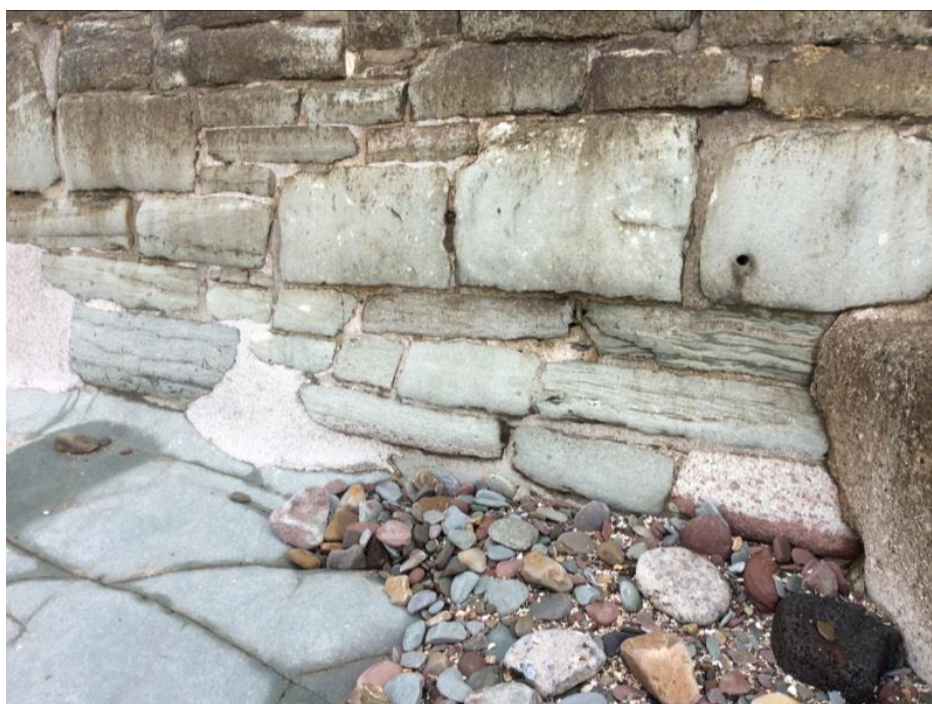
**Section A****Wall section****Defect Ref: D9**

Description: High pressure water draining through voids in sea wall. Between 2014 and 2020 the voids were repaired and visible water drainage was no longer present during the 2020 inspection.

Photo number: 59

Date Taken:

29/07/2020 08:47



Section A
Wall section
Defect Ref: D10
Description: Erosion at the connection between the sea wall and natural rock foundation. No change between 2014 and 2020, potentially due to protection afforded by rock armour in front of apron.
Photo number: 34



Section A
Wall Apron
Defect Ref: D11
Description: Large fractures in concrete apron. No change between 2014 and 2020, potentially due to protection afforded by rock armour in front of apron.
Photo number: 35



Section A

Wall Apron

Defect Ref: D12

Description: Large accumulations of algae growing on wall apron. No change between 2014 and 2020, potentially due to protection afforded by rock armour in front of apron.

Photo number: 36



Section A

Wall section

Defect Ref: D13

Description: Erosion of the natural rock forming part of the sea wall. No change between 2014 and 2020 inspections.

Photo number: 38



Section A
Wall section
Defect Ref: D13
Description: Erosion of the natural rock forming part of the sea wall. No change between 2014 and 2020 inspections.
Photo number: 63

Date Taken:
29/07/2020 09:04



Section A
Wall section
Defect Ref: D14
Description: Poor tie-in with natural rock foundations. Between 2014 and 2020 the material has continued to separate from the foundations.
Photo number: 39



Section A

Wall section

Defect Ref: D14

Description: Poor tie-in with natural rock foundations. Between 2014 and 2020 the material has continued to separate from the foundations.

Photo number: 65

Date Taken:

29/07/2020 09:15



Section A

Wall section

Defect Ref: D14

Description: Poor tie-in with natural rock foundations. Between 2014 and 2020 the material has continued to separate from the foundations.

Photo number: 66

Date Taken:

29/07/2020 09:16



Section A

Wall section

Defect Ref: D14

Description: Poor tie-in with natural rock foundations. Between 2014 and 2020 the material has continued to separate from the foundations.
Photo number: 67

Date Taken:

29/07/2020 09:16



Section B

Capping Wall

Defect Ref: D15

Description: Vegetation growth could weaken embankment pitching and cause localised structural damage. Between 2014 and 2020 minor increases in vegetation growth were observed.
Photo number: 37



Section B

Capping Wall

Defect Ref: D15

Description:

Vegetation growth could weaken embankment pitching and cause localised structural damage. Between 2014 and 2020 minor increases in vegetation growth were observed.

Photo number: 68

Date Taken:

29/07/2020 09:18



Section A

Wall section

Defect Ref: D16

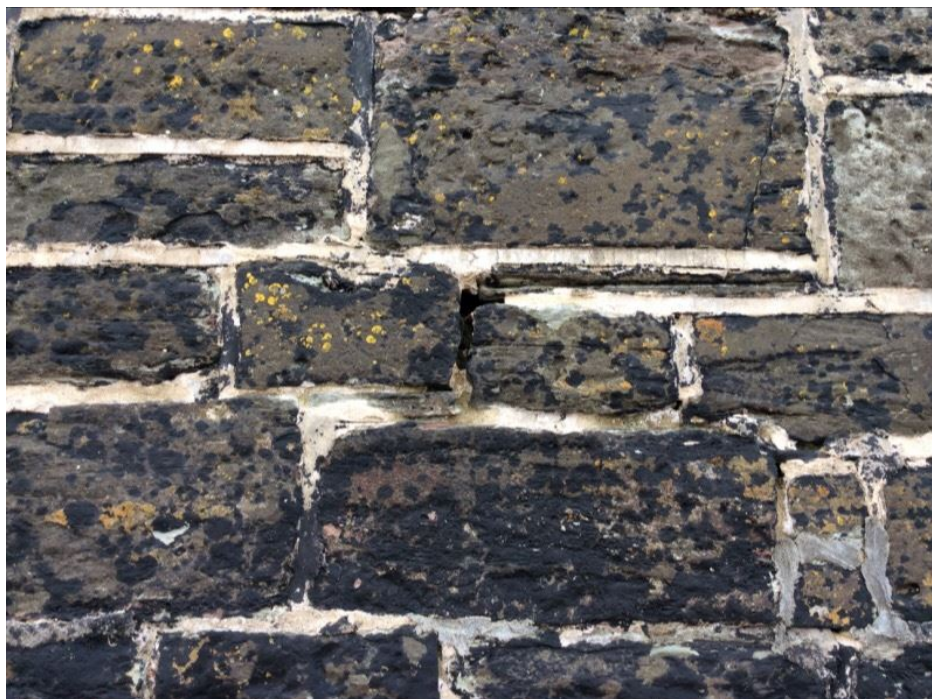
Description: Open joints, if left unrepaired further deterioration of the wall is expected. No change between 2014 and 2020 inspections.

Photo number: 40



Section A
Wall section
Defect Ref: D16
Description: Open joints, if left unrepaired further deterioration of the wall is expected. No change between 2014 and 2020 inspections.
Photo number: 64

Date Taken:
29/07/2020 09:13



Section A
Wall section
Defect Ref: D16
Description: Open joints, if left unrepaired further deterioration of the wall is expected. No change between 2014 and 2020 inspections.
Photo number: 69

Date Taken:
29/07/2020 09:21



Section A
Wall Armour
Defect Ref: D17
Description: Slope recession and poor tie-in. No change between 2014 and 2020 inspections (section B).
Photo number: 41



Section A
Wall Armour
Defect Ref: D17
Description: Slope recession and poor tie-in. No change between 2014 and 2020 inspections (section B).
Photo number: 70

Date Taken:
29/07/2020 09:23



Section A
Wall Armour
Defect Ref: D18
Description:
Discontinuous rock armour/unprotected wall. No change between 2014 and 2020 inspections.
Photo number: 42



Section A
Wall Armour
Defect Ref: D18
Description:
Discontinuous rock armour/unprotected wall. No change between 2014 and 2020 inspections.
Photo number: 71

Date Taken:
29/07/2020 09:27



Section A

Wall section

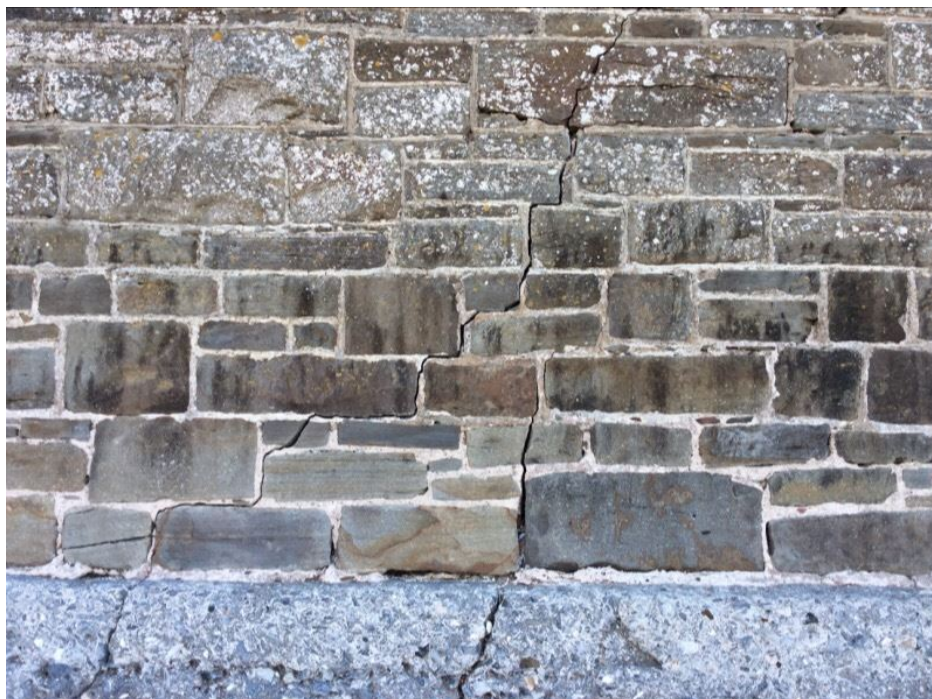
Defect Ref: D19

Description: New defect from 2020 inspection. Approx. 20mm cracks running vertically down wall beneath outfall pipe for approx. 3m of height. Possibly settlement cracking. If left unrepaired, further deterioration is expected.

Photo number: 44

Date Taken:

29/07/2020 08:20



Section A

Wall section

Defect Ref: D19

Description: New defect from 2020 inspection. Approx. 20mm cracks running vertically down wall beneath outfall pipe for approx. 3m of height. Possibly settlement cracking. If left unrepaired, further deterioration is expected.

Photo number: 45

Date Taken:

29/07/2020 08:20



Section A

Wall section

Defect Ref: D20

Description: New defect from 2020 inspection. Missing block work approx. 500 by 500 by 250 deep. 2 blocks in area missing. If left unrepaired, further deterioration is expected.

Photo number: 50

Date Taken:

29/07/2020 08:34



Section A

Wall section

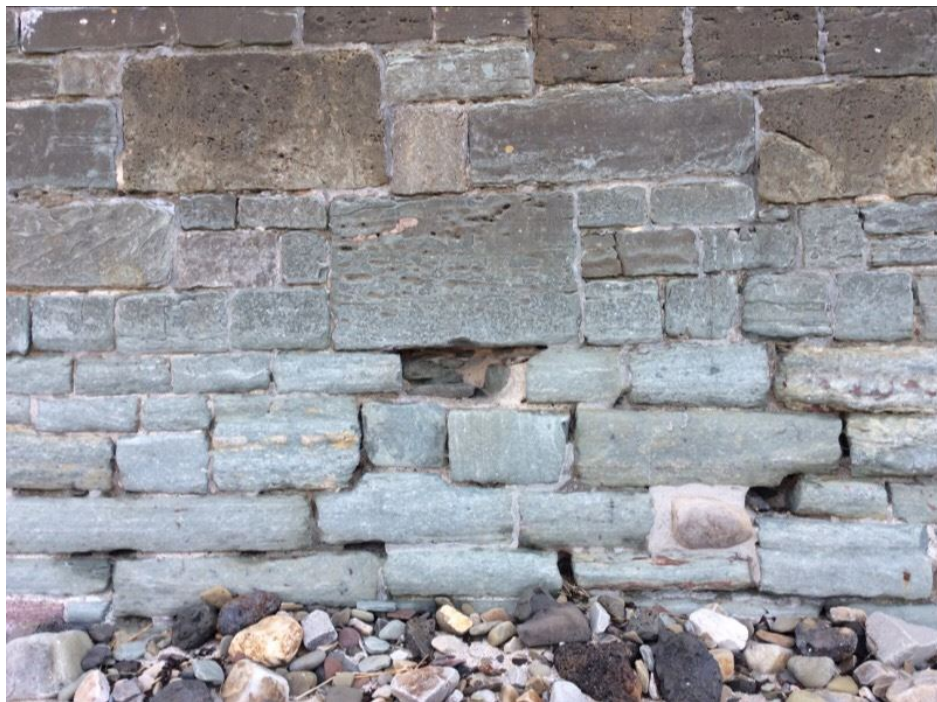
Defect Ref: D20

Description: New defect from 2020 inspection. Missing block work approx. 500 by 500 by 250 deep. 2 blocks in area missing. If left unrepaired, further deterioration is expected.

Photo number: 51

Date Taken:

29/07/2020 08:35



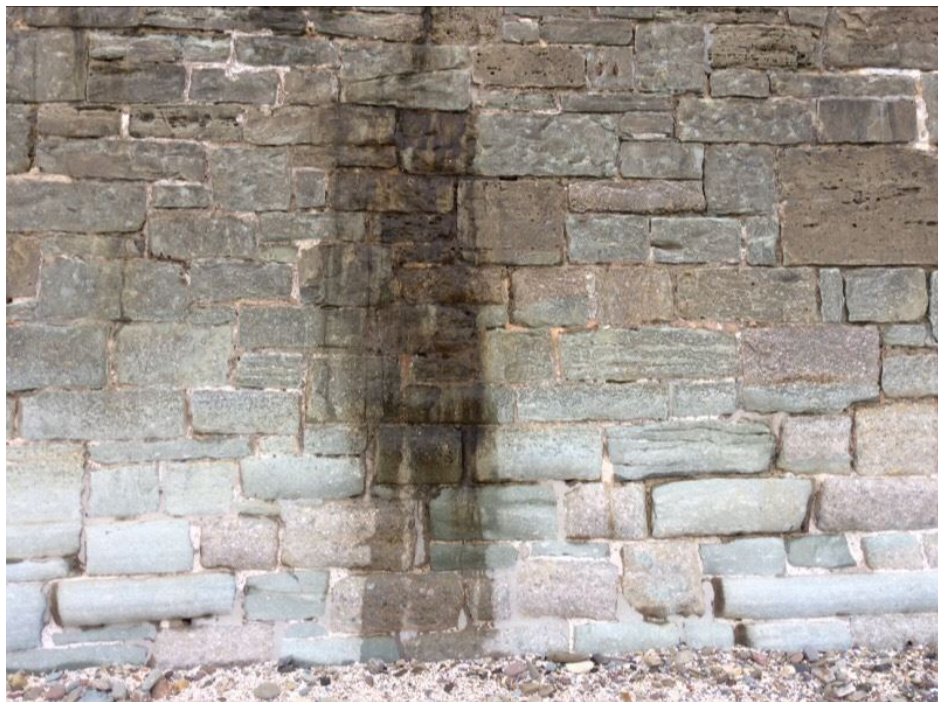
Section A
Wall section
Defect Ref: D21
Description: New defect from 2020 inspection. Seepage through wall at 2 adjacent locations. If left unrepaired, further deterioration is expected.
Photo number: 53

Date Taken:
29/07/2020 08:39



Section A
Wall section
Defect Ref: D21
Description: New defect from 2020 inspection. Seepage through wall at 2 adjacent locations. If left unrepaired, further deterioration is expected.
Photo number: 54

Date Taken:
29/07/2020 08:40



Section A

Wall section

Defect Ref: D22

Description: New defect from 2020 inspection. Hole in wall 300 by 300. If left unrepaired, further deterioration is expected.

Photo number: 60

Date Taken:

29/07/2020 08:49



Section A

Wall Armour

Defect Ref: D23

Description: New defect from 2020 inspection. Poor interlock between rock units.

Photo number: 61

Date Taken:

29/07/2020 08:55



Section A

Wall Armour

Defect Ref: D24

Description: New defect from 2020 inspection. Small rock units present in armour toe.

Photo number: 62

Date Taken:

29/07/2020 08:56



Appendix 2 – Asset descriptors

Asset Type	Major Element	Minor Elements	Attributes
Defence	Embankment	Apron	Stone, concrete, masonry
		Capping Wall	Stone, concrete, masonry
		Modular Blocks	Concrete
		Drainage	Pipe, masonry, Concrete Headline
		Gabions	Gabions
		Natural	Vegetated, un-vegetated
		Pitching	Stone, Concrete, Masonry
		Armour	Rock, concrete
		Toe	As above
Defence	Wall	Apron	Stone, concrete, masonry
		Parapet / Capping	Stone, concrete, masonry, timber
		Wall section	Stone, concrete, masonry, timber, sheet piles
		Armour	Rock, concrete
		Drainage	
		Toe	Concrete, natural, rock
Defence	Cliff / Slope	Drainage	
		Face protection	Netting, pinning, other
		Infill	Stone, concrete, masonry
		Natural	Vegetated, un-vegetated
		Toe	
Beach Structure	Groyne	Capping Beam	Concrete, timber (whaling)
		Piles	Steel, timber
		Groyne main section	Rock, stone, masonry, timber (planking), concrete
		Groyne landward connection	Rock, stone, masonry, timber (planking), concrete
		Groyne – seaward roundhead	Rock, stone, masonry, timber (planking), concrete
		Sheet piling	Steel
Beach Structure	Breakwater	Capping Beam	Concrete
		Breakwater Section	Stone, masonry, concrete
Land	Salt Marsh	Salt marsh edge	Vegetation (loss or growth), reduction in area
		Channel / creeks	Channels or creeks becoming wider, loss of vegetation on edge etc.
Land	Tidal Flats	Mudflats	Reduction in area
		Channel	Channels becoming wider, changing course etc.
Land	Sand Dune	Crest	sand
		Front face	sand
Land	Beach	Crest	Shingle, sand, cobbles, mixed
		Front face	Shingle, sand, cobbles, mixed
Structure	Outfall (>0.45m)	Outfall pipe	
		Upstream headwall	
		Downstream headwall	
		Apron	
		Frame	
		Screen	
		Penstock	
		Flap valve	

Appendix 3 – EA Condition Grades

10 Environment Agency Condition Assessment Manual

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