

## 1. General information

Location Plan:	<b>Afonwen Sea Wall</b> Assessment Date: 16/03/2022	
<p>Contains Ordnance Survey data © Crown copyright and database right 2015</p>	CARRS Exam ID:	<b>14468740</b>
	Exam Type:	<b>Detailed</b>
	Complete Survey:	Yes
	Network Rail ELR:	<b>DJP</b>
	Structure Reference:	<b>127 41</b>
	Mileage:	<b>127m 798yds 36chs</b>
	OS Ref:	245630 , 337300
	Operational Area:	Cambrian
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.	Governing SMP2:	Coastal Snowdonia
	SMP2 Policy Unit:	12.24
	SMP2 Policy:	2025 = hold the line; 2055 = managed realignment; 2105 = managed realignment.

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

Afonwen Sea Wall is located between Afonwen and Llanystumdwy. The defence is split into two sections, Afonwen Sea Wall A and B, corresponding to a change in major element type at 245068, 337218 (between Sections A and B):

- Afonwen Sea Wall A – The first section is an armourstone embankment. At the most western end of this section there is a failed vertical concrete wall fronted by the armourstone embankment. As this small section has now been covered by armourstone it has been discounted as an individual section.
- Afonwen Sea Wall B - The second section is a stone mortared wall. The wall is fronted by a concrete apron with an exposed sheet pile toe.

The defence ties into natural cliffs in the east and a barrier beach in the west.

D6 is an historic defect and as such, does not appear within the current defects table exported within this report.

### 1.2. Summary of condition and critical defects

From the 2022 inspections, we discovered one major defect where a large concrete slab has been expelled. In multiple areas, there has been damage to concrete and the sheet piles along the base of the seawall. A new area of rock armour has been added to protect the slumping cliff at the far eastern end of the asset.

Sections A and B are considered to be in fair condition. Multiple defects were repaired between the 2014 and 2019 inspections. However, there are still several issues that require attention:

- A broken outfall through the toe of the rock defence is causing loss of filter material. The function of the outfall should be investigated and the drainage pipe repaired to prevent the collapse of the armour toe.
- A rock embankment section has a lower crest level and the cliff face is unprotected. It is recommended to increase the rock crest level to protect the cliff face from erosion.
- Several single rocks have been placed on top of the crest/wall with no interlocking. Although most of the upper armourstones appear to be overdesigned, the safety hazard related to a possible rock collapse is relatively high and it may still occur during extreme storm conditions. Therefore, it is recommended to remove the upper rocks that do not adequately interlock. To reduce the increasing wave overtopping risk, the rock defence should be re-designed (by increasing the crest width or by decreasing the face slope).
- Undermining at the toe of the concrete wall and spalling. It is recommended to repair the section with concrete and place scour protection to the toe of the wall.

## 1.3. Access considerations

Network Rail access requirement:	No COSS
Third party/adjacent landowner permissions:	None
Nearest public highway:	A497
Local guidance:	The structure can be accessed from the high mileage (western end) at a public footpath. The inspection does not require an especially low tide as there is a large beach fronting the structure.
Tide state during survey:	Not defined (Not defined)
Equipment required for access and examinations:	No COSS required.

## 2. Structure information

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

General Description of Structure:	Afonwen Sea Wall is located between Afonwen and Llanystumdwy and consists of a section of armourstone embankment (behind which lies a failed vertical concrete wall) and a section of stone mortared wall fronted by a relatively new concrete apron with an exposed sheet pile toe.		
Approx. defence length (m):	1260		
Approx. co-ordinates from:	245620 , 337287	to:	244371 , 337115
As built drawing available:	No		
Linked to other Asset Types:	None		
NR Infrastructure protected:	1260m of DJP situated 3 – 15m behind crest of the defence		
Assets type and ownership that the defence ties into at either end:	The defence ties into natural cliffs in the east and a barrier beach in the west, both of unknown ownership.		

### 2.1. Topographic level information

	Defence (Section A)	Defence (Section B)
Track level (mAOD)	5.8 (LIDAR)	5.8 (LIDAR)
Crest level of primary defence (mAOD)	5.50 (GPS)	5.50 (GPS)
Toe level of primary defence (mAOD)	N/A	N/A
Approx. defence height above beach (m)	5.94 (GPS)	4.98 (GPS)
Upper beach level (mAOD)	-0.44 (GPS)	0.41 (GPS)
Lower beach level (mAOD)	-0.89 (GPS)	-0.91 (GPS)
Approx. total beach height (m)	0.45 (GPS)	1.32 (GPS)
Beach crest width (m)	N/A	N/A
Approx. beach gradient (1in ...)	6 (GPS)	15 (GPS)
Upper beach composition	Shingle	Sand
Lower beach composition	N/A	N/A

## 2.2. Extreme sea level information

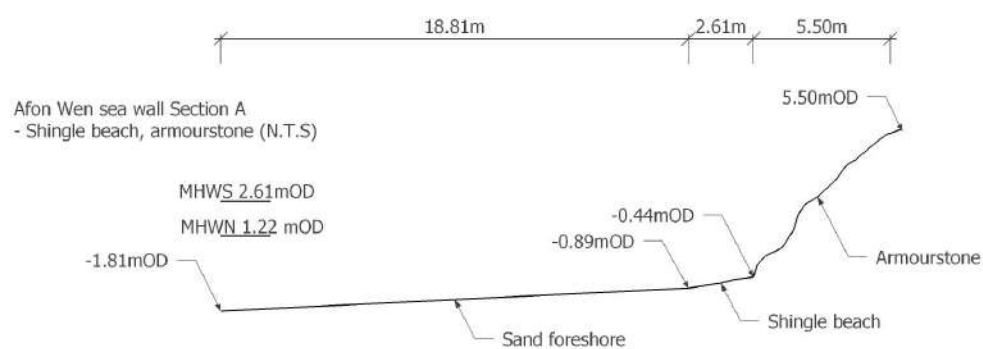
Return Period	Extreme sea level (mAOD)	Extreme sea level + climate change (mAOD)
1	3.45 (2013)	4.21 (2115)
5	3.66 (2013)	4.42 (2115)
10	3.74 (2013)	4.50 (2115)
20	3.82 (2013)	4.58 (2115)
50	3.92 (2013)	4.68 (2115)
100	3.99 (2013)	4.75 (2115)
200	4.08 (2013)	4.84 (2115)

## 3. Asset site sketch

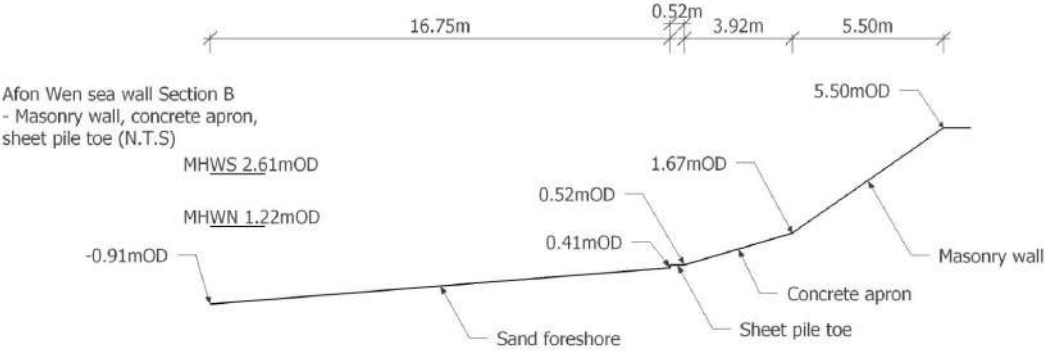
### Plan



### Sketch



Sketch



## 4. Visual Condition Survey

### Visual Condition Survey (Defence - Section A) Major Element - Embankment

Minor Elements	Photo No.	Attributes and General Notes	Condition Grade	Weighting (1-9)	Overall (CG x W)
Embankment Armour	18, 23	Rock (unstable upper rocks, poor interlocking, steep armourstone face, expelled rock units, exposed geotextile, unprotected cliff face, cliff erosion).	3	7	21
Sum (W)				7	
Sum (CG x W)					21
<b>Overall Asset Grade</b>	<b>Sum of (Weight x Condition Grades) divided by sum of weightings. Unless weighting of 9 for any element, then condition grade is used.</b>		<b>3</b>		

### Visual Condition Survey (Defence - Section B) Major Element - Wall

Minor Elements	Photo No.	Attributes and General Notes	Condition Grade	Weighting (1-9)	Overall (CG x W)
Wall section	20	Masonry (stone masonry open joints, missing blockworks, loss of mortar, longitudinal cracks).	3	7	21
Wall Apron	22	Concrete (undermining, voids behind steel sheet piles).	3	7	21
Wall Toe	19	Concrete (concrete spalling, undermining, scour, expelled rock units, corroded sheet pile).	4	5	20
Parapet/Capping	21	(Wall drainage).	4	7	28
Sum (W)				26	
Sum (CG x W)					90
<b>Overall Asset Grade</b>	<b>Sum of (Weight x Condition Grades) divided by sum of weightings. Unless weighting of 9 for any element, then condition grade is used.</b>		<b>3</b>		

### 4.1. Asset condition grade summary

	Defence (Section A)	Defence (Section B)
Target condition grade	2	2
Overall surveyed condition grade	3	3



# COASTAL ASSET CONDITION SURVEY REPORT



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	12	12
Total time taken to reach CG5	21	21

## 4.2. Additional information

General description and effect of any coastal erosion noted:	The defence is being outflanked at the eastern tie in with evidence of accelerated erosion. An additional approx. 50m of rock revetment has been added at the eastern end of the defence to protect the quickly eroding cliff. The new defence-cliff interface should be closely monitored for further erosion and potential outflanking. In addition, there is evidence of scour at the toe in Section B where beach levels have dropped.
General description and effect of any wave overtopping noted:	Not clearly evident during the asset inspection.
General description and effect of any longshore / cross-shore sediment transport noted:	Not clearly evident during the asset inspection. However, west to east aligned groyne bays along Section B indicates longshore processes in operation.

# COASTAL ASSET CONDITION SURVEY REPORT



## 5. Identification of defects and recommendations

Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D1	245547, 337285 DJP 127.095	Embankment	Embankment Armour	43, 143	2	3	6	True	Loss/damage of rock-armour	Expelled rock from profile. No change between 2021-2022 examinations.	Monitor the asset and if expulsion of rock armour continues consider re-profiling the embankment (possibly by replacing smaller rocks with larger rocks and with a slope no steeper than 1:2).	13
D2	245551, 337289 DJP 127.095	Embankment	Embankment Armour	44, 145	1	3	3	True	Loss/damage of rock-armour	Uncovered and ripped geotextile. Shingle coverage has predominantly been removed, leaving only sand covering the geotextile. No change between 2021-2022 examinations.	Monitor for signs of subsidence.	19

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D3	245469, 337284 DJP 127.103	Embankment	Embankment Armour	58, 140	2	4	8	True	Loss/damage of rock-armour	Exposed geotextile and loss of armourstone. No change between 2021-2022 examinations.	Monitor revetment for signs of subsidence and place additional rock armour if geotextile becomes uncovered.	14
D4	245388, 337262 DJP 127.113	Wall	Wall section	57, 147	2	4	8	False	Concrete damage	Exposed rebar. No change between the 2021-2022 examinations.	Remove surface corrosion from rebar and repair the section with concrete to avoid further cracks/spalling in concrete.	9
D5	245378, 337258 DJP 127.114	Wall	Wall section	56, 138	3	2	6	False	Concrete damage	Major cracking and spalling in the wall section. To be moved to Section A due to updated location. The defect has slightly worsened in 2022 examinations.	The wall does not form a critical component of the defence at this location however is still recommended to repair to prevent further cracking and instabilities within the defence.	13

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D7	245170, 337237 DJP 127.136	Embankment	Embankment Armour	52, 131	3	2	6	True	Loss/damage of rock-armour	Dissolved armour stone, loss of interlock between units. No change to the dissolved rock face during the 2022 examination. There is concern regarding the lack of interlock and the resultant potential for collapse.	Monitor the asset and consider replacing severely degraded units if re-profiling will be required.	17
D8	245069, 337217 DJP 127.148	Wall	Parapet/Capping	54, 124	4	3	12	True	Scour/undermining	Poor overall condition of the outfall pipe. During the 2022 examinations, heavy water flows through dilapidated outfall, corrosion, and leaky pipes.	Investigate the function of the outfall and monitor possible scour caused by the drainage water. Remove failed sections of outfall pipe as causing health and safety hazard on foreshore.	3

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHS	Defect Group	Defect Description	Recommendations	Defect Priority
D9	245064, 337217 DJP 127.148	Wall	Wall section	32, 61	2	4	8	False	Concrete damage	Poor condition of wall section, longitudinal cracks and delaminating in the wall section and capping. Although the defect has previously been repaired, it is evident voids have been filled without breaking out the section and an adequate bond between new and existing material has not been ensured. Some cracks protrude through the thickness of the wall. There was no change between 2021-2022 examinations.	Monitor the section and if cracks occur, break out delaminating concrete section, fill voids in structure and replace ensuring adequate bond between new and existing material.	9

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHS	Defect Group	Defect Description	Recommendations	Defect Priority
	245064, 337217 DJP 127.148	Wall	Wall section	24, 25, 31, 62	2	4	8	False	Concrete damage	Poor condition of wall section, longitudinal cracks and delaminating in the wall section and capping. Although the defect has previously been repaired, it is evident voids have been filled without breaking out the section and an adequate bond between new and existing material has not been ensured. Some cracks protrude through the thickness of the wall. There was no change between 2021-2022 examinations.	Monitor the section and if cracks occur, break out delaminating concrete section, fill voids in structure and replace ensuring adequate bond between new and existing material.	9

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D10	245064, 337217 DJP 127.148	Wall	Wall section	33, 60	2	3	6	False	Concrete damage	Exposed aggregate and scour at the base of the wall section. This defect has been previously repaired with rock scour protection at the toe of the wall, however, this may not protect the concrete matrix from abrasion. There was no change between the 2021-2022 examinations.	Monitor the asset and consider refacing scoured toe.	18

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D11	245047, 337218 DJP 127.15	Wall	Wall Toe	63, 123	3	3	9	True	Concrete damage	Concrete spalling, undermining at the toe, and loss of material. The defect worsened slightly, and the undermining has been covered up by an increase in beach level between the 2021 and 2022 examinations	Repair the section with concrete patch repairs and place scour protection to the toe of the wall.	6



# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D12	244989, 337200 DJP 127.157	Wall	Wall section	34, 64	1	2	2	False	Repointing	Open joints, poor connections, and loss of mortar. This defect has been previously repaired but the poor quality of repairs were noted in the 2021 examination. No change between 2021-2022 examinations.	Monitor repairs and consider improving quality.	20
D13	244989, 337200 DJP 127.156	Wall	Wall section	65, 98, 118	2	3	6	False	Concrete damage	Poor concrete patch repair and delamination from the wall section with exposed rebar. Heavy spalling to patch repair has been discovered from 2022, with possible additional rock placement.	Patch repair voids in the structure with concrete and ensure an adequate bond between the new and existing material.	8

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D14	244989, 337200 DJP 127.157	Wall	Parapet/Capping	66, 119	1	1	1	False	Concrete damage	Missing capping beam. There was no change between the 2021-2022 examinations.	Investigate reason behind missing section of the capping beam. Consider closing defect if beam not required.	20
D15	244965, 337195 DJP 127.159	Wall	Parapet/Capping	35, 73	1	1	1	False	Repointing	Poor connection, open joints, loss of mortar. This defect has been previously repaired in 2020. There was no change between 2021-2022 examinations.	Close out defect.	20

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D16	244965, 337195 DJP 127.159	Wall	Wall section	74, 117	2	3	6	False	Repointing	Open joints, loss of mortar. This defect has been previously repaired in 2020. During the 2022 examination, heavily spalled concrete repairs, delamination and open joints were observed.	Monitor for further spalling. Consider refacing the repair.	12
D17	244697, 337159 DJP 128.013	Wall	Wall Toe	79, 94	2	2	4	True	Concrete damage	Corrosion at the top of the steel sheet piles. This is a general defect along the length of the element. Between 2021 and 2022 the defect worsened.	Monitor corrosion of piles.	18

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D18	244810, 337169 DJP 128	Wall	Parapet/Capping	71, 114	2	3	6	True	Concrete damage	Bulging occurs in the capping. No change between the 2021-2022 examinations.	Monitor section for further bulging.	12
D19	244785, 337176 DJP 128.003	Wall	Wall Toe	72, 113	3	2	6	False	Concrete damage	Expelled sheet piling. This defect has been previously repaired. Possible separation has occurred between the 2021 and 2022 examinations.	Monitor sheet piles for possible further separation.	20
D20	244773, 337175 DJP 128.004	Wall	Wall Apron	36, 70	1	1	1	False	Scour/undermining	Undermining under the apron, hollow section. This defect has been previously repaired in 2020. There was no change between the 2021-2022 examinations.	Close out defect.	20

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D21	244703, 337156 DJP 128.012	Wall	Wall Toe	81, 107	3	3	9	True	Concrete damage	Water seepage through eyelets in the sheet piling indicates a large pressure head behind the wall. The source of the build-up of water could be from a large water body north of the wall which may be draining through the structure. This mechanism could explain one of the factors behind the pile failure in D19. Reduced water seepage was observed during the 2022 examination. It is noted this could be due	Monitor the asset and consider re-designing the apron and toe detail by incorporating additional drainage if the concrete apron will be subjected to subsidence.	12

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D22	244603, 337137 DJP 128.023	Wall	Wall section	67, 89	3	3	9	False	Missing blockwork	Missing stone from masonry wall. Void behind the wall. This defect has been previously repaired but additional missing units were noted during the 2021 examination. There is voiding behind patch repair. There was no change between the 2021 and 2022 examinations.	Fill voids in structure and ensure an adequate bond between new and existing material.	8

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D23	244566, 337131 DJP 128.028	Wall	Wall section	84, 87	2	3	6	False	Vegetation clearance	Vegetation growth and loss of mortar. Little to no vegetation growth was observed during the 2022 examination. It is noted that this could be due to changes in seasonal growth.	Development of a staged vegetation clearance plan.	11
D24	244513, 337127 DJP 128.033	Wall	Wall Toe	78, 85, 86	5	2	10	True	Timber groyne damage	Dilapidated groynes (safety hazard). There was no change between the 2021-2022 examinations.	Remove steel groynes supports and dilapidated planking (safety hazard).	5

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D25	245629, 337299 DJP 127.086	Embankment	Embankment Armour	40, 146	3	3	9	False	Erosion of bank/cliff	Adjacent cliff eroding and risk of outflanking. Risk of the fencing collapsing. An approx. 50m extension to the rock armour revetment was installed between the 2020 and 2021 examinations. Slight erosion to the remaining cliff was noted during the 2022 examination.	Monitor rates of cliff erosion east of the structure. Consider re-designing the tie in if erosion rates continue.	15
D26	245535, 337289 DJP 127.096	Embankment	Embankment Armour	42, 144	4	4	16	True	Loss/damage of rock-armour	Lower rock crest with the exposed cliff. There was no change between the 2021-2022 examinations.	Increase the rock crest level to protect the cliff face from erosion.	7



# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D27	245358, 337260 DJP 127.115	Embankment	Embankment Armour	27, 53	3	2	6	False	Loss/damage of rock-armour	Overly steep rock profile with a poor interlock between the rock units. There was no change between 2021-2022 examinations.	Reprofile the embankment to an appropriate angle (1 in 2 slope) and place rock armour such that it has appropriate interlock between armour units.	17
D28	245170, 337233 DJP 127.136	Embankment	Embankment Armour	51, 132	5	2	10	False	Loss/damage of rock-armour	Single rocks are placed on top of the crest/wall with no interlocking. During extreme storm conditions, rocks may collapse resulting in a high safety hazard. There was no change between the 2021-2022 examinations.	Remove upper rocks that do not interlock and re-design the revetment to increase crest height or decrease face slope angle to reduce chance of wave overtopping.	4

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D29	245070, 337222 DJP 127.147	Wall	Parapet/Capping	55, 125	4	4	16	True	Scour/undermining	Outfall broken, high water flow through toe of defence which is causing loss of fine material and scour. During the 2022 examination, heavy water flows through the dilapidated outfall were observed with additional corrosion and leaking pipes.	Investigate the function of the outfall and repair the drainage pipe to prevent loss of filter material and scour. Consider raising the invert level of the outfall and installing a one-way self-clearing valve.	2
D30	245032, 337217 DJP 127.151	Wall	Parapet/Capping	59, 122	2	3	6	False	Concrete damage	Extensive cracking in the capping beam. There was no change between the 2021 and 2022 examinations.	Repair the section to avoid further cracks in concrete and fill void.	11

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D31	244863, 337194 DJP 127.17	Wall	Wall Apron	82, 115	3	3	9	True	Concrete damage	Corroded steel sheet piles, hole through the pile without concrete backfill. No change between 2021 and 2022 examinations.	Monitor the asset and consider upgrading concrete apron and pile connection.	12
D32	244727, 337169 DJP 128.009	Wall	Wall Apron	80, 105	4	2	8	True	Concrete damage	Movement in pile with separation from concrete (about 0.5 - 0.10 m of gap) for a wall extent of approx. 15 m. Significant movement in the piling was observed in 2022 (approx. 0.75m of separation).	The pile movement would suggest that the wall may be exposed to a relatively high hydrostatic pressure. Monitor the asset as the concrete apron may be subjected to subsidence.	12

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D33	244654, 337152 DJP 128.018	Wall	Wall Apron	83, 91, 97	2	4	8	False	Concrete damage	Exposed rebar. From the 2022 examinations, newly exposed rebar is present along the extent of the apron.	Remove surface corrosion from rebar and repair the section with concrete to avoid further cracks/spalling in concrete.	9
D34	244626, 337154 DJP 128.02	Wall	Wall section	37, 90	3	3	9	False	Missing blockwork	Missing blockwork. See photo in D22. There are multiple missing units in the wall section. No change between the 2021 and 2022 examinations.	Fill voids in structure and ensure an adequate bond between new and existing material.	8
D35	245625, 337296 DJP 127.087	Embankment	Embankment Armour	26, 41	2	3	6	True	Loss/damage of rock-armour	Remaining armour is steep and minimal. No change between 2021 and 2022 examinations.	Monitor the asset and if expulsion of rock armour continues consider re-profiling the embankment (possibly by replacing smaller rocks with larger rocks and with a slope no steeper than 1:2).	13

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D36	245484, 337284 DJP 127.101	Embankment	Embankment Armour	45, 141	2	3	6	True	Loss/damage of rock-armour	Crest is formed of poorly graded rock armour. There was no change between the 2021 and 2022 examinations.	Replace poorly graded rock armour with well graded rock armour.	13
D37	245404, 337275 DJP 127.11	Embankment	Embankment Armour	47, 139	2	3	6	True	Loss/damage of rock-armour	Loss of backfill behind rock armour and erosion behind the crest. There was no change between the 2021 and 2022 inspections.	Replace backfill with properly graded and interlocked units and monitor erosion rate.	13

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Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D38	245338, 337250 DJP 127.118	Wall	Wall section	48, 137	2	2	4	True	Concrete damage	Exposed rebar. To be moved to Section A due to updated location. There has been no change between the 2021 and 2022 examinations	Monitor continued erosion of wall face as it will affect the stability of the rock units placed atop it.	9
D39	245318, 337249 DJP 127.12	Embankment	Embankment Armour	28, 136	2	3	6	True	Loss/damage of rock-armour	Expelled rock armour. There was no change between the 2021 and 2022 examinations.	Monitor the asset and if expulsion of rock armour continues consider re-profiling the embankment (possibly by replacing smaller rocks with larger rocks and with a slope no steeper than 1:2).	13

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D40	245281, 337244 DJP 127.124	Wall	Wall section	49, 135	3	2	6	False	Concrete damage	Cracking and spalling in wall section. To be moved to Section A due to updated location. There was no change between the 2021 and 2022 examinations	The wall does not form a critical component of the defence at this location however is still recommended to repair to prevent further cracking.	13
D41	245269, 337247 DJP 127.125	Wall	Wall Toe	50, 134	5	2	10	True	Concrete damage	Remove exposed rebar (safety hazard). To be moved to Section A due to updated location. There was no change between the 2021 and 2022 inspections	Remove exposed rebar (safety hazard).	5

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D42	245103, 337228 DJP 127.143	Wall	Parapet/Capping	29, 128, 130	2	3	6	True	Loss/damage of rock-armour	Very steep rock armour. During the 2022 examination, areas of very steep rock armour were observed with potentially unstable units and other split units	Monitor the asset and if expulsion of rock armour continues consider re-profiling the embankment (possibly by replacing smaller rocks with larger rocks and with a slope no steeper than 1:2).	13
D43	245152, 337233 DJP 127.138	Wall	Parapet/Capping	30, 127	5	3	15	True	Timber groyne damage	Broken/failed groynes. There was no change between the 2021 and 2022 examinations.	Remove dilapidated groyne (safety hazard).	5
D44	244811, 337164 DJP 128	Wall	Parapet/Capping	75, 112	2	3	6	False	Repointing	Mortar washout in crest at concrete repair. There was no change between the 2021 and 2022 examinations.	Monitor the asset and re-point open joints if required.	16



# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D45	244766, 337175 DJP 128.005	Wall	Parapet/Capping	76, 148	2	3	6	False	Concrete damage	Scour damage to poor repair on the face of the wall. During the 2022 examination, deterioration to the lower section of the patch repair was noted with visible loss of material.	Consider breaking out old repair and reforming.	11

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D46	244753, 337177 DJP 128.006	Wall	Wall Toe	77, 108	2	3	6	True	Concrete damage	Damaged concrete with a void in the concrete apron. To be moved to Wall Apron element due to updated location. Between the 2021 and 2022 examinations, the defect has worsened, now beginning to undercut the adjacent slab. Concern over potential for expulsion of concrete slab.	Fill void.	12

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D47	244596, 337132 DJP 128.024	Wall	Wall section	38, 88	3	3	9	False	Missing blockwork	Missing blockwork in the wall. Between the 2021 and 2022 examinations, there is possible worsening of concrete patch repair adjacent to missing blockwork. Beach level was observed to be visibly lower.	Fill voids in structure with stones and ensure an adequate bond between new and existing material.	8
D48	244591, 337128 DJP 128.024	Wall	Wall Toe	39	5	1	5	True	Timber damage groyne	Dilapidated groynes. This defect is noted as a duplicate of D24 and is recommended for closure.	Remove steel groynes supports (safety hazard).	5

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D49	245578, 337293 DJP 127.091	Embankment	Embankment Armour	46, 142	2	2	4	False	H&S	An unstable concrete fence post creating potential health and safety hazard should the post or fence fail. There has been no change between the 2021 and 2022 examinations.	Consider repairing/stabilising the concrete fence to prevent further failure.	10
D50	244895, 337198 DJP 127.167	Wall	Wall Apron	68, 116	2	2	4	True	Concrete damage	Scour at the joints between apron units for approx. 40m. There was no change between the 2021 and 2022 examinations.	Monitor and patch repair if continued scour.	16

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D51	244865, 337194 DJP 127.17	Wall	Wall Apron	69, 106	2	2	4	True	Concrete damage	Cracks in the concrete apron. During the 2022 examination, multiple large cracks and removed material creating voids were observed throughout the large concrete slabs.	Fill voids and repair cracks. Monitor for further movement.	10
D52	244638, 337144 DJP 128.019	Wall	Wall Apron	92	2	4	8	False	Concrete damage	Scouring to the concrete apron, likely due to the lowered beach level.	Monitor for continued scour and consider the installation of scour protection measures.	15
D53	244637, 337147 DJP 128.019	Wall	Wall Apron	93	3	3	9	True	Concrete damage	Water seepage through the base of concrete apron.	Investigate further and consider remedial works.	14
D54	244652, 337151 DJP 128.018	Wall	Parapet/Capping	96, 110	2	2	4	False	Concrete damage	Voiding between capping and the crest.	Fill void.	7

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
	244652, 337151 DJP 128.018	Wall	Parapet/Capping	95, 109	2	2	4	False	Concrete damage	Voiding between capping and the crest.	Fill void.	7
D55	244686, 337158 DJP 128.014	Wall	Wall Apron	99	2	3	6	True	Concrete damage	Spalling to the concrete apron material.	Monitor and consider patch repair.	12
D56	244697, 337163 DJP 128.013	Wall	Wall Apron	100	2	2	4	True	Concrete damage	Concrete void with crack in left hand corner of slab.	Fill void and monitor slab for further movement.	13
D57	244700, 337159 DJP 128.012	Wall	Wall Apron	101	2	2	4	True	Concrete damage	Missing patch repair material with multiple cracks present.	Replace missing patch repair material	16

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D58	244707, 337165 DJP 128.012	Wall	Wall Apron	102, 103, 104	4	4	16	True	Concrete damage	Expelled apron material leaving a large void in concrete (approx. 2.5x5m). Concern over possibility for adjacent slab removal due to large cracks and the exposed undermining mechanism.	Break out the damaged sections of concrete and install a new concrete slab insitu.	5
D59	244754, 337179 DJP 128.006	Wall	Parapet/Capping	111	2	2	4	False	Concrete damage	Spalling to concrete capping beam.	Monitor for continued spalling and consider patch repairs.	18
D60	244984, 337203 DJP 127.156	Wall	Wall Toe	120	2	3	6	False	Loss/damage of rock-armour	Inconsistent crest height and missing armour units at base of wall.	Place additional units to reach the design crest height.	18
D61	244996, 337212 DJP 127.155	Wall	Wall section	121	2	2	4	True	Concrete damage	Poor wall tie in between different wall types	Improve tie-in between wall types	25

# COASTAL ASSET CONDITION SURVEY REPORT



Defect Ref No.	Defect Location (NGR)	Major Element	Minor Element	Photo Ref	Severity	Probability	Risk Score	Below MHW	Defect Group	Defect Description	Recommendations	Defect Priority
D62	245064, 337225 DJP 127.148	Wall	Wall section	126	2	3	6	False	Concrete damage	Missing wall material resulting in a void.	Fill void and reinstate missing material.	13
D63	245092, 337227 DJP 127.145	Wall	Parapet/Capping	129	2	3	6	True	Concrete damage	Spalling to the concrete capping beam with reduced rock cover in areas.	Monitor and patch repair if the capping beam continues to deteriorate.	20
D64	245244, 337250 DJP 127.128	Embankment	Embankment Armour	133	3	3	9	False	Loss/damage of rock-armour	Missing rock armour crest units, leaving exposed concrete capping beam and an inconsistent crest height.	Place additional units to reach the design crest height.	10



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## 6. Health and safety check

# COASTAL ASSET CONDITION SURVEY REPORT



Health and Safety Check (Defence - Section A)		
		Photos and Notes
<b>Handrails</b>		
Are handrails necessary?	No	Adjacent cliff eroding and risk of outflanking and collapse of fencing. The fencing should be securely fixed. Since the 2021 examination, the fencing has since been relocated and secured at the crest of the new cliff line.
Are handrails present?	Yes	
Are handrails secured?	No	
Handrail construction material	-	
Are handrails corroded?	No	
Is handrail paint in good condition?	Yes	
<b>Ladders / Steps</b>		
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?	-	
<b>Ramps and walkways</b>		
Are ramps and walkways necessary for access?	No	
Are ramps and walkways present?	No	

# COASTAL ASSET CONDITION SURVEY REPORT



Ramp construction material	-	
Are ramps in good condition?	-	
Are ramps free of algae growth?	-	
<b>Safety Harness Attachments</b>		
Are attachments necessary for inspection?	No	
Are attachments present?	No	
Are attachments in good condition?	-	
<b>Summary of health and safety items</b> Adjacent cliff eroding and risk of outflanking and collapse of fencing. The fencing should be securely fixed. Since the 2021 examination, the fencing has since been relocated and secured at the crest of the new cliff line.		

# COASTAL ASSET CONDITION SURVEY REPORT



Health and Safety Check (Defence - Section B)		
		Photos and Notes
<b>Handrails</b>		
Are handrails necessary?	No	
Are handrails present?	No	
Are handrails secured?	-	
Handrail construction material	-	
Are handrails corroded?	-	
Is handrail paint in good condition?	-	
<b>Ladders / Steps</b>		
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?	-	
<b>Ramps and walkways</b>		
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?	-	
<b>Safety Harness Attachments</b>		
Are attachments necessary for inspection?	No	
Are attachments present?	No	
Are attachments in good condition?	-	
<b>Summary of health and safety items</b>		

## 7. Asset Assessment

### 7.1. Recommended works

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

No defects identified in this band

**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	Brickwork/Stone Repairs	Monitor the asset and if expulsion of rock armour continues consider re-profiling the embankment (possibly by replacing smaller rocks with larger rocks and with a slope no steeper than 1:2).	16/03/2023 00:00:00	Active Defect (Approved)
D2	Brickwork/Stone Repairs	Monitor for signs of subsidence.	16/03/2023 00:00:00	Active Defect (Approved)
D3	Brickwork/Stone Repairs	Monitor revetment for signs of subsidence and place additional rock armour if geotextile becomes uncovered.	16/03/2023 00:00:00	Active Defect (Approved)
D7	Brickwork/Stone Repairs	Monitor the asset and consider replacing severely degraded units if re-profiling will be required.	16/03/2023 00:00:00	Active Defect (Approved)
D8	Drainage	Investigate the function of the outfall and monitor possible scour caused by the drainage water. Remove failed sections of outfall pipe as causing health and safety hazard on foreshore.	16/03/2023 00:00:00	Active Defect (Approved)
D9	Concrete Repairs	Monitor the section and if cracks occur, break out delaminating concrete section, fill voids in structure and replace ensuring adequate bond between new and existing material.	16/03/2023 00:00:00	Active Defect (Approved)
D9	Concrete Repairs	Monitor the section and if cracks occur, break out delaminating concrete section, fill voids in structure and replace ensuring adequate bond between new and existing material.	27/04/2022 00:00:00	Active Defect (Approved)
D10	Concrete Repairs	Monitor the asset and consider refacing scoured toe.	16/03/2023 00:00:00	Active Defect (Approved)
D11	Concrete Repairs	Repair the section with concrete patch repairs and place scour protection to the toe of the wall.	16/03/2023 00:00:00	Active Defect (Approved)
D24	Other	Remove steel groynes supports and dilapidated planking (safety hazard).	16/03/2023 00:00:00	Active Defect
D28	Brickwork/Stone Repairs	Remove upper rocks that do not interlock and re-design the revetment to increase crest height or decrease face slope angle to reduce chance of wave overtopping.	16/03/2023 00:00:00	Active Defect
D29	Drainage	Investigate the function of the outfall and repair the drainage pipe to prevent loss of filter material and scour. Consider raising the invert level of the outfall and installing a one-way self-clearing valve.	16/03/2023 00:00:00	Active Defect

# COASTAL ASSET CONDITION SURVEY REPORT



D35	Other	Monitor the asset and if expulsion of rock armour continues consider re-profiling the embankment (possibly by replacing smaller rocks with larger rocks and with a slope no steeper than 1:2).	16/03/2023 00:00:00	Active Defect
D41	Other	Remove exposed rebar (safety hazard).	16/03/2023 00:00:00	Active Defect
D43	Other	Remove dilapidated groyne (safety hazard).	16/03/2023 00:00:00	Active Defect
D48	Other	Remove steel groynes supports (safety hazard).	16/03/2023 00:00:00	Active Defect
D54	Concrete Repairs	Fill void.		Newly Recorded Defect
D54	Concrete Repairs	Fill void.	16/03/2023 00:00:00	Newly Recorded Defect
D55	Concrete Repairs	Monitor and consider patch repair.	16/03/2023 00:00:00	Newly Recorded Defect
D58	Concrete Repairs	Break out the damaged sections of concrete and install a new concrete slab insitu.	16/03/2023 00:00:00	Newly Recorded Defect
D64	Other	Place additional units to reach the design crest height.	16/03/2023 00:00:00	Newly Recorded Defect

**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
D4	Concrete Repairs	Remove surface corrosion from rebar and repair the section with concrete to avoid further cracks/spalling in concrete.	16/03/2024 00:00:00	Active Defect (Approved)
D13	Concrete Repairs	Patch repair voids in the structure with concrete and ensure an adequate bond between the new and existing material.	16/03/2024 00:00:00	Active Defect (Approved)
D16	Concrete Repairs	Monitor for further spalling. Consider refacing the repair.	16/03/2024 00:00:00	Active Defect (Approved)
D18	Concrete Repairs	Monitor section for further bulging.	16/03/2024 00:00:00	Active Defect (Approved)
D21	Foundation Works	Monitor the asset and consider re-designing the apron and toe detail by incorporating additional drainage if the concrete apron will be subjected to subsidence.	16/03/2024 00:00:00	Active Defect (Approved)
D22	Brickwork/Stone Repairs	Fill voids in structure and ensure an adequate bond between new and existing material.	16/03/2024 00:00:00	Active Defect (Approved)

# COASTAL ASSET CONDITION SURVEY REPORT



D25	Fencing Repair/Renewal	Monitor rates of cliff erosion east of the structure. Consider re-designing the tie in if erosion rates continue.	16/03/2024 00:00:00	Active Defect
D26	Other	Increase the rock crest level to protect the cliff face from erosion.	16/03/2024 00:00:00	Active Defect
D30	Concrete Repairs	Repair the section to avoid further cracks in concrete and fill void.	16/03/2024 00:00:00	Active Defect
D31	Concrete Repairs	Monitor the asset and consider upgrading concrete apron and pile connection.	16/03/2024 00:00:00	Active Defect
D33	Concrete Repairs	Remove surface corrosion from rebar and repair the section with concrete to avoid further cracks/spalling in concrete.	16/03/2024 00:00:00	Active Defect
D34	Concrete Repairs	Fill voids in structure and ensure an adequate bond between new and existing material.	16/03/2024 00:00:00	Active Defect
D39	Other	Monitor the asset and if expulsion of rock armour continues consider re-profiling the embankment (possibly by replacing smaller rocks with larger rocks and with a slope no steeper than 1:2).	16/03/2024 00:00:00	Active Defect
D42	Other	Monitor the asset and if expulsion of rock armour continues consider re-profiling the embankment (possibly by replacing smaller rocks with larger rocks and with a slope no steeper than 1:2).	16/03/2024 00:00:00	Active Defect
D44	Concrete Repairs	Monitor the asset and re-point open joints if required.	16/03/2024 00:00:00	Active Defect
D45	Concrete Repairs	Consider breaking out old repair and reforming.	16/03/2024 00:00:00	Active Defect
D47	Brickwork/Stone Repairs	Fill voids in structure with stones and ensure an adequate bond between new and existing material.	16/03/2024 00:00:00	Active Defect
D49	Concrete Repairs	Consider repairing/stabilising the concrete fence to prevent further failure.	16/03/2024 00:00:00	Active Defect
D50	Concrete Repairs	Monitor and patch repair if continued scour.	16/03/2024 00:00:00	Active Defect
D51	Concrete Repairs	Fill voids and repair cracks. Monitor for further movement.	16/03/2024 00:00:00	Active Defect
D52	Concrete Repairs	Monitor for continued scour and consider the installation of scour protection measures.	16/03/2024 00:00:00	Newly Recorded Defect
D53	Drainage	Investigate further and consider remedial works.	16/03/2024 00:00:00	Newly Recorded Defect
D56		Fill void and monitor slab for further movement.	16/03/2024 00:00:00	Newly Recorded Defect
D57	Concrete Repairs	Replace missing patch repair material	16/03/2024 00:00:00	Newly Recorded Defect

# COASTAL ASSET CONDITION SURVEY REPORT



D59	Concrete Repairs	Monitor for continued spalling and consider patch repairs.	16/03/2024 00:00:00	Newly Recorded Defect
D60	Other	Place additional units to reach the design crest height.	16/03/2024 00:00:00	Newly Recorded Defect
D62	Concrete Repairs	Fill void and reinstate missing material.	16/03/2024 00:00:00	Newly Recorded Defect
D63	Concrete Repairs	Monitor and patch repair if the capping beam continues to deteriorate.	16/03/2024 00:00:00	Newly Recorded Defect

**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
D5	Concrete Repairs	The wall does not form a critical component of the defence at this location however is still recommended to repair to prevent further cracking and instabilities within the defence.	16/03/2025 00:00:00	Active Defect (Approved)
D12	Concrete Repairs	Monitor repairs and consider improving quality.	16/03/2025 00:00:00	Active Defect (Approved)
D14	Concrete Repairs	Investigate reason behind missing section of the capping beam. Consider closing defect if beam not required.	16/03/2025 00:00:00	Active Defect (Approved)
D15	Concrete Repairs	Close out defect.	16/03/2025 00:00:00	Active Defect (Approved)
D17	Foundation Works	Monitor corrosion of piles.	16/03/2025 00:00:00	Active Defect
D19	Other	Monitor sheet piles for possible further separation.	16/03/2025 00:00:00	Active Defect (Approved)
D20	Other	Close out defect.	16/03/2025 00:00:00	Active Defect (Approved)
D23	Vegetation	Development of a staged vegetation clearance plan.	16/03/2025 00:00:00	Active Defect (Approved)
D27	Brickwork/Stone Repairs	Reprofile the embankment to an appropriate angle (1 in 2 slope) and place rock armour such that it has appropriate interlock between armour units.	16/03/2025 00:00:00	Active Defect
D32	Foundation Works	The pile movement would suggest that the wall may be exposed to a relatively high hydrostatic pressure. Monitor the asset as the concrete apron may be subjected to subsidence.	16/03/2025 00:00:00	Active Defect




# COASTAL ASSET CONDITION SURVEY REPORT



D36	Other	Replace poorly graded rock armour with well graded rock armour.	16/03/2025 00:00:00	Active Defect
D37	Other	Replace backfill with properly graded and interlocked units and monitor erosion rate.	16/03/2025 00:00:00	Active Defect
D38	Concrete Repairs	Monitor continued erosion of wall face as it will affect the stability of the rock units placed atop it.	16/03/2025 00:00:00	Active Defect
D40	Concrete Repairs	The wall does not form a critical component of the defence at this location however is still recommended to repair to prevent further cracking.	16/03/2025 00:00:00	Active Defect
D46	Concrete Repairs	Fill void.	16/03/2025 00:00:00	Active Defect
D61	Other	Improve tie-in between wall types	16/03/2025 00:00:00	Newly Recorded Defect

## Appendix 1 – Photographs

Asset Structure Photos	
Photo number: 1	No photo available
Photo number: 3	No photo available
Photo number: 4	No photo available
Photo number: 2	No photo available
Photo number: 5  Date Taken: 16/03/2022 10:34	

## Section Photos

**Section A**  
**Photo number: 6**



**Section A**  
**Photo number: 8**

**Date Taken:**  
29/10/2019 13:48



**Section A**  
**Photo number: 10**

**Date Taken:**  
16/09/2020 11:33



**Section A**  
**Photo number: 12**

**Date Taken:**  
27/04/2021 15:01





**Section A**  
**Photo number: 13**

**Date Taken:**  
27/04/2021 15:23



**Section A**  
**Photo number: 16**

**Date Taken:**  
16/03/2022 12:14



**Section A**  
**Photo number: 17**

**Date Taken:**  
16/03/2022 12:25

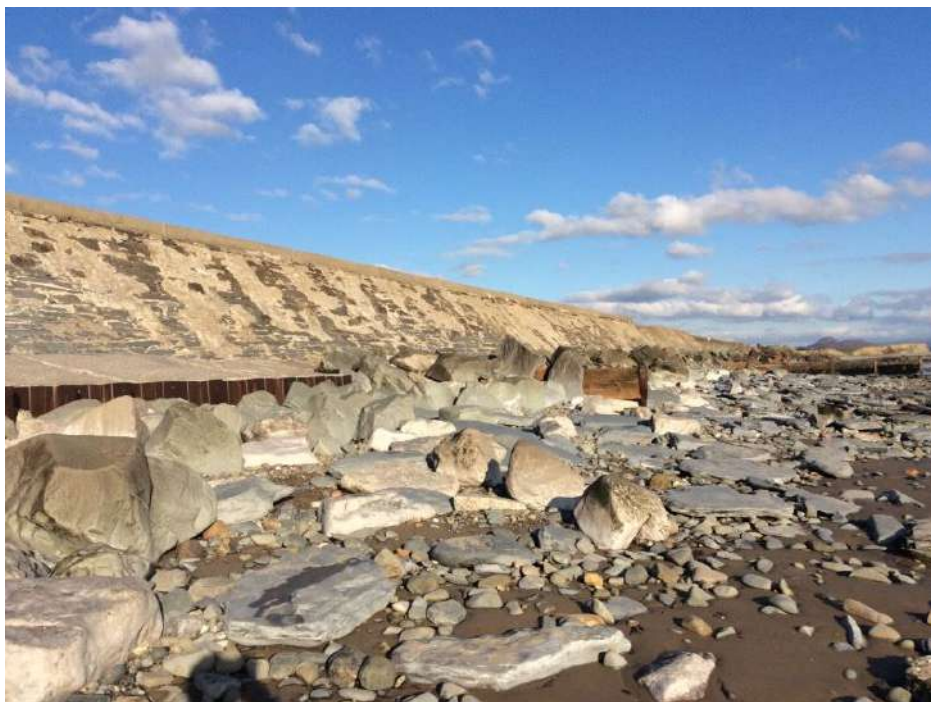


**Section B**  
**Photo number: 7**



**Section B**  
**Photo number: 9**

**Date Taken:**  
29/10/2019 14:30



**Section B**  
**Photo number: 11**

**Date Taken:**  
16/09/2020 12:33





**Section B**  
**Photo number: 14**

**Date Taken:**  
27/04/2021 16:20



**Section B**  
**Photo number: 15**

**Date Taken:**  
16/03/2022 10:36





## Element Survey Photos

**Section A  
Embankment  
Armour  
Photo number: 18**

**Date Taken:**  
29/10/2019 13:48



**Section A  
Embankment  
Armour  
Photo number: 23**

**Date Taken:**  
27/04/2021 15:25



**Section B**  
**Parapet/Capping**  
**Photo number: 21**

**Date Taken:**  
29/10/2019 14:46



**Section B**  
**Wall Apron**  
**Photo number: 22**

**Date Taken:**  
29/10/2019 15:10





**Section B**  
**Wall section**  
**Photo number: 20**

**Date Taken:**  
29/10/2019 14:43



**Section B**  
**Wall Toe**  
**Photo number: 19**

**Date Taken:**  
29/10/2019 14:17



## Defect Photos

### Section A Embankment Armour

**Defect Ref: D1**

#### Description:

Expelled rock from profile. No change between 2021-2022 examinations.

**Photo number: 43**

#### Date Taken:

27/04/2021 15:36



### Section A Embankment Armour

**Defect Ref: D1**

#### Description:

Expelled rock from profile. No change between 2021-2022 examinations.

**Photo number: 143**

#### Date Taken:

16/03/2022 13:00





**Section A  
Embankment  
Armour**

**Defect Ref: D2**

**Description:**

Uncovered and ripped geotextile. Shingle coverage has predominantly been removed, leaving only sand covering the geotextile. No change between 2021-2022 examinations.

**Photo number: 44**

**Date Taken:**

27/04/2021 15:37



**Section A  
Embankment  
Armour**

**Defect Ref: D2**

**Description:**

Uncovered and ripped geotextile. Shingle coverage has predominantly been removed, leaving only sand covering the geotextile. No change between 2021-2022 examinations.

**Photo number: 145**

**Date Taken:**

16/03/2022 13:05



**Section A**  
**Embankment**  
**Armour**  
**Defect Ref: D3**  
**Description:**  
Exposed geotextile  
and loss of  
armourstone. No  
change between  
2021-2022  
examinations.  
**Photo number: 58**

**Date Taken:**  
27/04/2021 16:14



**Section A**  
**Embankment**  
**Armour**  
**Defect Ref: D3**  
**Description:**  
Exposed geotextile  
and loss of  
armourstone. No  
change between  
2021-2022  
examinations.  
**Photo number: 140**

**Date Taken:**  
16/03/2022 12:55





## Section B

### Wall section

Defect Ref: D4

#### Description:

Exposed rebar. No change between the 2021-2022 examinations.

Photo number: 57

#### Date Taken:

27/04/2021 16:13



## Section B

### Wall section

Defect Ref: D4

#### Description:

Exposed rebar. No change between the 2021-2022 examinations.

Photo number: 147

#### Date Taken:

16/03/2022 13:13



## Section B

### Wall section

#### Defect Ref: D5

**Description:** Major cracking and spalling in the wall section. To be moved to Section A due to updated location. The defect has slightly worsened in 2022 examinations.

**Photo number: 56**

**Date Taken:**

27/04/2021 16:10



## Section B

### Wall section

#### Defect Ref: D5

**Description:** Major cracking and spalling in the wall section. To be moved to Section A due to updated location. The defect has slightly worsened in 2022 examinations.

**Photo number: 138**

**Date Taken:**

16/03/2022 12:51





**Section A  
Embankment  
Armour**

**Defect Ref: D7**

**Description:**

Dissolved armour stone, loss of interlock between units. No change to the dissolved rock face during the 2022 examination. There is concern regarding the lack of interlock and the resultant potential for collapse.

**Photo number: 52**

**Date Taken:**

27/04/2021 15:55



**Section A  
Embankment  
Armour**

**Defect Ref: D7**

**Description:**

Dissolved armour stone, loss of interlock between units. No change to the dissolved rock face during the 2022 examination. There is concern regarding the lack of interlock and the resultant potential for collapse.

**Photo number: 131**

**Date Taken:**

16/03/2022 12:33



## Section B

### Parapet/Capping

#### Defect Ref: D8

**Description:** Poor overall condition of the outfall pipe. During the 2022 examinations, heavy water flows through dilapidated outfall, corrosion, and leaky pipes.

**Photo number: 54**

**Date Taken:**

27/04/2021 16:01



## Section B

### Parapet/Capping

#### Defect Ref: D8

**Description:** Poor overall condition of the outfall pipe. During the 2022 examinations, heavy water flows through dilapidated outfall, corrosion, and leaky pipes.

**Photo number: 124**

**Date Taken:**

16/03/2022 12:20





## Section B

### Wall section

#### Defect Ref: D9

**Description:** Poor condition of wall section, longitudinal cracks and delaminating in the wall section and capping. Although the defect has previously been repaired, it is evident voids have been filled without breaking out the section and an adequate bond between new and existing material has not been ensured. Some cracks protrude through the thickness of the wall. There was no change between 2021-2022 examinations.

**Photo number: 24**



## Section B

### Wall section

#### Defect Ref: D9

**Description:** Poor condition of wall section, longitudinal cracks and delaminating in the wall section and capping. Although the defect has previously been repaired, it is evident voids have been filled without breaking out the section and an adequate bond between new and existing material has not been ensured. Some cracks protrude through the thickness of the wall. There was no change between 2021-2022 examinations.

**Photo number: 25**

#### Date Taken:

29/10/2019 14:14



## Section B

### Wall section

#### Defect Ref: D9

**Description:** Poor condition of wall section, longitudinal cracks and delaminating in the wall section and capping. Although the defect has previously been repaired, it is evident voids have been filled without breaking out the section and an adequate bond between new and existing material has not been ensured. Some cracks protrude through the thickness of the wall. There was no change between 2021-2022 examinations.

**Photo number: 31**

**Date Taken:**

16/09/2020 12:34



## Section B

### Wall section

#### Defect Ref: D9

**Description:** Poor condition of wall section, longitudinal cracks and delaminating in the wall section and capping. Although the defect has previously been repaired, it is evident voids have been filled without breaking out the section and an adequate bond between new and existing material has not been ensured. Some cracks protrude through the thickness of the wall. There was no change between 2021-2022 examinations.

**Photo number: 32**

**Date Taken:**

16/09/2020 12:34





## Section B

### Wall section

#### Defect Ref: D9

**Description:** Poor condition of wall section, longitudinal cracks and delaminating in the wall section and capping. Although the defect has previously been repaired, it is evident voids have been filled without breaking out the section and an adequate bond between new and existing material has not been ensured. Some cracks protrude through the thickness of the wall. There was no change between 2021-2022 examinations.

**Photo number: 61**

#### Date Taken:

27/04/2021 16:26



## Section B

### Wall section

#### Defect Ref: D9

**Description:** Poor condition of wall section, longitudinal cracks and delaminating in the wall section and capping. Although the defect has previously been repaired, it is evident voids have been filled without breaking out the section and an adequate bond between new and existing material has not been ensured. Some cracks protrude through the thickness of the wall. There was no change between 2021-2022 examinations.

**Photo number: 62**

#### Date Taken:

27/04/2021 16:26



## Section B

### Wall section

Defect Ref: D10

#### Description:

Exposed aggregate and scour at the base of the wall section.

This defect has been previously repaired with rock scour protection at the toe of the wall, however, this may not protect the concrete matrix from abrasion. There was no change between the 2021-2022 examinations.

Photo number: 33

#### Date Taken:

16/09/2020 12:36



## Section B

### Wall section

Defect Ref: D10

#### Description:

Exposed aggregate and scour at the base of the wall section.

This defect has been previously repaired with rock scour protection at the toe of the wall, however, this may not protect the concrete matrix from abrasion. There was no change between the 2021-2022 examinations.

Photo number: 60

#### Date Taken:

27/04/2021 16:24





## Section B

### Wall Toe

**Defect Ref: D11**

#### Description:

Concrete spalling, undermining at the toe, and loss of material. The defect worsened slightly, and the undermining has been covered up by an increase in beach level between the 2021 and 2022 examinations

**Photo number: 63**

**Date Taken:**

27/04/2021 16:27



## Section B

### Wall Toe

**Defect Ref: D11**

#### Description:

Concrete spalling, undermining at the toe, and loss of material. The defect worsened slightly, and the undermining has been covered up by an increase in beach level between the 2021 and 2022 examinations

**Photo number: 123**

**Date Taken:**

16/03/2022 12:11



## Section B

### Wall section

**Defect Ref: D12**

**Description:** Open joints, poor connections, and loss of mortar. This defect has been previously repaired but the poor quality of repairs were noted in the 2021 examination. No change between 2021-2022 examinations.

**Photo number: 34**

**Date Taken:**

16/09/2020 12:41



## Section B

### Wall section

**Defect Ref: D12**

**Description:** Open joints, poor connections, and loss of mortar. This defect has been previously repaired but the poor quality of repairs were noted in the 2021 examination. No change between 2021-2022 examinations.

**Photo number: 64**

**Date Taken:**

27/04/2021 16:29





## Section B

### Wall section

**Defect Ref: D13**

**Description:** Poor concrete patch repair and delamination from the wall section with exposed rebar. Heavy spalling to patch repair has been discovered from 2022, with possible additional rock placement.

**Photo number: 65**

**Date Taken:**

27/04/2021 16:31



## Section B

### Wall section

**Defect Ref: D13**

**Description:** Poor concrete patch repair and delamination from the wall section with exposed rebar. Heavy spalling to patch repair has been discovered from 2022, with possible additional rock placement.

**Photo number: 98**

**Date Taken:**

16/03/2022 11:06



## Section B

### Wall section

**Defect Ref: D13**

**Description:** Poor concrete patch repair and delamination from the wall section with exposed rebar. Heavy spalling to patch repair has been discovered from 2022, with possible additional rock placement.

**Photo number: 118**

**Date Taken:**

16/03/2022 11:58



## Section B

### Parapet/Capping

**Defect Ref: D14**

**Description:** Missing capping beam. There was no change between the 2021-2022 examinations.

**Photo number: 66**

**Date Taken:**

27/04/2021 16:32





## Section B

### Parapet/Capping

**Defect Ref: D14**

**Description:** Missing capping beam. There was no change between the 2021-2022 examinations.

**Photo number: 119**

**Date Taken:**

16/03/2022 12:00



## Section B

### Parapet/Capping

**Defect Ref: D15**

**Description:** Poor connection, open joints, loss of mortar. This defect has been previously repaired in 2020. There was no change between 2021-2022 examinations.

**Photo number: 35**

**Date Taken:**

16/09/2020 13:00



## Section B

### Parapet/Capping

#### Defect Ref: D15

**Description:** Poor connection, open joints, loss of mortar. This defect has been previously repaired in 2020. There was no change between 2021-2022 examinations.

**Photo number: 73**

**Date Taken:**

27/04/2021 16:53



## Section B

### Wall section

#### Defect Ref: D16

**Description:** Open joints, loss of mortar. This defect has been previously repaired in 2020. During the 2022 examination, heavily spalled concrete repairs, delamination and open joints were observed.

**Photo number: 74**

**Date Taken:**

27/04/2021 16:55





## Section B

### Wall section

#### Defect Ref: D16

**Description:** Open joints, loss of mortar. This defect has been previously repaired in 2020. During the 2022 examination, heavily spalled concrete repairs, delamination and open joints were observed.

**Photo number: 117**

**Date Taken:**

16/03/2022 11:56



## Section B

### Wall Toe

#### Defect Ref: D17

**Description:** Corrosion at the top of the steel sheet piles. This is a general defect along the length of the element. Between 2021 and 2022 the defect worsened.

**Photo number: 79**

**Date Taken:**

27/04/2021 17:02



## Section B

### Wall Toe

**Defect Ref: D17**

#### Description:

Corrosion at the top of the steel sheet piles. This is a general defect along the length of the element. Between 2021 and 2022 the defect worsened.

**Photo number: 94**

**Date Taken:**

16/03/2022 11:02



## Section B

### Parapet/Capping

**Defect Ref: D18**

**Description:** Bulging occurs in the capping. No change between the 2021-2022 examinations.

**Photo number: 71**

**Date Taken:**

27/04/2021 16:51





## Section B

### Parapet/Capping

**Defect Ref: D18**

**Description:** Bulging occurs in the capping. No change between the 2021-2022 examinations.

**Photo number: 114**

**Date Taken:**

16/03/2022 11:47



## Section B

### Wall Toe

**Defect Ref: D19**

**Description:**

Expelled sheet piling. This defect has been previously repaired. Possible separation has occurred between the 2021 and 2022 examinations.

**Photo number: 72**

**Date Taken:**

27/04/2021 16:52



## Section B

### Wall Toe

**Defect Ref: D19**

#### Description:

Expelled sheet piling.  
This defect has been previously repaired.  
Possible separation has occurred between the 2021 and 2022 examinations.

**Photo number: 113**

#### Date Taken:

16/03/2022 11:45



## Section B

### Wall Apron

**Defect Ref: D20**

#### Description:

Undermining under the apron, hollow section. This defect has been previously repaired in 2020.  
There was no change between the 2021-2022 examinations.

**Photo number: 36**

#### Date Taken:

16/09/2020 13:12





## Section B

### Wall Apron

**Defect Ref: D20**

#### Description:

Undermining under the apron, hollow section. This defect has been previously repaired in 2020. There was no change between the 2021-2022 examinations.

**Photo number: 70**

#### Date Taken:

27/04/2021 16:49



## Section B

### Wall Toe

**Defect Ref: D21**

#### Description:

Water seepage through eyelets in the sheet piling indicates a large pressure head behind the wall. The source of the build-up of water could be from a large water body north of the wall which may be draining through the structure. This mechanism could explain one of the factors behind the pile failure in D19. Reduced water seepage was observed during the 2022 examination. It is noted this could be due to seasonal variations in rainfall.

**Photo number: 81**

#### Date Taken:

27/04/2021 17:05



## Section B

### Wall Toe

#### Defect Ref: D21

**Description:** Water seepage through eyelets in the sheet piling indicates a large pressure head behind the wall. The source of the build-up of water could be from a large water body north of the wall which may be draining through the structure. This mechanism could explain one of the factors behind the pile failure in D19. Reduced water seepage was observed during the 2022 examination. It is noted this could be due to seasonal variations in rainfall.

**Photo number: 107**

**Date Taken:**

16/03/2022 11:24



## Section B

### Wall section

#### Defect Ref: D22

**Description:** Missing stone from masonry wall. Void behind the wall. This defect has been previously repaired but additional missing units were noted during the 2021 examination. There is voiding behind patch repair. There was no change between the 2021 and 2022 examinations.

**Photo number: 67**

**Date Taken:**

27/04/2021 16:41





## Section B

### Wall section

**Defect Ref: D22**

**Description:** Missing stone from masonry wall. Void behind the wall. This defect has been previously repaired but additional missing units were noted during the 2021 examination. There is voiding behind patch repair. There was no change between the 2021 and 2022 examinations.

**Photo number: 89**

**Date Taken:**

16/03/2022 10:49



## Section B

### Wall section

**Defect Ref: D23**

**Description:**

Vegetation growth and loss of mortar. Little to no vegetation growth was observed during the 2022 examination. It is noted that this could be due to changes in seasonal growth.

**Photo number: 84**

**Date Taken:**

27/04/2021 17:11



## Section B

### Wall section

**Defect Ref: D23**

#### Description:

Vegetation growth and loss of mortar. Little to no vegetation growth was observed during the 2022 examination. It is noted that this could be due to changes in seasonal growth.

**Photo number: 87**

#### Date Taken:

16/03/2022 10:41



## Section B

### Wall Toe

**Defect Ref: D24**

#### Description:

Dilapidated groynes (safety hazard). There was no change between the 2021-2022 examinations.

**Photo number: 78**

#### Date Taken:

27/04/2021 17:01





## Section B

### Wall Toe

**Defect Ref: D24**

#### Description:

Dilapidated groynes (safety hazard).  
There was no change between the 2021-2022 examinations.

**Photo number: 85**

#### Date Taken:

16/03/2022 10:38



## Section B

### Wall Toe

**Defect Ref: D24**

#### Description:

Dilapidated groynes (safety hazard).  
There was no change between the 2021-2022 examinations.

**Photo number: 86**

#### Date Taken:

16/03/2022 10:38



**Section A  
Embankment  
Armour**

**Defect Ref: D25**

**Description:**

Adjacent cliff eroding and risk of outflanking. Risk of the fencing collapsing. An approx. 50m extension to the rock armour revetment was installed between the 2020 and 2021 examinations. Slight erosion to the remaining cliff was noted during the 2022 examination.

**Photo number: 40**

**Date Taken:**

27/04/2021 15:29



**Section A  
Embankment  
Armour**

**Defect Ref: D25**

**Description:**

Adjacent cliff eroding and risk of outflanking. Risk of the fencing collapsing. An approx. 50m extension to the rock armour revetment was installed between the 2020 and 2021 examinations. Slight erosion to the remaining cliff was noted during the 2022 examination.

**Photo number: 146**

**Date Taken:**

16/03/2022 13:08





**Section A**  
**Embankment**  
**Armour**  
**Defect Ref: D26**  
**Description:** Lower rock crest with the exposed cliff. There was no change between the 2021-2022 examinations.  
**Photo number: 42**

**Date Taken:**  
27/04/2021 15:33



**Section A**  
**Embankment**  
**Armour**  
**Defect Ref: D26**  
**Description:** Lower rock crest with the exposed cliff. There was no change between the 2021-2022 examinations.  
**Photo number: 144**

**Date Taken:**  
16/03/2022 13:04





**Section A**  
**Embankment**  
**Armour**  
**Defect Ref: D27**  
**Description:** Overly steep rock profile with a poor interlock between the rock units. There was no change between 2021-2022 examinations.  
**Photo number: 27**

**Date Taken:**  
16/09/2020 11:58



**Section A**  
**Embankment**  
**Armour**  
**Defect Ref: D27**  
**Description:** Overly steep rock profile with a poor interlock between the rock units. There was no change between 2021-2022 examinations.  
**Photo number: 53**

**Date Taken:**  
27/04/2021 15:56



**Section A  
Embankment  
Armour**

**Defect Ref: D28**

**Description:** Single rocks are placed on top of the crest/wall with no interlocking. During extreme storm conditions, rocks may collapse resulting in a high safety hazard. There was no change between the 2021-2022 examinations.

**Photo number: 51**

**Date Taken:**  
27/04/2021 15:53



**Section A  
Embankment  
Armour**

**Defect Ref: D28**

**Description:** Single rocks are placed on top of the crest/wall with no interlocking. During extreme storm conditions, rocks may collapse resulting in a high safety hazard. There was no change between the 2021-2022 examinations.

**Photo number: 132**

**Date Taken:**  
16/03/2022 12:34





## Section B

### Parapet/Capping

Defect Ref: D29

**Description:** Outfall broken, high water flow through toe of defence which is causing loss of fine material and scour. During the 2022 examination, heavy water flows through the dilapidated outfall were observed with additional corrosion and leaking pipes.

**Photo number: 55**

**Date Taken:**

27/04/2021 16:03



## Section B

### Parapet/Capping

Defect Ref: D29

**Description:** Outfall broken, high water flow through toe of defence which is causing loss of fine material and scour. During the 2022 examination, heavy water flows through the dilapidated outfall were observed with additional corrosion and leaking pipes.

**Photo number: 125**

**Date Taken:**

16/03/2022 12:21



## Section B

### Parapet/Capping

Defect Ref: D30

#### Description:

Extensive cracking in the capping beam. There was no change between the 2021 and 2022 examinations.

Photo number: 59

#### Date Taken:

27/04/2021 16:20



## Section B

### Parapet/Capping

Defect Ref: D30

#### Description:

Extensive cracking in the capping beam. There was no change between the 2021 and 2022 examinations.

Photo number: 122

#### Date Taken:

16/03/2022 12:05





## Section B

### Wall Apron

**Defect Ref: D31**

#### Description:

Corroded steel sheet piles, hole through the pile without concrete backfill. No change between 2021 and 2022 examinations.

**Photo number: 82**

**Date Taken:**

27/04/2021 17:06



## Section B

### Wall Apron

**Defect Ref: D31**

#### Description:

Corroded steel sheet piles, hole through the pile without concrete backfill. No change between 2021 and 2022 examinations.

**Photo number: 115**

**Date Taken:**

16/03/2022 11:50





## Section B

### Wall Apron

**Defect Ref: D32**

#### Description:

Movement in pile with separation from concrete (about 0.5 - 0.10 m of gap) for a wall extent of approx. 15 m. Significant movement in the piling was observed in 2022 (approx. 0.75m of separation).

**Photo number: 80**

**Date Taken:**

27/04/2021 17:03



## Section B

### Wall Apron

**Defect Ref: D32**

#### Description:

Movement in pile with separation from concrete (about 0.5 - 0.10 m of gap) for a wall extent of approx. 15 m. Significant movement in the piling was observed in 2022 (approx. 0.75m of separation).

**Photo number: 105**

**Date Taken:**

16/03/2022 11:18





## Section B

### Wall Apron

**Defect Ref: D33**

#### Description:

Exposed rebar. From the 2022 examinations, newly exposed rebar is present along the extent of the apron.

**Photo number: 83**

#### Date Taken:

27/04/2021 17:07



## Section B

### Wall Apron

**Defect Ref: D33**

#### Description:

Exposed rebar. From the 2022 examinations, newly exposed rebar is present along the extent of the apron.

**Photo number: 91**

#### Date Taken:

16/03/2022 10:54





## Section B

### Wall Apron

**Defect Ref: D33**

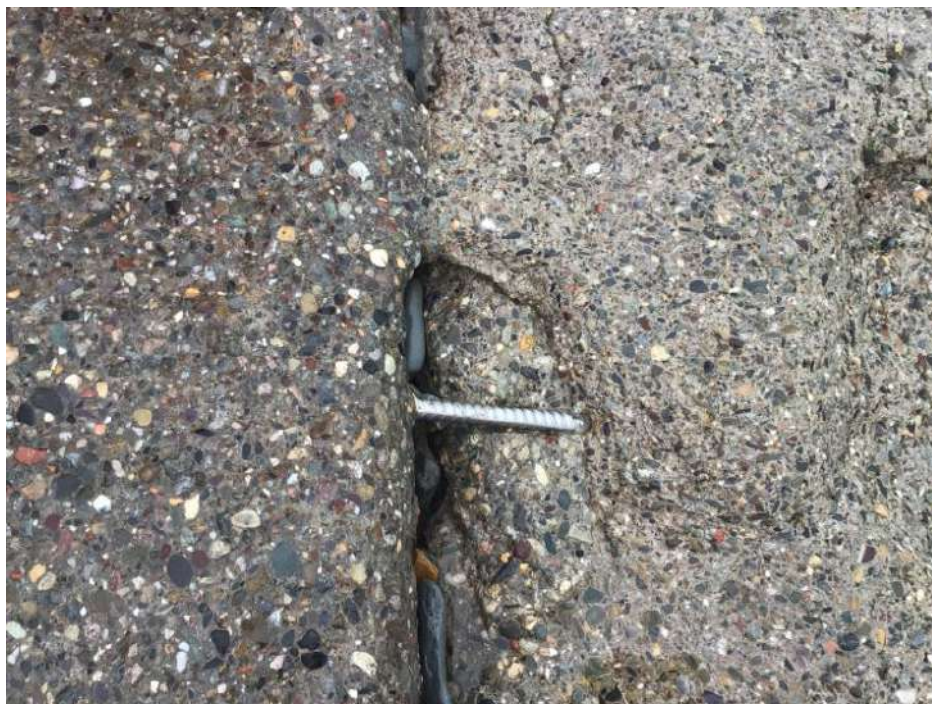
#### Description:

Exposed rebar. From the 2022 examinations, newly exposed rebar is present along the extent of the apron.

**Photo number: 97**

#### Date Taken:

16/03/2022 11:05



## Section B

### Wall section

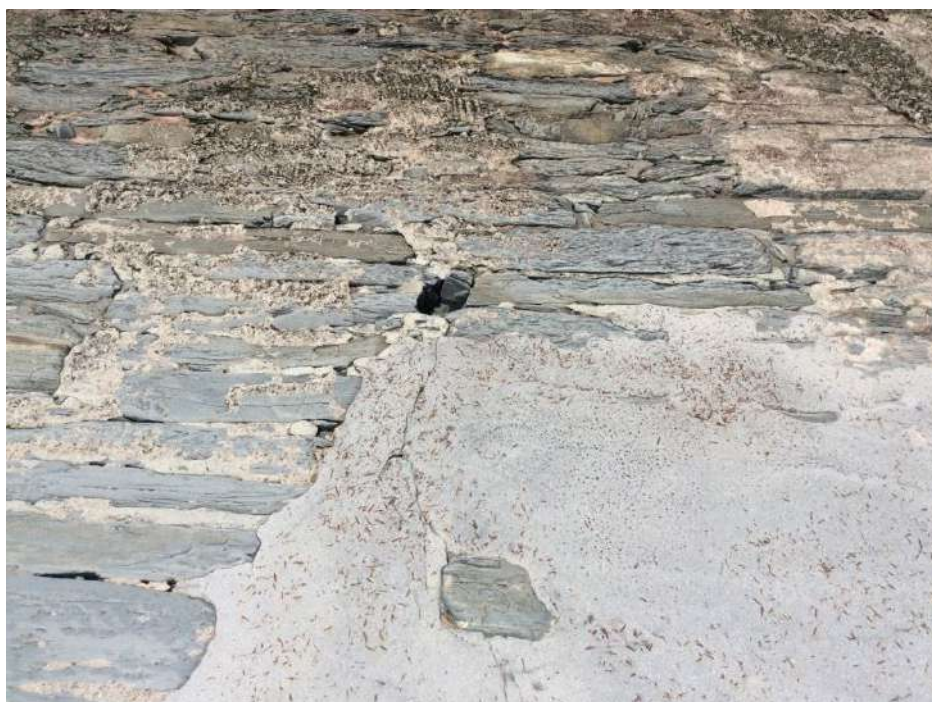
**Defect Ref: D34**

**Description:** Missing blockwork. See photo in D22. There are multiple missing units in the wall section. No change between the 2021 and 2022 examinations.

**Photo number: 37**

#### Date Taken:

16/09/2020 13:17





## Section B

### Wall section

#### Defect Ref: D34

**Description:** Missing blockwork. See photo in D22. There are multiple missing units in the wall section. No change between the 2021 and 2022 examinations.

**Photo number: 90**

**Date Taken:**

16/03/2022 10:52



## Section A

### Embankment

#### Armour

#### Defect Ref: D35

#### Description:

Remaining armour is steep and minimal. No change between 2021 and 2022 examinations.

**Photo number: 26**

**Date Taken:**

16/09/2020 11:34



**Section A**  
**Embankment**  
**Armour**  
**Defect Ref: D35**  
**Description:**  
Remaining armour is  
steep and minimal.  
No change between  
2021 and 2022  
examinations.  
**Photo number: 41**

**Date Taken:**  
27/04/2021 15:31



**Section A**  
**Embankment**  
**Armour**  
**Defect Ref: D36**  
**Description:** Crest is  
formed of poorly  
graded rock armour.  
There was no change  
between the 2021  
and 2022  
examinations.  
**Photo number: 45**

**Date Taken:**  
27/04/2021 15:40





**Section A  
Embankment  
Armour**

**Defect Ref: D36**

**Description:** Crest is formed of poorly graded rock armour. There was no change between the 2021 and 2022 examinations.

**Photo number: 141**

**Date Taken:**

16/03/2022 12:56



**Section A  
Embankment  
Armour**

**Defect Ref: D37**

**Description:** Loss of backfill behind rock armour and erosion behind the crest. There was no change between the 2021 and 2022 inspections.

**Photo number: 47**

**Date Taken:**

27/04/2021 15:44



**Section A**  
**Embankment**  
**Armour**

**Defect Ref: D37**

**Description:** Loss of backfill behind rock armour and erosion behind the crest.

There was no change between the 2021 and 2022 inspections.

**Photo number: 139**

**Date Taken:**

16/03/2022 12:54



**Section B**  
**Wall section**

**Defect Ref: D38**

**Description:**

Exposed rebar. To be moved to Section A due to updated location. There has been no change between the 2021 and 2022 examinations

**Photo number: 48**

**Date Taken:**

27/04/2021 15:48





## Section B

### Wall section

**Defect Ref: D38**

#### Description:

Exposed rebar. To be moved to Section A due to updated location. There has been no change between the 2021 and 2022 examinations

**Photo number: 137**

#### Date Taken:

16/03/2022 12:48



## Section A

### Embankment

#### Armour

**Defect Ref: D39**

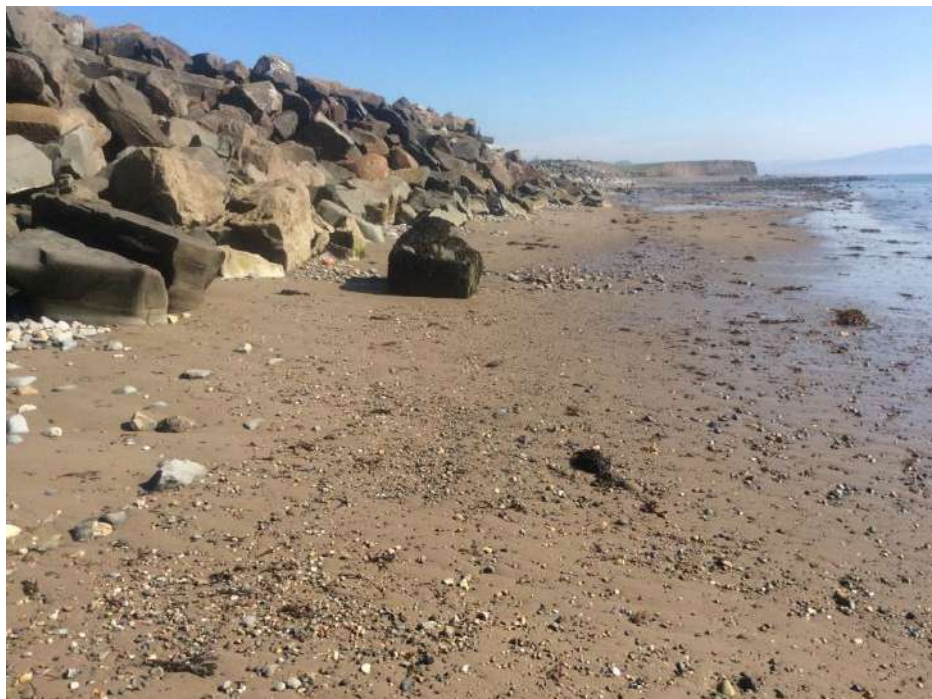
#### Description:

Expelled rock armour. There was no change between the 2021 and 2022 examinations.

**Photo number: 28**

#### Date Taken:

16/09/2020 11:59



**Section A**  
**Embankment**  
**Armour**

**Defect Ref: D39**

**Description:**

Expelled rock armour.  
There was no change  
between the 2021  
and 2022  
examinations.

**Photo number: 136**

**Date Taken:**

16/03/2022 12:46



**Section B**  
**Wall section**

**Defect Ref: D40**

**Description:**

Cracking and spalling  
in wall section. To be  
moved to Section A  
due to updated  
location. There was  
no change between  
the 2021 and 2022  
examinations

**Photo number: 49**

**Date Taken:**

27/04/2021 15:50





## Section B

### Wall section

**Defect Ref: D40**

#### Description:

Cracking and spalling in wall section. To be moved to Section A due to updated location. There was no change between the 2021 and 2022 examinations

**Photo number: 135**

#### Date Taken:

16/03/2022 12:44



## Section B

### Wall Toe

**Defect Ref: D41**

#### Description:

Remove exposed rebar (safety hazard). To be moved to Section A due to updated location. There was no change between the 2021 and 2022 inspections

**Photo number: 50**

#### Date Taken:

27/04/2021 15:51



## Section B

### Wall Toe

**Defect Ref: D41**

#### Description:

Remove exposed rebar (safety hazard).  
To be moved to  
Section A due to  
updated location.

There was no change  
between the 2021  
and 2022 inspections

**Photo number: 134**

#### Date Taken:

16/03/2022 12:41



## Section B

### Parapet/Capping

**Defect Ref: D42**

#### Description:

Very  
steep rock armour.  
During the 2022  
examination, areas of  
very steep rock  
armour were  
observed with  
potentially unstable  
units and other split  
units

**Photo number: 29**

#### Date Taken:

16/09/2020 12:11





**Section B**  
**Parapet/Capping**  
**Defect Ref: D42**  
**Description:** Very steep rock armour. During the 2022 examination, areas of very steep rock armour were observed with potentially unstable units and other split units  
**Photo number: 128**

**Date Taken:**  
16/03/2022 12:27



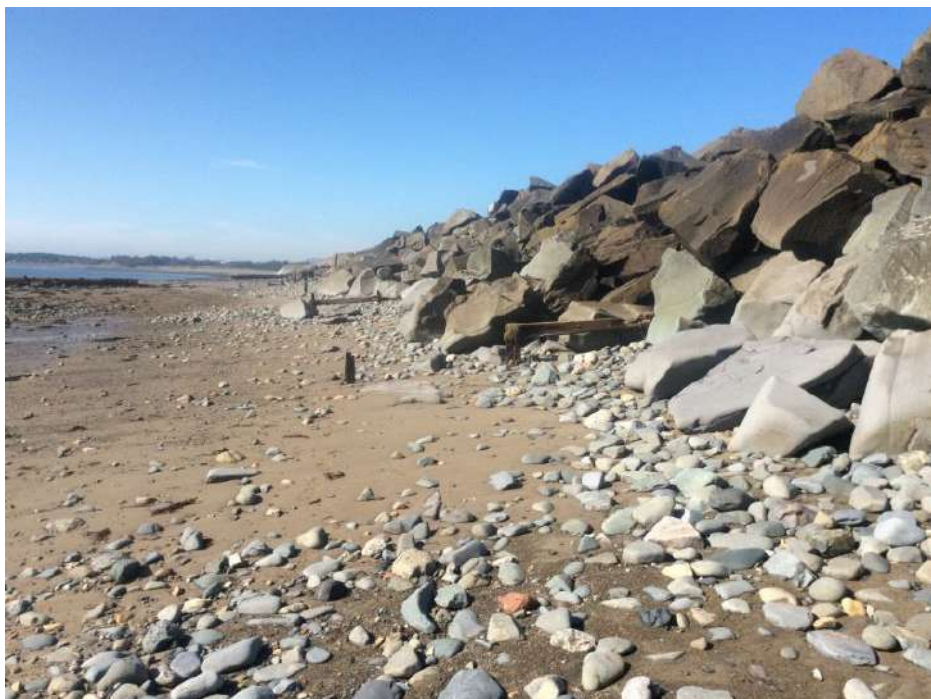
**Section B**  
**Parapet/Capping**  
**Defect Ref: D42**  
**Description:** Very steep rock armour. During the 2022 examination, areas of very steep rock armour were observed with potentially unstable units and other split units  
**Photo number: 130**

**Date Taken:**  
16/03/2022 12:29



**Section B**  
**Parapet/Capping**  
**Defect Ref: D43**  
**Description:**  
Broken/failed  
groynes. There was  
no change between  
the 2021 and 2022  
examinations.  
**Photo number: 30**

**Date Taken:**  
16/09/2020 12:13



**Section B**  
**Parapet/Capping**  
**Defect Ref: D43**  
**Description:**  
Broken/failed  
groynes. There was  
no change between  
the 2021 and 2022  
examinations.  
**Photo number: 127**

**Date Taken:**  
16/03/2022 12:26





## Section B

### Parapet/Capping

**Defect Ref: D44**

**Description:** Mortar washout in crest at concrete repair. There was no change between the 2021 and 2022 examinations.

**Photo number: 75**

**Date Taken:**

27/04/2021 16:56



## Section B

### Parapet/Capping

**Defect Ref: D44**

**Description:** Mortar washout in crest at concrete repair. There was no change between the 2021 and 2022 examinations.

**Photo number: 112**

**Date Taken:**

16/03/2022 11:39



**Section B**  
**Parapet/Capping**  
**Defect Ref: D45**  
**Description:** Scour damage to poor repair on the face of the wall. During the 2022 examination, deterioration to the lower section of the patch repair was noted with visible loss of material.  
**Photo number: 76**

**Date Taken:**  
27/04/2021 16:59



**Section B**  
**Parapet/Capping**  
**Defect Ref: D45**  
**Description:** Scour damage to poor repair on the face of the wall. During the 2022 examination, deterioration to the lower section of the patch repair was noted with visible loss of material.  
**Photo number: 148**

**Date Taken:**  
12/08/2022 15:16





## Section B

### Wall Toe

**Defect Ref: D46**

#### Description:

Damaged concrete with a void in the concrete apron. To be moved to Wall Apron element due to updated location. Between the 2021 and 2022 examinations, the defect has worsened, now beginning to undercut the adjacent slab. Concern over potential for expulsion of concrete slab.

**Photo number: 77**

**Date Taken:**

27/04/2021 17:00



## Section B

### Wall Toe

**Defect Ref: D46**

#### Description:

Damaged concrete with a void in the concrete apron. To be moved to Wall Apron element due to updated location. Between the 2021 and 2022 examinations, the defect has worsened, now beginning to undercut the adjacent slab. Concern over potential for expulsion of concrete slab.

**Photo number: 108**

**Date Taken:**

16/03/2022 11:27





## Section B

### Wall section

#### Defect Ref: D47

**Description:** Missing blockwork in the wall. Between the 2021 and 2022 examinations, there is possible worsening of concrete patch repair adjacent to missing blockwork. Beach level was observed to be visibly lower.

**Photo number: 38**

**Date Taken:**

16/09/2020 13:19



## Section B

### Wall section

#### Defect Ref: D47

**Description:** Missing blockwork in the wall. Between the 2021 and 2022 examinations, there is possible worsening of concrete patch repair adjacent to missing blockwork. Beach level was observed to be visibly lower.

**Photo number: 88**

**Date Taken:**

16/03/2022 10:46





## Section B

### Wall Toe

**Defect Ref: D48**

#### Description:

Dilapidated groynes.  
This defect is noted  
as a duplicate of D24  
and is recommended  
for closure.

**Photo number: 39**

#### Date Taken:

16/09/2020 13:20



## Section A

### Embankment

#### Armour

**Defect Ref: D49**

**Description:** An  
unstable concrete  
fence post creating  
potential health and  
safety hazard should  
the post or fence fail.  
There has been no  
change between the  
2021 and 2022  
examinations.

**Photo number: 46**

#### Date Taken:

27/04/2021 15:41



**Section A**  
**Embankment**  
**Armour**  
**Defect Ref: D49**  
**Description:** An unstable concrete fence post creating potential health and safety hazard should the post or fence fail. There has been no change between the 2021 and 2022 examinations.  
**Photo number: 142**

**Date Taken:**  
16/03/2022 12:58



**Section B**  
**Wall Apron**  
**Defect Ref: D50**  
**Description:** Scour at the joints between apron units for approx. 40m. There was no change between the 2021 and 2022 examinations.  
**Photo number: 68**

**Date Taken:**  
27/04/2021 16:45





**Section B**  
**Wall Apron**  
**Defect Ref: D50**  
**Description:** Scour at the joints between apron units for approx. 40m. There was no change between the 2021 and 2022 examinations.  
**Photo number: 116**

**Date Taken:**  
16/03/2022 11:51



**Section B**  
**Wall Apron**  
**Defect Ref: D51**  
**Description:** Cracks in the concrete apron. During the 2022 examination, multiple large cracks and removed material creating voids were observed throughout the large concrete slabs.  
**Photo number: 69**

**Date Taken:**  
27/04/2021 16:46





## Section B

### Wall Apron

#### Defect Ref: D51

**Description:** Cracks in the concrete apron. During the 2022 examination, multiple large cracks and removed material creating voids were observed throughout the large concrete slabs.

**Photo number: 106**

**Date Taken:**

16/03/2022 11:20



## Section B

### Wall Apron

#### Defect Ref: D52

#### Description:

Scouring to the concrete apron, likely due to the lowered beach level.

**Photo number: 92**

**Date Taken:**

16/03/2022 10:57



**Section B**  
**Wall Apron**  
**Defect Ref: D53**  
**Description:** Water seepage through the base of concrete apron.  
**Photo number: 93**

**Date Taken:**  
16/03/2022 10:59



**Section B**  
**Parapet/Capping**  
**Defect Ref: D54**  
**Description:** Voiding between capping and the crest.  
**Photo number: 95**

**Date Taken:**  
16/03/2022 11:04





**Section B**  
**Parapet/Capping**  
**Defect Ref: D54**  
**Description:** Voiding  
between capping and  
the crest.  
**Photo number: 96**

**Date Taken:**  
16/03/2022 11:04



**Section B**  
**Parapet/Capping**  
**Defect Ref: D54**  
**Description:** Voiding  
between capping and  
the crest.  
**Photo number: 109**

**Date Taken:**  
16/03/2022 11:30





**Section B**  
**Parapet/Capping**  
**Defect Ref: D54**  
**Description:** Voiding  
between capping and  
the crest.  
**Photo number: 110**

**Date Taken:**  
16/03/2022 11:30



**Section B**  
**Wall Apron**  
**Defect Ref: D55**  
**Description:** Spalling  
to the concrete apron  
material.  
**Photo number: 99**

**Date Taken:**  
16/03/2022 11:08





**Section B**  
**Wall Apron**  
**Defect Ref: D56**  
**Description:**  
Concrete void with  
crack in left hand  
corner of slab.  
**Photo number: 100**

**Date Taken:**  
16/03/2022 11:10



**Section B**  
**Wall Apron**  
**Defect Ref: D57**  
**Description:** Missing  
patch repair material  
with multiple cracks  
present.  
**Photo number: 101**

**Date Taken:**  
16/03/2022 11:12





## Section B

### Wall Apron

**Defect Ref: D58**

#### Description:

Expelled apron material leaving a large void in concrete (approx. 2.5x5m). Concern over possibility for adjacent slab removal due to large cracks and the exposed undermining mechanism.

**Photo number: 102**

**Date Taken:**

16/03/2022 11:13



## Section B

### Wall Apron

**Defect Ref: D58**

#### Description:

Expelled apron material leaving a large void in concrete (approx. 2.5x5m). Concern over possibility for adjacent slab removal due to large cracks and the exposed undermining mechanism.

**Photo number: 103**

**Date Taken:**

16/03/2022 11:14





## Section B

### Wall Apron

**Defect Ref: D58**

#### Description:

Expelled apron material leaving a large void in concrete (approx. 2.5x5m). Concern over possibility for adjacent slab removal due to large cracks and the exposed undermining mechanism.

**Photo number: 104**

**Date Taken:**

16/03/2022 11:15



## Section B

### Parapet/Capping

**Defect Ref: D59**

**Description:** Spalling to concrete capping beam.

**Photo number: 111**

**Date Taken:**

16/03/2022 11:31



## Section B

### Wall Toe

**Defect Ref: D60**

#### Description:

Inconsistent crest height and missing armour units at base of wall.

**Photo number: 120**

#### Date Taken:

16/03/2022 12:03



## Section B

### Wall section

**Defect Ref: D61**

**Description:** Poor wall tie in between different wall types

**Photo number: 121**

#### Date Taken:

16/03/2022 12:04



## Section B

### Wall section

**Defect Ref: D62**

**Description:** Missing wall material resulting in a void.

**Photo number: 126**

**Date Taken:**

16/03/2022 12:23



## Section B

### Parapet/Capping

**Defect Ref: D63**

**Description:** Spalling to the concrete capping beam with reduced rock cover in areas.

**Photo number: 129**

**Date Taken:**

16/03/2022 12:28





**Section A**  
**Embankment**  
**Armour**

**Defect Ref: D64**

**Description:** Missing  
rock armour crest  
units, leaving  
exposed concrete  
capping beam and an  
inconsistent crest  
height.

**Photo number: 133**

**Date Taken:**

16/03/2022 12:38



## 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