Mostyn Sea Wall

OPTION SELECTION REPORT

ELR: CHN3

Mileage: 199m 0605yds 27.50chs

Structure ID: W1990286

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DOCUMENT REFERENCE:	23013W-REP-001 A01 – Mostyn Sea Wall
REVISION:	A01
ISSUE DATE:	21st July 2023

Document Control Sheet

Issued by: Crouch Waterfall and Partners Limited
Address: The Barn, Elms Farm, Hobb Lane, Daresbury, Warrington, WA4 5LS
Tel: 01925 740 404
Client: MPH Construction
Project Number: 23013W
Project Title: Mostyn Sea Wall
Document Title: Mostyn Sea Wall Option Selection Report
Document Ref: 23013W-REP-001 A01
Status: First Issue
Date: 21 July 2023

Document Production Record

Issue Number:	A01	Name	Signature
Prepared		Peter Hardy	Digitally signed by PETER HARDY Date: 2023.07.21 15:11:06 +01'00'
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Approved		Tim Elton	Tim Elton cn=Tim Elton gn=Tim Elton c=GB United Kingdom l=GB United Kingdom o=Crouch Waterfall ou=Warrington e=tim.elton@crouchwaterfall.co.uk 2023-07-21 16:13+01:00

Document Revision Record

Issue number	Date	Revision Details
A01	21st July 2023	First Submission

Crouch Waterfall and partners Limited has prepared this report in accordance with the instructions of the above-named Client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

Contents

1. Project Scope & Requirements

1.1. Introduction

Crouch Waterfall have been appointed by MPH Construction to assess options for the repair of a tidal flap which is permanently constrained and blocked by beach material.

4 No options are to be covered within this Option Selection Report (OSR), itemised as per the following:

- Option 1 - Replace the existing tidal flap with a duckbill valve.
- Option 2 – Build out from existing outfall with a concrete surround that allows higher outfall level using tidal flaps.
- Option 3 – Build out from existing outfall with a concrete surround that allows higher outfall level using a duckbill valve.
- Option 4 – Increase the height of the existing outfall by decreasing the gradient of the final run under track.

This report has been prepared for the client alone and no third party should rely upon it. The aim is to investigate potential options to ensure an effective outfall which effectively discharges stormwater and prevents water entering the outfall during high tide.

2. Background

2.1. Existing Outfall

The existing outfall is headed by a top hinged tidal flap. The tidal flap is bolted to a concrete surround which protrudes approx. 0.8m from the stone masonry sea wall. The tidal flap is currently wedged slightly open by beach material and therefore not functioning as designed. Behind the sea wall the CNH3 railway line runs above the outfall.

A 1.05 x 0.9m culvert carries the storm water under the railway line to the outfall. At the upstream side of the culvert is a natural attention area, which is >1.5m below adjacent road and track levels.

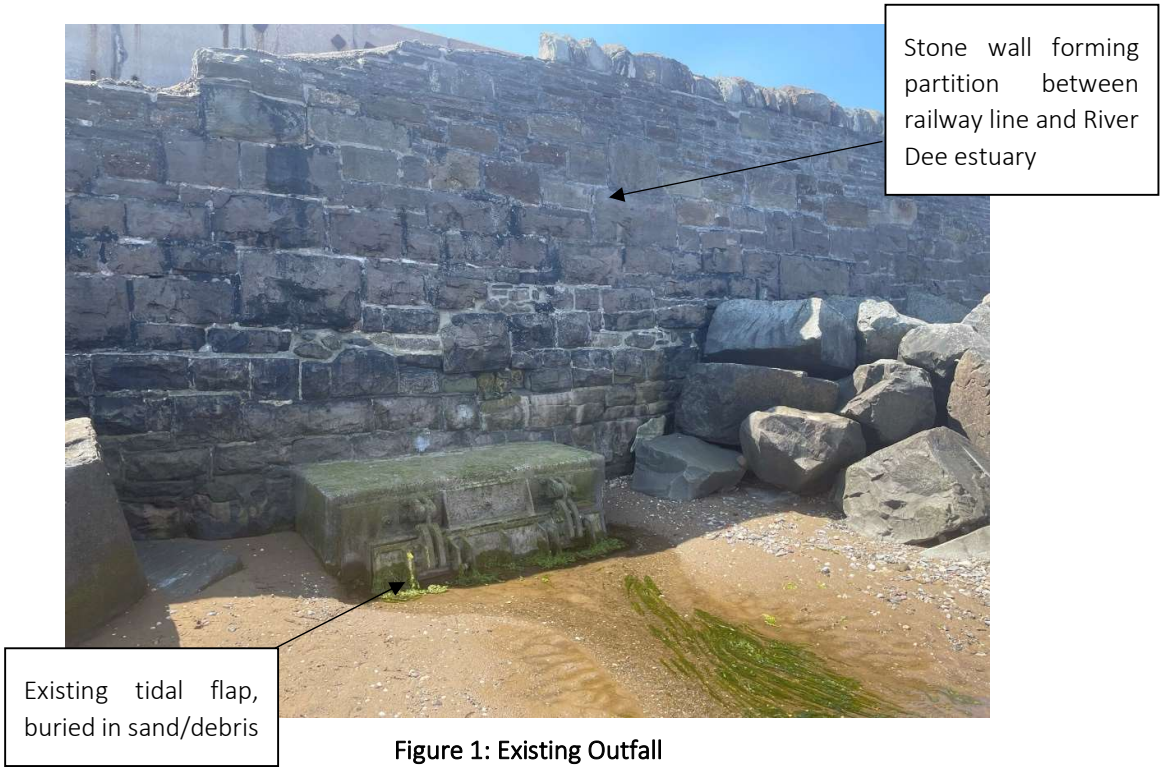


Figure 1: Existing Outfall

Although not a frequent occurrence, a report of flooding of the adjacent A548 has been reported previously, resulting in the closure of the highway. Crouch Waterfall has not been provided with detailed flood information at this stage.

3. General Considerations

The following are overall considerations that apply to each of the 4 no options covered within this OSR.

3.1. Planning / Consents

Beach is owned by the Crown Estate, but consent will be requested from Network Rail before works commence. Liaison with Local Authority (LA) and Welsh Water may be required for approval of the amended outfall solution.

3.2. Environmental Considerations

The area must be surveyed for habitats on / around the structure which may be affected by the works. The beach must be protected from hazardous materials at all times.

3.3. Constructability Considerations

Consideration must be given to access and construction operations due to the beach surface/estuary environment. Any works under the railway line will result in temporary closure.

Access to the outfall can be gained from 'The Port of Mostyn Ltd' via Dock Rd subject to approval.

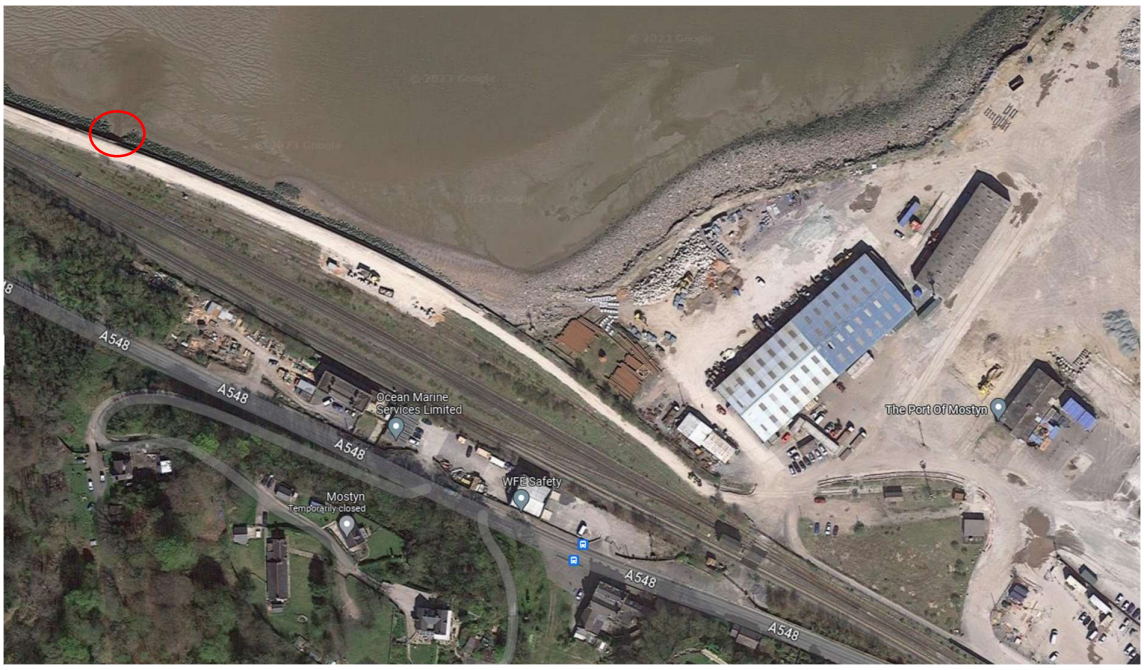


Figure 2: Site Location Plan

3.4. Assumptions

The following assumptions have been made for the purpose of producing of this report:

- Required consents would be granted to allow proposed remediation options.
- Upstream drainage network is suitably designed.
- Culvert is in satisfactory condition.

4. Option Analysis

The following 4 no options are to be assessed as part of this report:

4.1. Option 1 – Replace the existing tidal flap with a duckbill check valve.

4.1.1. Overview

This option involves the removal of sand/debris buildup in front of the tidal flap. The existing tidal flap will then be removed and replaced with a duckbill check valve of appropriate size to suit the discharge requirement.

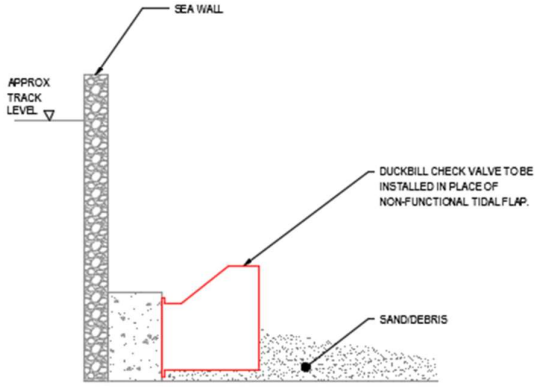


Figure 3: Sketch Option 1

4.1.2. Option 1 Advantages & Disadvantages

Advantages	Disadvantages
• Direct replacement so limited intrusion/disturbance • Less labour/workforce requirement as other options • No formwork/minimal temporary works • Consent likely not required or easier to obtain than other options considered.	• High cost of duckbill check valve. • As the outfall level is to remain unchanged self-clearing capability may not work if valve becomes completely submerged in sand. In that case, the valve would not be able to function as designed.

4.2. Option 2 – Build out from existing outfall with a concrete surround that allows higher outfall level using tidal flaps.

4.2.1. Overview

This option involves the forming of a concrete extension to the outfall which enables a higher soffit level at point of discharge. Existing tidal flap may be able to be reused or if not a new tidal flap with the same discharge capacity will be installed.

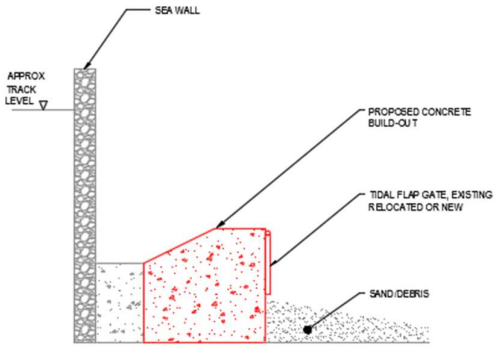


Figure 4: Option 2 Sketch

4.2.2. Option 2 Advantages & Disadvantages

Advantages	Disadvantages
• Higher soffit level achieved to give increased clearance from beach level. • Tidal flaps may be able to be reused or if not, a new tidal flap is to be installed, the cost of which would still be considerably less than that of duckbill check valve. • If tidal flap did become wedged in future, the option would still be available to replace with a duckbill check valve.	• Formwork required. • Difficulties of concrete curing on beach. • Involves construction on beach side of sea wall so planning consent will need to be obtained. • New outfall invert level higher than invert level of run under sea wall so reduction in flow will mean flap opens less frequently as the water level will need to rise to exert sufficient pressure on the tidal flap. • If beach material level continues to build up, tidal flap could become wedged in future. To evaluate this possibility a coastal engineering assessment will have to be carried out which will incur further costs.

4.3. Option 3 – Build out from existing outfall with a concrete surround that allows higher outfall level using duckbill check valve.

4.3.1. Overview

This option involves the forming of a concrete extension to the outfall which enables a higher soffit level at point of discharge. New duckbill check valve to be installed.

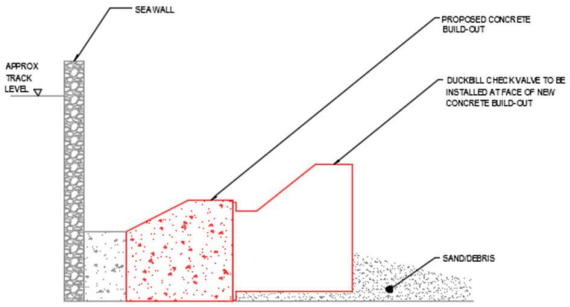


Figure 5: Option 3 Sketch

4.3.2. Option 3 Advantages & Disadvantages

Advantages	Disadvantages
• Larger duckbill check valve can be used than Option 1, due to the increased surface area of the outfall face. • Raised soffit of valve will create necessary conditions for self-clearing of debris. • High discharge rate can be achieved. • Will be operational in low tide.	• Formwork required. • Difficulties of concrete curing on beach. • Involves construction on beach side of sea wall so planning consent will need to be obtained. • High cost of duckbill check valve.

4.4. Option 4 – Increase height of existing outfall by decreasing the gradient of final run under track.

4.4.1. Overview

Initially, an investigation will need to be carried out to ascertain the difference in levels between outfall and upstream side of culvert to determine gradient and viability of decreasing it. This will need to include checking the minimum depth requirement is maintained under track level.

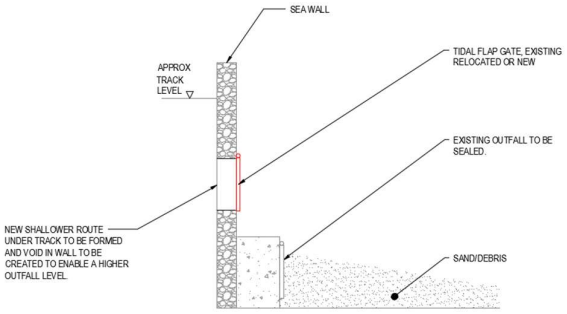


Figure 6: Option 4 Sketch

4.4.2. Option 4 Advantages & Disadvantages

Advantages	Disadvantages
• Tidal flaps may be able to be reused or if not, a new tidal flap is to be installed, the cost of which would still be considerably less than that of duckbill check valve. • This option has the potential to deliver the highest outfall level, therefore the flap will be closed less frequently and able to discharge storm water for longer periods. • Consent likely not required or easier to obtain than Options 2 & 3.	• Most intrusive option as there will be works carried out under railway line, resulting in closures. • Works will be intrusive both under track and through sea wall. Adding complexity to the design, logistics and construction. • More significant site investigation will be required compared to other options, such as topographical or level survey, possibly CCTV etc. • This is the most expensive option.

5. Conclusion and Recommendations

Option 1 – This is both the quickest and simplest option. However, the fact that the existing outfall is so deeply embedded in beach material is of concern when considering this solution. If this option was selected and the duckbill valve had limited functionality this could result in failure of the attempted remediation, which is undesirable for all concerned.

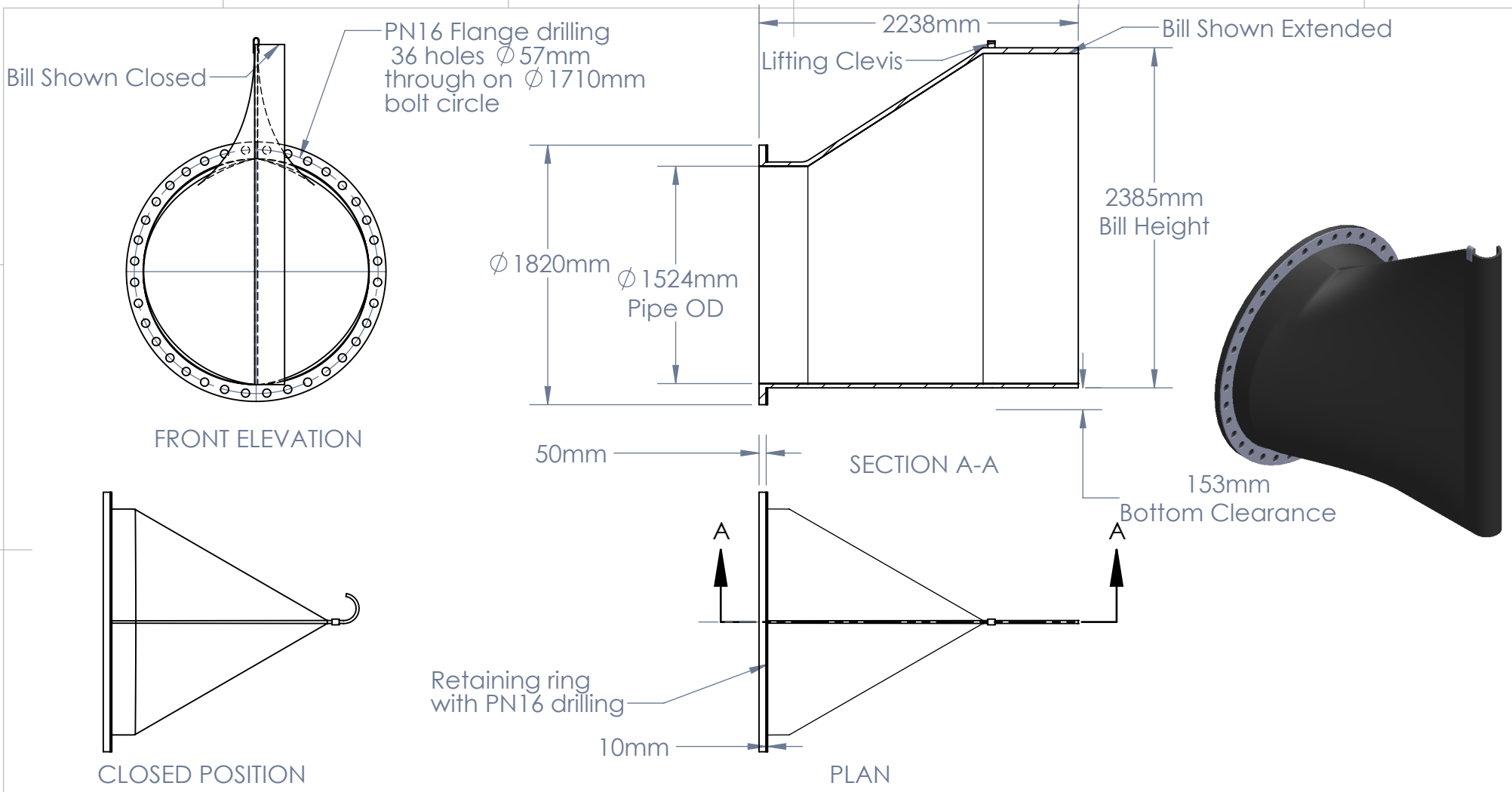
Option 2 – This option is attractive as, although there is considerable time/financial/labour investment in the concrete build-out there is a large saving in reusing tidal flap or installing a new tidal flap as opposed to acquiring a duckbill check valve. The major drawback is the risk of further sand/sediment build-up and the repositioned tidal flap becoming blocked. If the installation was carried out to enable a duckbill check valve to be speedily installed if required in future, this would make this option more appealing.

Option 3 – This option is similar to Option 2 and therefore shares many of the advantages and disadvantages. It would be more expensive with the high cost of the duckbill check valve but there would be greater confidence that a robust and solution had been installed with more longevity.

Option 4 – If achievable, this option would be the most robust solution with the highest outfall level being achieved. It would also be the option causing the most disturbance and the most complex for design, logistics and construction. More significant site investigation would also need to be carried out. This would also be the most expensive option of the four considered.

Preferred Option(s) – Option 2 or 3 would be the most preferred. Option 1 would have a higher risk of failure as explored above and Option 4 would be effective but result in a larger scale operation. Option 2 would be preferable if it could be future proofed to allow quick installation of a duckbill valve in the event that the tidal flap becomes blocked and redundant. If the possibility of future works is to be avoided as a priority, Option 3 would be the most suitable. The short-term additional cost of the duckbill valve would be tolerated in order to have a much lower likelihood of encountering future issues.

Appendix A – Example Duckbill Check Valve



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN millimetres SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	NOTE: This drawing is for indicative purposes only. Installation to be in accordance with the TideFlex Installation,Operation and Maintenance Manual.	DEBUR AND BREAK SHARP EDGES

DO NOT SCALE DRAWING | REVISION A

MEASURIT

	NAME	SIGNATURE	DATE
DRAWN	MM		
CHK'D	GS		
APPV'D	MR		

TITLE:

1500mm Tideflex S35-1 Valve with PN16 Flange

MATERIAL: Neoprene Ripstop Reinforced construction

DWG NO. S351-1500-PN16

A4

WEIGHT: Kg

SCALE:1:40

SHEET 1 OF 1