

Assessment of coastal defence structures at Old Ranges, Shoeburyness

November 2015

Southend-on-Sea Borough Council

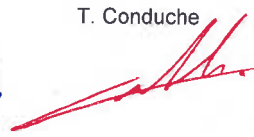
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Issue and revision record

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A	13/10/2015	M Rivers	T. Conduche S. Hampshire	Z. Hutchison	For comment
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Executive Summary

Mott MacDonald has carried out a visual assessment of the sea defence repairs carried out by County and Metropolitan (C & M) on behalf of Southend-on-Sea Borough Council (SBC). Works are required to be completed by C & M prior to SBC taking ownership and responsibility for the maintenance of the defences as outlined in a Section 106 agreement in 2004. The independent visual assessment undertaken by Mott MacDonald identified that most of the major works had been carried out. However not all of C & M's contractual obligations have been fulfilled. Minor defects were found in the coastal defences, both within the repairs already carried out, and in the form of unrepaired pre-existing damage. C & M acknowledges that there are still outstanding works, however this does not cover the full list of unfulfilled obligations.

Essential, contractually obligated outstanding repairs of high importance include:

- Repairing of sections of open stone asphalt;
- Repairing cracks with sealant;
- Replacing planks in the timber groynes.

Desirable, contractually obligated outstanding repairs of lower importance include:

- Removing metal fixings and making holes flush using repair mortar;
- Removing vegetation and resealing;

Furthermore the placing of new plastic cone groyne markers was set out as a requirement in Plan 11012606-01 C4. These have not yet been placed as discussions between C & M and Trinity House regarding the location of the hazard markers are ongoing. When an agreement is reached C & M will provide new posts for the markers and SBC will erect the top-cones.

With specific reference to the groynes, repairs did not always appear to correspond to the repair description listed in the groyne repair schedule provided. In some cases planks had deliberately been removed to encourage sand

movement; in a few, repairs appeared to have already been carried out; in others there was no obvious need of repair; while in some there was clear damage to the groynes which had not been repaired. However partially buried groynes as well as marine vegetation made the assessment of groyne repair completion difficult.

It is noted that long sections of hand railing on the Old Ranges frontage are extremely unstable. While this was not a contractual obligation of C & M it poses a potentially serious risk to public health and safety and as such Mott MacDonald recommends that SBC consider taking action to mitigate this. Other specific issues such as the potential for failure of a retaining wall and drainage outfalls that were in poor condition were also highlighted.

Recommended works, not contractually obligated but required on health and safety or structural integrity grounds include:

- repairs and replacements to hand railings
- review of retaining wall and identification of required repairs
- repairs to undermining of promenade

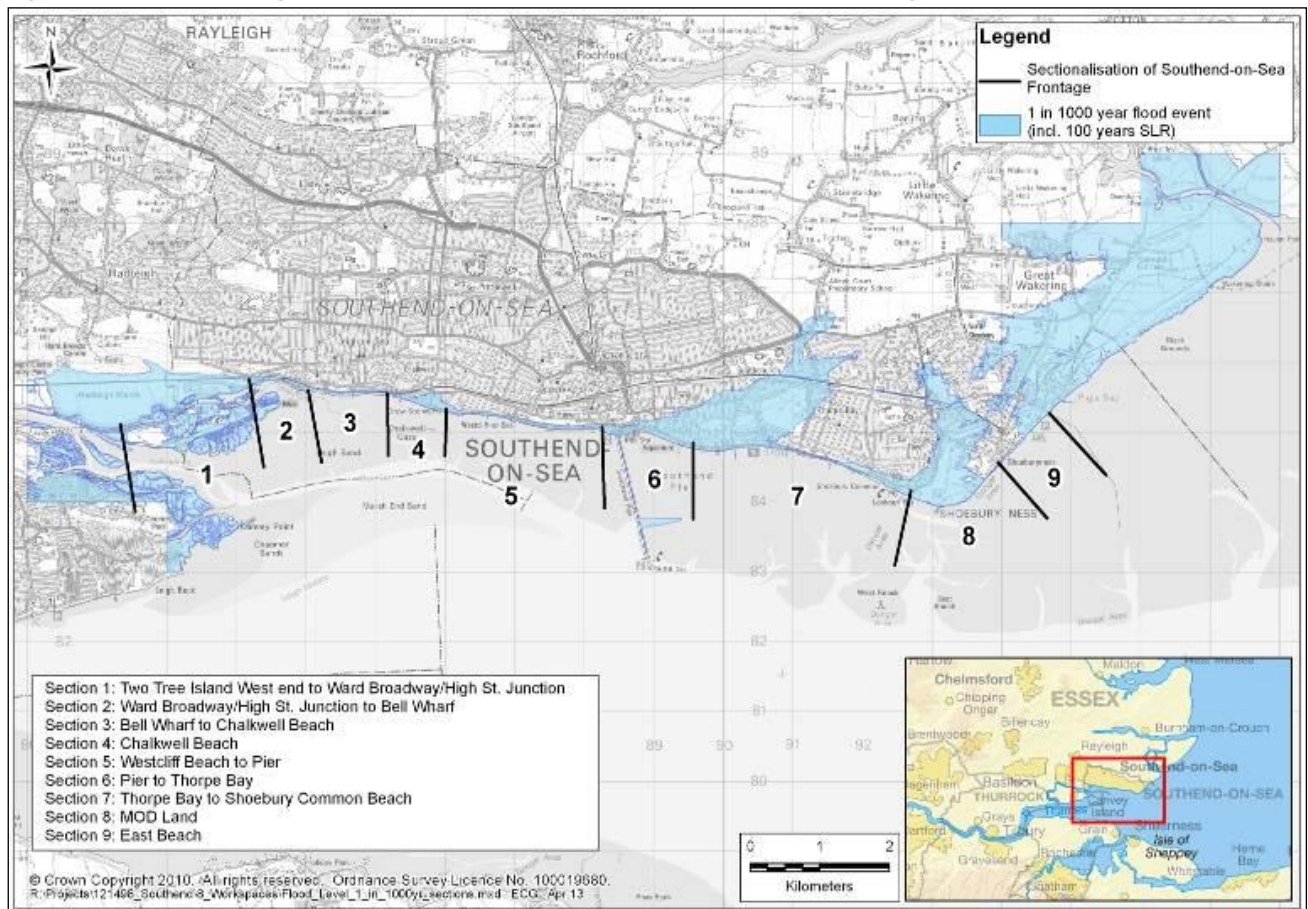
Mott MacDonald recommend that it would be beneficial for both parties if outstanding repairs to the sea defences are acted on quickly and efficiently, as delays in some repairs (particularly over the winter period) may lead to greater maintenance costs being required in the future.

1 Introduction

Southend-on-Sea Borough Council (SBC) have an agreement with the developer of the 'Old Ranges' site in Shoeburyness, County and Metropolitan (C & M) to adopt for maintenance the coastal defences around the southern and eastern boundaries of the site. The two parties entered into an S106 agreement in 2004. This agreement, and subsequent mutually agreed modifications in 2014, set out the required works to be carried out on the coastal defences along the frontage before the defences are to become the responsibility of SBC to maintain.

The location of the Old Ranges site is shown in Figure 1 as Section 8. Mott MacDonald has previously carried out condition assessments of the coastal defences along the surrounding frontage (Sections 1-7 and Section 9) on behalf of SBC. SBC have commissioned Mott MacDonald to undertake an independent assessment of the coastal defence repairs at Old Ranges listed in Plan 11012606-01 C4 Sea Wall Repairs. A copy of this is provided in Appendix A.

Figure 1: Map of Old Ranges Site (Section 8) relative to the Southend-on-Sea Frontage



Source: Southend-on-Sea Shoreline Strategy Plan Coastal Defence Condition Assessment, 2010, Black and Veatch

The following report outlines the independent visual assessment undertaken on the 25th September 2015 by Mott MacDonald. It aims to outline the extent to which the listed repairs have been completed in comparison with those agreed in Plan 11012606-01 C4 as part of the S106 agreement. The assessment takes into account reasonable wear and tear to works carried out since 2004. Wall works to the east of the large quick firing gun battery were signed off as satisfactorily complete in 2008, but not adopted for maintenance because of the dependence of these structures on the condition of the timber groynes, which had not been repaired at that time.

C & M have accepted that a number of outstanding items of work are yet to be completed. These are:-

- Replacement of isolated areas of displaced Open Stone Asphalt (OSA) overlay to the revetments at the western end of the site. These are located in the vicinities of Groynes 3, 5, 6, 9 and at Gogs Berth
- Additional OSA overlay to the area of large concrete slabs on the revetment in the vicinity of groyne number 18.
- Fixing of a number of new planks (approximately 20) to the groynes set out in the following table

Groyne	5	8	10	17	19	22	24	25	27	29	31	33	35	42
Planks	2	1	1	4	5	1	half	1	1	half	1	1	1	1

- Sealing of vertical cracks in the coast protection wall below the “Officers’ Mess” development which related to an earlier failure of this wall. This work is to be undertaken using a hot poured asphaltic concrete to retain flexibility in the crack while sealing it against loss of retained ground.

The structure of the report is as follows:

1. Introduction
2. Assessment findings
3. Summary

The Assessment findings are presented in a tabulated format to represent the frontage. Approximate chainages along the frontage are presented in the first column, groyne numbers are listed in the second column while their approximate locations are represented as a thick horizontal black line. The repair descriptions listed in Plan 11012606-01 C4 are listed in column 3 at their approximate locations. The corresponding photos and comments regarding the repair are presented in column 4. Repairs are split between Essential; those that are contractual obligations and of high importance, Desirable; those that are contractual obligations but of lower importance, and Recommended; those that are not contractual obligations but are deemed to be important.



Cells are blank in columns 3 where no repair works were listed in Plan 11012606-01 C4 and also blank in column 4 if no further work stood out as being required. In some cases no repair was listed as required (column 3) but comments were made on significant damage in column 4.



It was stated in Plan 11012606-01 C4 that 'vegetation on the revetment faces was to be removed and joints made good with sealant'. This applied throughout the frontage so comments were made as and when significant vegetation was noted on the revetments.

It is noted that the visual assessment of groyne conditions and completed repairs did not generally correspond to the repairs listed in the groyne repair schedule table included in Plan 11012606-01 C4 (Appendix A). In some cases repairs appeared to have already been carried out, in others there was no obvious need of repair, while in some there was clear damage to the groynes which had not been repaired. It should be noted that partially buried groynes as well as marine vegetation made the visual assessment of groyne repair completion difficult. Thus only the most evident missing planks and repairs were listed in this report and may underestimate the full extent of repairs required.




2 Assessment findings




Table 2.1: Assessment of repair works (refer to Appendix A for detailed plan: Plan 11012606-01 C4)



Chainage	Groyne No.	Sea Wall Repair Works listed in Plan 11012606-01 C4	Comments
0-50			<p>DESIRABLE REPAIR: Vegetation on the revetment faces should be removed and joints made good with sealant</p> 
50-100	1		<p>Groyne 1 is currently completely below beach level so could not be checked visually.</p> 



100-150			<p>DESIRABLE REPAIR: Vegetation on the revetment faces should be removed and joints made good with sealant</p> 
	2		
150-200	3		
		Repair required to damaged OSA	<p>Not Complete. ESSENTIAL REPAIR: Damaged OSA (10's of cm's) requires repair</p> 
	4		
200-250			

	<p>Repair fractured concrete face with Open Stone Asphalt (OSA)</p>	<p>Repair Completed. ESSENTIAL REPAIR: However, two further small (cm) repairs are required to the OSA as shown below.</p> 
<p>5</p>		


		<p>Repair fractured concrete face with Open Stone Asphalt</p>	<p>Repair completed (except 2 areas noted below)</p>  <p>ESSENTIAL REPAIR: Two further (m) repairs required to OSA</p>  
	<p>Repairs to concrete face of wall</p>		<p>No obvious damage or repair</p>

250-300	6		<p>ESSENTIAL REPAIR: A plank missing from the base of the groyne requires replacing</p> 
		<p>Repair fractured concrete face with Open Stone Asphalt</p>	<p>Repair completed</p>  <p>ESSENTIAL REPAIR: Further repair required to OSA</p> 

	7		<p>Planks are missing from the top layer of this groyne. These were removed deliberately to encourage some sand movement. Hence these planks are not to be replaced.</p> 
300-350		<p>Repairs to concrete face of wall. New sealant required</p>	<p>Repair completed (concrete face resurfaced with OSA). ESSENTIAL REPAIR: Join between OSA has been sealed however minor (cm) damage at bottom of join should be repaired.</p> 


	8		<p>ESSENTIAL REPAIR: Two planks missing from the top layer of the groyne</p> 
		<p>Repair fractured concrete face with Open Stone Asphalt</p>	<p>Repair completed</p> 
350-400	9		<p>Planks are missing from the top layer of this groyne. These were removed deliberately to encourage some sand movement. Hence these planks are not to be replaced.</p> 



	<p>Repairs to concrete face of wall. New sealant required</p>	<p>Repair completed (concrete face resurfaced with OSA)</p>  <p>ESSENTIAL REPAIR: However further repair needed to damaged OSA.</p> 
<p>10</p>		<p>ESSENTIAL REPAIR: Two planks are missing from the top layer of the groyne</p> 



		Repair rust staining to top of wavewall	Repair completed 



400-450	<p>'Sinking wall' to be investigated by removing Essex blocks. Repair if necessary.</p>	<p>From visual assessment repair appears to have been completed. However there is evidence of recent fracturing, subsequent repair, and further fracturing. ESSENTIAL REPAIR: Further repair to the fractures in the OSA is recommended. Due to high beach levels it was not possible to assess the condition of the toe of the sea wall.</p> 
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	11		
	12		
450-500	13		


	<p>'Sinking wall' to be investigated by removing Essex blocks. Repair if necessary.</p>	<p>From visual assessment repair appears to have been completed. Due to high beach levels it was not possible to assess the condition of the toe of the sea wall.</p> 
<p>14</p>		

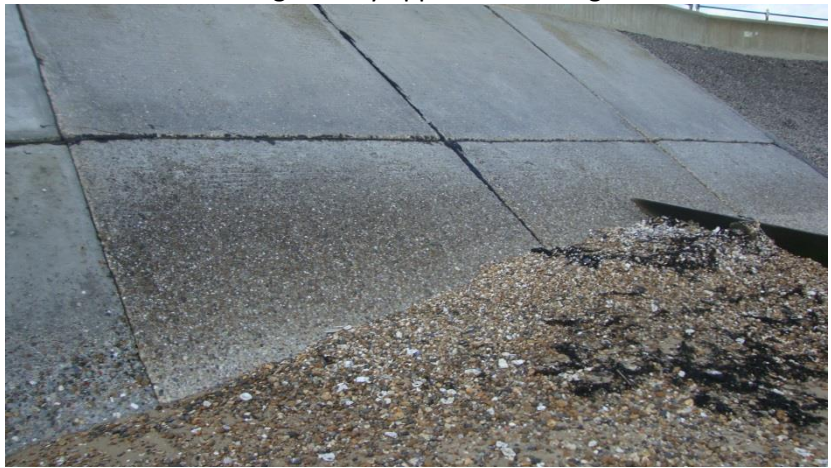

		<p>'Sinking wall' to be investigated by removing Essex blocks. Repair if necessary.</p>	<p>From visual assessment repair appears to have been completed. Due to high beach levels it was not possible to assess the condition of the toe of the sea wall.</p> 
<p>500-550</p>		<p>Barge Pier New security fencing</p>	<p>Fencing completed. The only deviation from design noted was a minor change in the signage. 3 signs read 'No Access', 'Danger Unsafe Structure', and 'Keep Off' as opposed to the one sign stating 'Dangerous Structure Unauthorised Access Prohibited'</p> 



		<p>Gog's Berth + Sea Outfall</p> <p>Break out existing damaged concrete corner and repair with reinforced concrete</p>	<p>Repair completed.</p> 
<p>550-600</p>		<p>New sealant required</p>	<p>Sea wall resurfaced with OSA. ESSENTIAL REPAIR: Some cracks in Gog's berth require repair.</p> 



	15		<p>Planks are missing from the top layer of this groyne. These were removed deliberately to encourage some sand movement. Hence these planks are not to be replaced.</p> 
600-650	16		<p>DESIRABLE REPAIR: Planks missing from the top layer of the groyne.</p> 



	17		<p>ESSENTIAL REPAIR: Planks missing from the base of the groyne require replacing</p> 
650-700		New sealant required	<p>Not completed. ESSENTIAL REPAIR: New sealant still required</p> 



		<p>Repair undermined toe of wall</p>	<p>Repair completed</p> 
<p>18</p>			


		<p>Repair undermined toe of wall</p>	<p>The level of the beach does not allow the visual assessment of the condition of the toe of the wall below beach level but the sea wall above the beach level generally appears to be in good condition.</p> 
	<p>19</p>		
<p>700-750</p>	<p>20</p>		<p>ESSENTIAL REPAIR: Planks required at base of groyne.</p> 



			<p>Outfall pipe damaged (outside scope of repairs and assessment but noted for completeness)</p> 
	21		
750-800			<p>Not satisfactorily completed. ESSENTIAL REPAIRS: Further repointing is recommended to reduce weathering and erosion. Sealing of cracks is recommended.</p> 
	22	Repointing and new sealant required	
	23		

800-850		Repointing and new sealant required	<p>Not satisfactorily completed. ESSENTIAL REPAIRS: Further repointing/sealing is recommended to reduce weathering and erosion.</p> 
	24		
		Repointing and new sealant required	<p>The planned repair is no longer necessary due to satisfactory resurfacing of a new OSA revetment</p> 
	25		


850-900		Repointing and new sealant required	<p>The planned repair is no longer necessary due to satisfactory resurfacing of a new OSA revetment</p> 
	25 A		
	25 B		
900-950		Repair rust staining to face of seawall	<p>Work completed to satisfaction</p> 
	26		
	27		


		<p>Repair rust staining to face of seawall</p> 	<p>Repair seems to have been attempted, however rust stains are still evident.</p>
950-1000	28		
	29	<p>ESSENTIAL REPAIR: Significant (centimetres) cracks between concrete block structures require sealing</p> 	<p>ESSENTIAL REPAIR: Significant (centimetres) cracks between concrete block structures require sealing</p>



		Remove metal ladder and landing plate	<p>Repair has not been satisfactorily completed. The metal ladder and landing plate have been removed. However the metal fixings have not been removed, nor made flush with the face of the concrete using repair mortar. DESIRABLE REPAIR: The metal fixings should be removed or made flush with the face of the concrete using repair mortar</p> 
	30		
1000-1050	31		



		<p>Repair rust staining to face of seawall</p> 	<p>Repair has been attempted, however there are still rust staining marks.</p>
	32		<p>ESSENTIAL REPAIR: Repair of cracks with sealant is recommended.</p>
1050-1100	33		
	34		



1100-1150	35		
		Hall's Parade	<p>Some rust staining is evident. ESSENTIAL REPAIR: Sealing of cracks between blocks is recommended.</p> 
	36		



1150-1200		Repair spalled concrete to wavewall corner	ESSENTIAL REPAIR: Completed, but with evidence of minor defects that require repair. 
	37		

			ESSENTIAL REPAIR: Not completed, cracks have not been sealed
		Remortar/seal cracks in face of wall	
	38		
1200-1250	39		

		<p>Repair cracks to concrete</p>	<p>Repairs completed with some minor defects. ESSENTIAL REPAIR: Further repairs to the cracks are recommended.</p>  
<p>40</p>			

1250-1300		Repair cracks to concrete	<p>ESSENTIAL REPAIRS: Repairs completed, however small defects need repair</p> 
	41		
1300-1350			<p>ESSENTIAL REPAIR: Repair of cracks in concrete is recommended</p> 
	42		

		<p>RECOMMENDED REPAIR: Old fence is not structurally stable and replacement is recommended. Although not included in the contractual obligations repair is required on a health and safety basis.</p> 
	<p>Remove metal steps and close off access</p>	<p>Repair not satisfactorily completed. Metal steps have been removed and access closed off, but fixings have not been entirely removed. DESIRABLE REPAIR: Fixings should be removed and holes made adequately flush to the concrete with repair mortar</p> 



			
		43	
1350-1400		44	
1400-1450		45	
		46	



1450-1500			Groyne alignment not straight but no evidence of missing planks
	47		


		<p>New sealant required to cracks in concrete</p>	<p>Not completed. ESSENTIAL REPAIR: Significant (mm-cm) cracks require sealant. Weeds in cracks to be cleared prior to sealing.</p>    
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			<p>RECOMMENDED REPAIR: Handrail missing. Although not included in the contractual obligations repair is required on a health and safety basis.</p> 
48			

1500-1550		<p>RECOMMENDED REPAIR: Major cracks present and potential for failure of retaining wall requires action. Although not included in the contractual obligations review is required on a health and safety basis.</p>  
49		

	<p>Repair of embankment failure and Groynes 49-50 (completed by another contractor)</p>	<p>New concrete structure and rock revetment built to prevent further failure. Appears to be in good condition</p>  <p>ESSENTIAL REPAIR: Groynes require further repair</p> 
<p>50</p>		

			<p>RECOMMENDED REPAIR: Severely rusted and damaged handrail poses health and safety risk and requires replacing. Although not included in the contractual obligations repair is required on a health and safety basis.</p> 
<p>1550-1600</p>	<p>51</p>		<p>ESSENTIAL REPAIR: Large crack (cm), sealant required</p> 


			<p>ESSENTIAL REPAIR: Evidence of cracks (cm) in wall. Sealant should be applied to cracks</p> 
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		<p>Boathouse</p> <p>Remove metal staircase, metal handrail and close off access</p>	<p>Partially completed works. Access closed off to Boathouse, metal staircase removed and rock moved to protect wall. New guardrail added.</p>  <p>ESSENTIAL REPAIR: However section of handrail requires replacement DESIRABLE REPAIR: Many bolts are still to be removed and holes made flush with concrete face using repair mortar. Cracks to wall face noted.</p>  
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	52		

		<p>New sealant required to cracks in concrete. Plan indicates this may form part of stabilisation works.</p>	<p>Not completed. ESSENTIAL REPAIR: New sealant still required</p>    
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	53		
1650-1700			<p>RECOMMENDED REPAIR: Although not included in the contractual obligations the undermining of the concrete slab requires repair to maintain structural integrity.</p> 
	54		

		<p>Drainage outfall</p>	<p>Beyond scope but noted for completeness. Partly blocked by deposited shingle. Would benefit from cleaning out to allow greater flow rates.</p>  
<p>1700-1750</p>			
	<p>55</p>		

1750-1800		Repair to concrete slab at Groyne 56	Repairs completed and in good condition
	56		

	57		<p>DESIRABLE REPAIR: Vegetation on revetment to be removed and joints made good with sealant as necessary</p> 

1800-1840		New sealant required to cracks in concrete	<p>Not completed. ESSENTIAL REPAIR: New sealant required</p>  
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	58		<p>DESIRABLE REPAIR: Vegetation on revetment to be removed and joints made good with sealant as necessary</p> 
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3 Summary

C & M have successfully carried out some aspects of the planned works. This included the erection of the Barge Pier's security fencing, repairs to the concrete slab at Groyne 56, the concrete corner at Gog's Berth, the rust staining and spalled concrete on the seawall corner. C & M have also carried out the urgent repairs to the sea wall where some areas of fractured concrete face had led to collapse, and have resurfaced large areas of the sea wall with OSA. C & M have also removed the metal stairs, ladders and steps. However there are still many minor defects within the repairs, and other pre-existing damage that has not been repaired.

Essential, contractually obligated outstanding repairs of high importance include:

- damaged sections of OSA;
- unrepaired cracks in the concrete surfaces;
- replacing planks in the timber groynes

Desirable, contractually obligated outstanding repairs of lower importance include:

- metal fixings not removed from the sea wall nor made flush using repair mortar;
- large areas of vegetation that require removal and joints to be made good with sealant.

Recommended works, not contractually obligated but required on health and safety or structural integrity grounds include:

- repairs and replacements to railings
- review of retaining wall and identification of any required repairs
- repairs to undermining of promenade

It is noted that the visual assessment of groyne conditions and completed repairs did not generally correspond to the repairs listed in the groyne repair schedule table included in Plan 11012606-01 C4 (Appendix A). In some cases planks had deliberately been removed to encourage sand movement; in a few, repairs appeared to have already been carried out; in others there was no obvious need of repair; while in some there was clear damage to the groynes which had not been repaired. Groynes 6, 8, 10, 16-17, 20 and 49-50 noticeably required repair, though it should be noted that partially buried groynes as well as marine vegetation made the visual assessment of groyne repair completion difficult. Thus only the most evident missing planks and repairs were listed in this report and may underestimate the full extent of repairs required.

It is acknowledged that C & M are aware that some works are still outstanding but had not acknowledged the full extent of works remaining. The placing of new plastic cone groyne markers was set out as a requirement in Plan 11012606-01 C4. These have not yet been placed as discussions between C & M and Trinity House regarding the location of the hazard markers are ongoing. When an agreement is reached C & M will provide new posts for the markers and SBC will erect the top-cones.

It is recommended that SBC utilise the observations in this report to ensure C & M fulfil their contractual obligations before the responsibility for maintaining the sea defences is handed over. It would be beneficial for both parties if this process were carried out quickly (particularly with winter approaching) and efficiently as a lack of action on some repairs may lead to greater maintenance costs being required in the future.

In addition, under recommended items, it was noted that a section of retaining wall at approximate chainage 1500-1550 is likely to fail in the future if preventative action is not taken. Furthermore long sections of hand railing on the Old Ranges site above the promenade are extremely unstable. While this was not a contractual obligation of C & M it poses a potentially serious risk to public health and safety and as such Mott MacDonald recommends that SBC consider taking action to mitigate this.

Appendices

Appendix A. Plan 11012606-01 C4	54
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Appendix A. Plan 11012606-01 C4

