

ARDROSSAN HARBOUR REDEVELOPMENT PROJECT MARINE WORKS LONG LIST OPTIONS

04/02/19

RAMBOLL

PRIMARY REQUIREMENTS

- Two operational berths (one Primary Berth, and one Secondary Berth).
- Both berths have a linkspan.
- Primary berth designed for both existing vessels and Glen Sannox. Has a PAS.
- Secondary berth designed for existing vessels. Gangway access only.
- Base case for primary berth is a double lane linkspan. Costing of single lane linkspan to also be assessed.

Note: Marine Works SRS assigns the Arran Berth as the Primary Berth.

GMG Notes from meeting

- Not supported by Calmac as MV Glen Sannox cannot easily navigate on to the berth and provides very low resilience.
- Also the vessel overhangs the berth.
- Discussion around adding canting dolphin / roundhead (as seen at eg Rosyth ferry terminal) to assist berthing manoeuvres but Calmac felt (and PPG Harbour master/pilot agreed) this only reduces the available space.
- Discussion around adopting moormaster or similar automatic mooring to deal with the vessel overhang but ultimately the navigational issues rule this option out anyway.

Not Taken Forward


Option 1 (Original Base Case)

Primary Berth	Arran
Secondary Berth	Irish

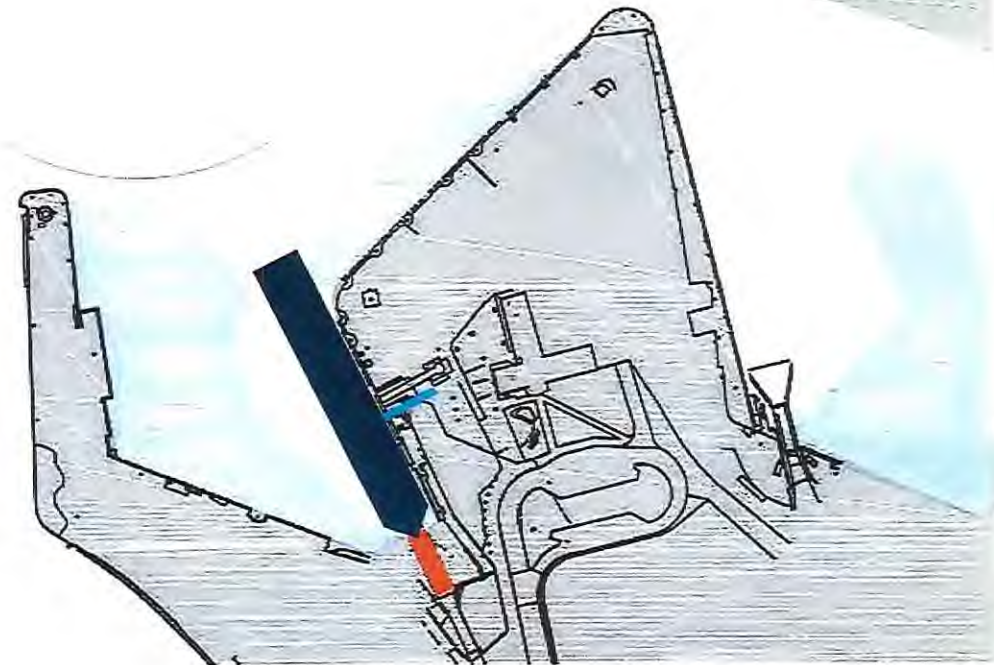
- Arran Berth Works
- Replacement linkspan (same location as existing)

- Irish Berth Works
- Refurbishment of suspended deck
 - Refurbishment of linkspan

Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox

RAMBOLL




GMcG Meeting Notes

This option is similar to Option 1 but deals with the issue of the reduced quay length for mooring by recessing the linkspan. However it does not deal with the fundamental navigational issues.

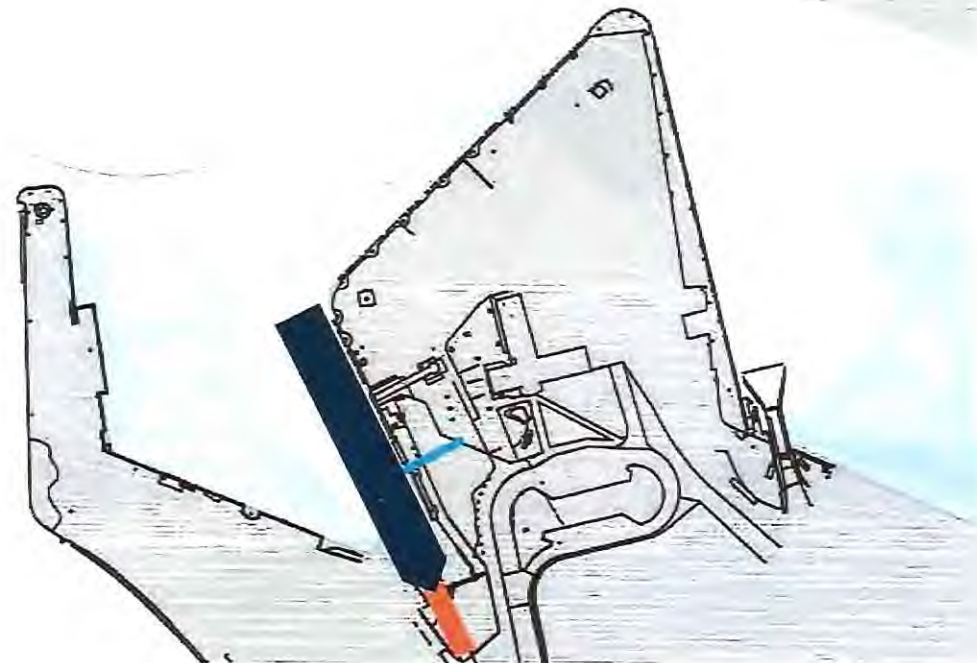
Not Taken Forward

Option 1A (Initial Ramboll Design)	
Primary Berth	Arran
Secondary Berth	Irish
Arran Berth Works	
• Replacement linkspan	
• Recess for linkspan	
Irish Berth Works	
• Refurbishment of suspended deck	
• Refurbishment of linkspan	

Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox

RAMBOLL




Taken Forward

GMcG Meeting Notes

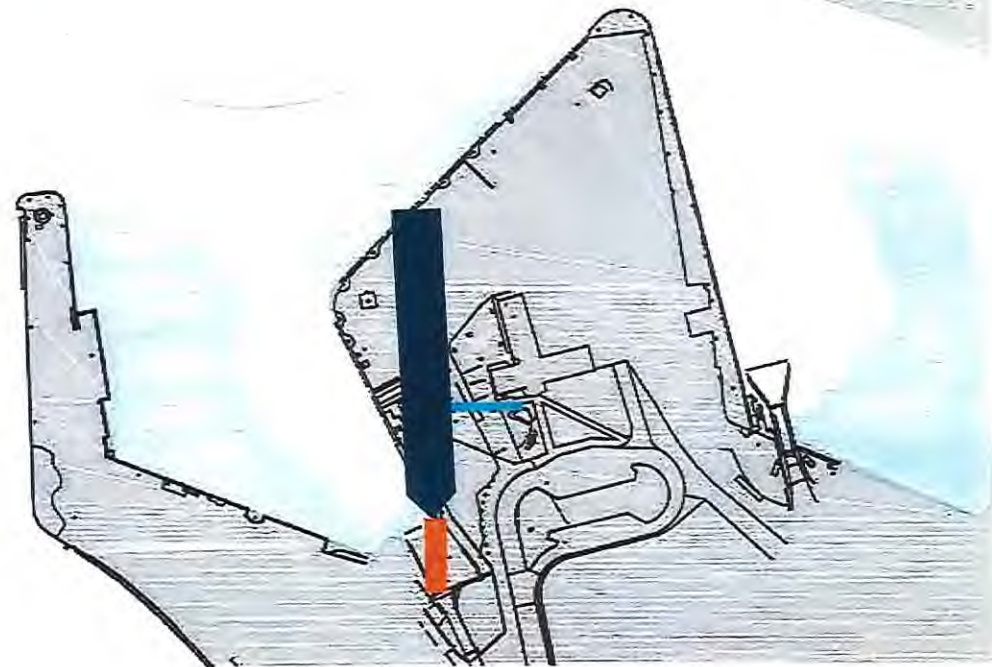
- This is the current option 2 scheme under discussion. This is preferred by Calmac as they feel it addresses the navigational issues and provides better resilience on the Arran berth (see other notes for comments on two berth operation)
- Recognition from the meeting that this is not without its challenges:-
 - PPG/NAC/Arran community rate the retention of the service very highly in assessment and this option will make it very difficult to do so as the Arran berth is not available for the majority of the time meaning a service to Irish berth only (refer to Calmac papers on this topic)
 - The recent SI work has identified a number of structures within the area to be demolished / excavated giving rise to potential technical challenges, cost, programme and risk issues.

Option 2 (Previously Option S2)	
Primary Berth	Arran
Secondary Berth	Irish
Arran Berth Works	
<ul style="list-style-type: none">• Replacement linkspan• Large cut-out of existing quay wall• Dredging at turning circle	
Irish Berth Works	
<ul style="list-style-type: none">• Refurbishment of suspended deck• Refurbishment of linkspan	

Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox

RAMBOLL




GMcG Meeting Notes

- Provides the programme benefit that the linkspan could be constructed off line and potentially shorter construction period as less disruptive.
- Provides some benefits landside as it removes the requirement for pedestrian crossing from car park across the marshalling area.
- Dolphins make the navigation more difficult (less available space and requires a greater turn)
- Some concerns over wave climate and reflected wave / swell at the bow would require some work.
- Challenging manoeuvre when leaving the berth.
- Reduces resilience due to vessel movements.

Option 3	
Primary Berth	Arran
Secondary Berth	Irish
Arran Berth Works	
<ul style="list-style-type: none">• Replacement linkspan• Recess for linkspan• Construction of dolphins• Dredging at linkspan and turning circle	
Irish Berth Works	
<ul style="list-style-type: none">• Refurbishment of suspended deck• Refurbishment of linkspan	

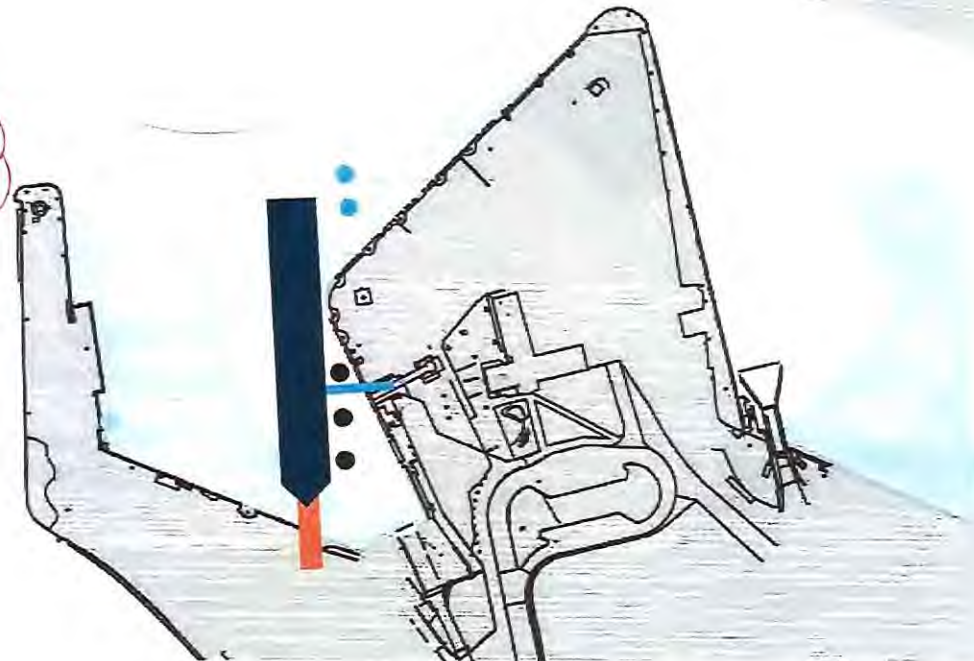
Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox

RAMBOLL

Not Taken Forward

Risk of need for breakwater enhancement



GMcG Meeting Notes


One of the more "out there" ideas and no one could see any benefits but worth reviewing just to rule it out if nothing else.

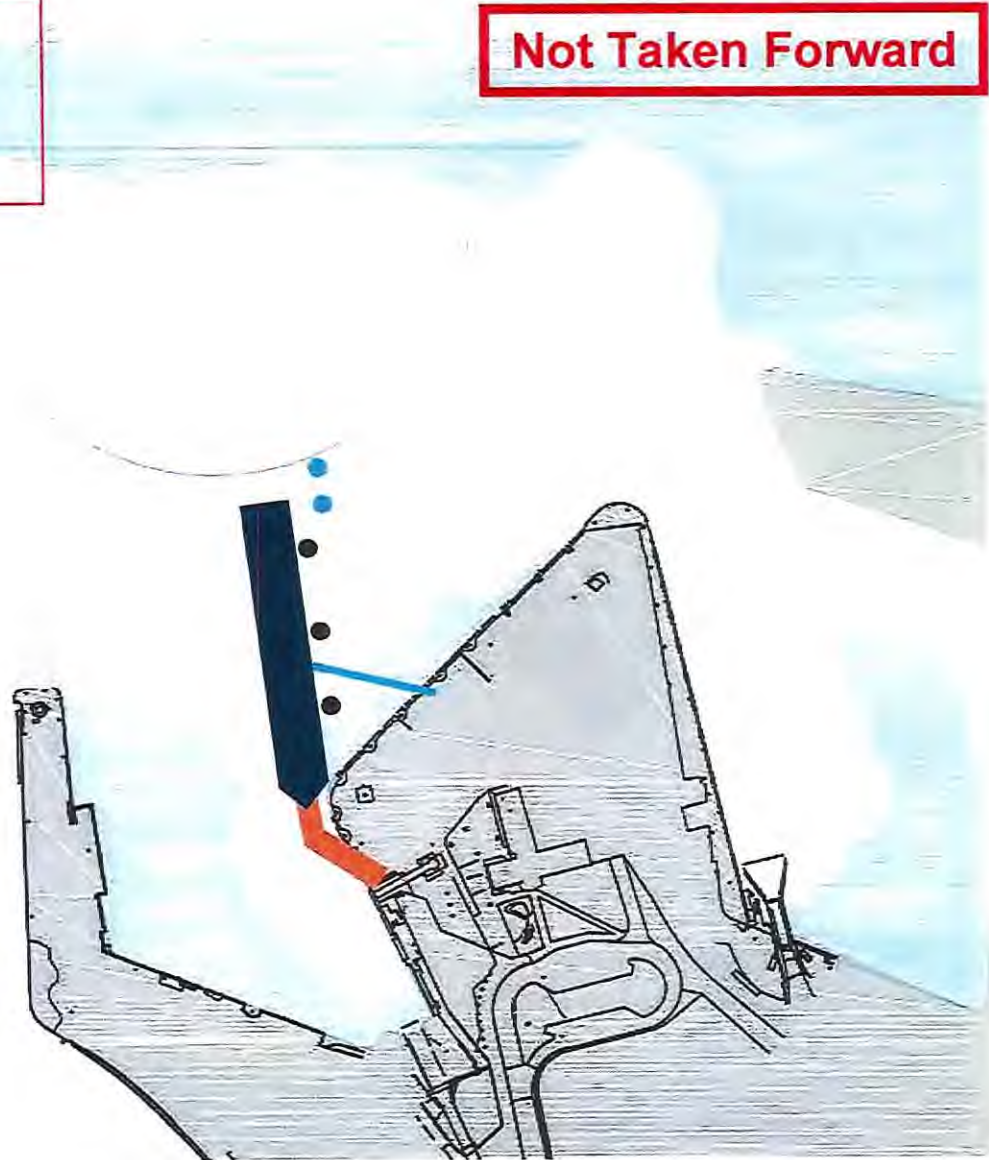
- Less space to manoeuvre, more exposed berth
- more complicated landside set up.

Not Taken Forward

Option 4	
Primary Berth	Arran
Secondary Berth	Irish
Arran Berth Works	
<ul style="list-style-type: none">• Replacement linkspan• Island berth construction• Enhancement to southern pier at entrance• Significant dredging at turning circle	
Irish Berth Works	
<ul style="list-style-type: none">• Refurbishment of suspended deck• Refurbishment of linkspan	

Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox



GMcG Meeting Notes

Moves the vessel across slightly from option 3 to provide more space.

- Dolphins present a potential impediment / reduce space
- exposure to waves around the breakwater and/or breakwater enhancement required.


Generally not considered viable.

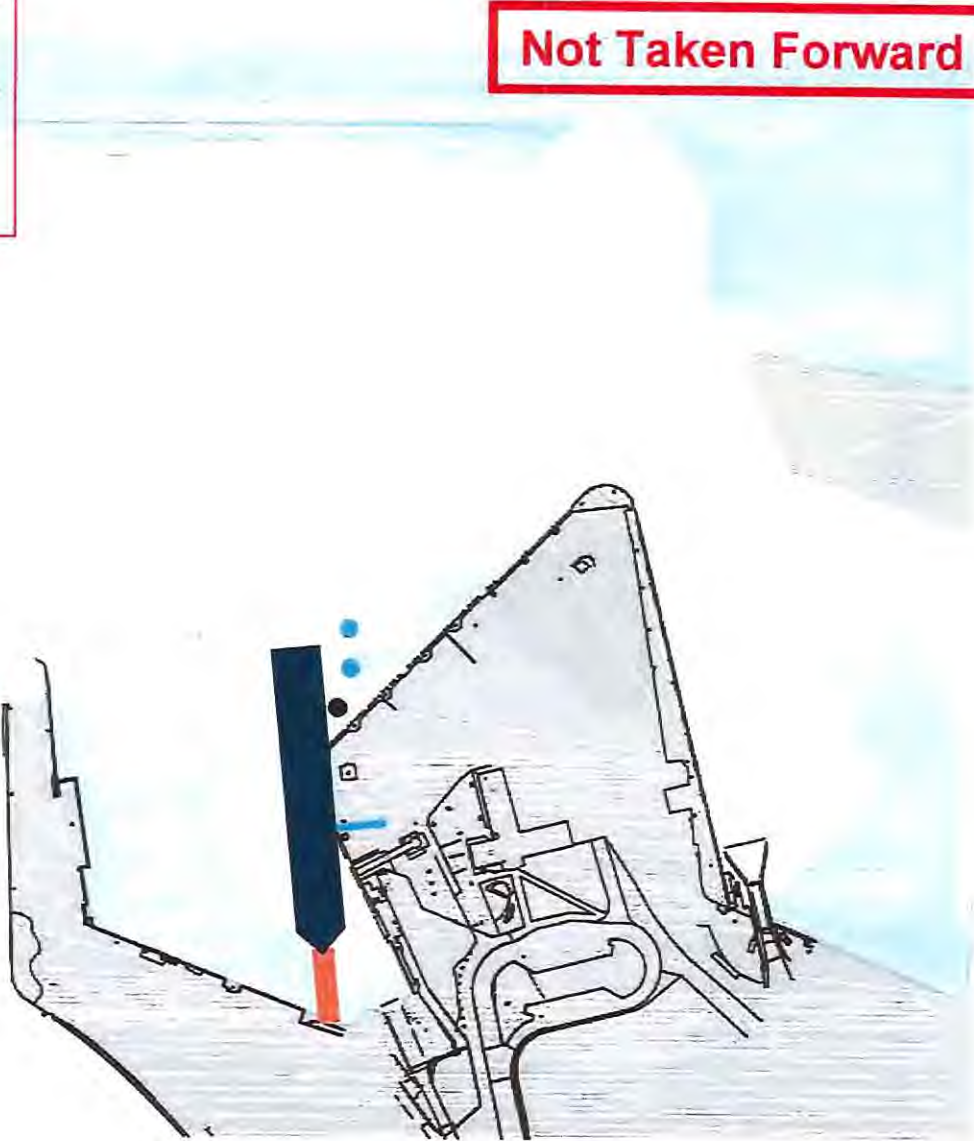
Not Taken Forward

Option 5	
Primary Berth	Arran
Secondary Berth	Irish
Arran Berth Works	
<ul style="list-style-type: none">• Replacement linkspan• Breasting and mooring dolphin construction• Cut off corner to quay wall• Possible dredging at turning circle• Possible extension to southern pier at entrance	
Irish Berth Works	
<ul style="list-style-type: none">• Refurbishment of suspended deck• Refurbishment of linkspan	

Need for breakwater enhancement TBC

Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox




GMcG Meeting Notes
See option 7 for comments

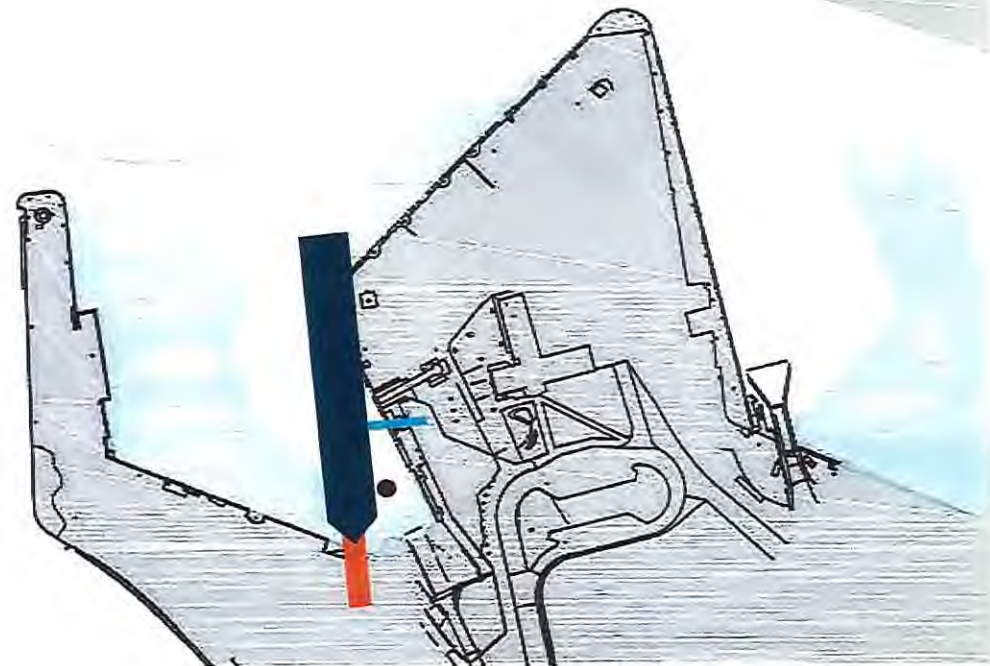
Taken Forward

Option 6	
Primary Berth	Arran
Secondary Berth	Irish
Arran Berth Works	
<ul style="list-style-type: none">• Replacement linkspan (set into quayside)• Breasting dolphin construction• Cut off corner to quay wall• Possible dredging at turning circle	
Irish Berth Works	
<ul style="list-style-type: none">• Refurbishment of suspended deck• Refurbishment of linkspan	

Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox

RAMBOLL



GMcG Meeting Notes

Option 6 and 7 were discussed together and it was agreed that something between or around this might be worth developing further. Ramboll agreed that these are only indicative and that geometry / exact positioning needs working on.


- Similar alignment to Option 2
- Benefit over 2 of less demolition and less construction (better for programme, cost, risk and disruption)
- Work to be done on potential swell conditions around the bow. Possibly a solid wall rather than dolphins but still shorter than Option 2.
- Calmac comments 7 is better than 6 and 2 is better than 7 but it is worth exploring further particularly on the balance of cost / programme.
- There are masterplanning / landside benefits as, due to the linkspan position, you can flip the current car park and marshalling yard positions and remove the requirement for crossing point.

Option 7

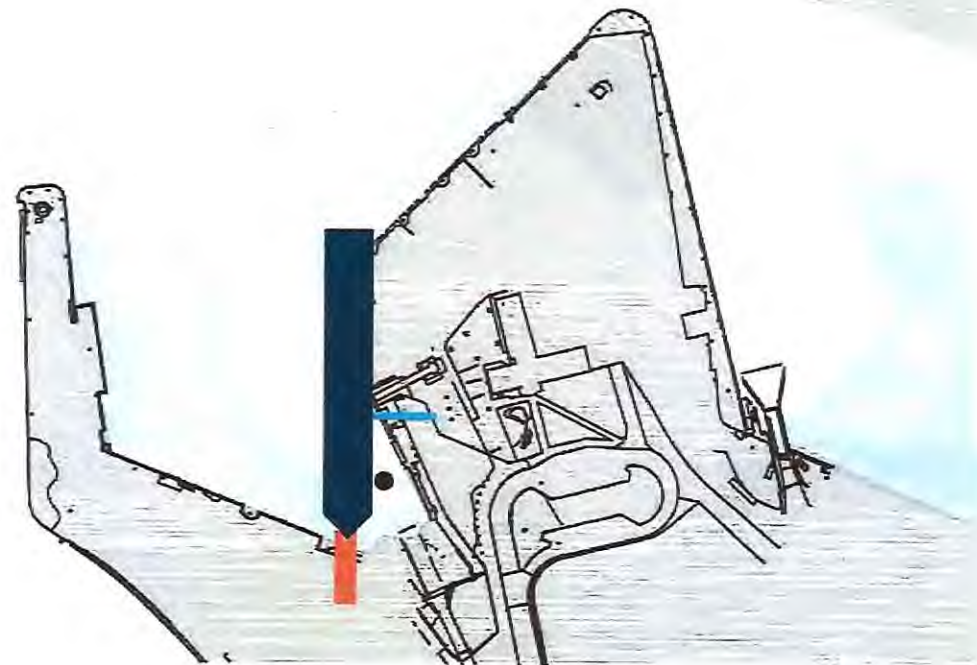
Primary Berth	Arran
Secondary Berth	Irish
Arran Berth Works	
• Replacement linkspan (set in)	
• Cut off corner to quay wall	
• Breasting dolphin construction	
• Dredging at turning circle	
Irish Berth Works	
• Refurbishment of suspended deck	
• Refurbishment of linkspan	

Taken Forward

Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox

RAMBOLL



GMcG Meeting Notes

Strengthens the Irish berth by removing the suspended deck sections and replacing with mooring dolphins.

-Clear operational advantage during the works as Arran berth is left in use for the duration.

-Albeit not insurmountable it creates landside complications of ped / vehicle flows that are not ideal.


- Navigation challenging in the most prevalent SW wind conditions so likely reduces resilience.

-Provides next to no contingency for berthing

-These comments on navigation and landside apply to pretty much all of the Irish Berth only options. Non were taken forward.

Option 9- 8	
Primary Berth	Irish
Secondary Berth	Arran
Arran Berth Works	
• Left as-is / maintenance works	
Irish Berth Works	
• Demolition of suspended deck on existing alignment; construction of breasting dolphins OR replacement suspended deck	
• Replacement linkspan	
• Cut-out at Winton Pier	
• Possible dredging at turning area	

Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox

RAMBOLL

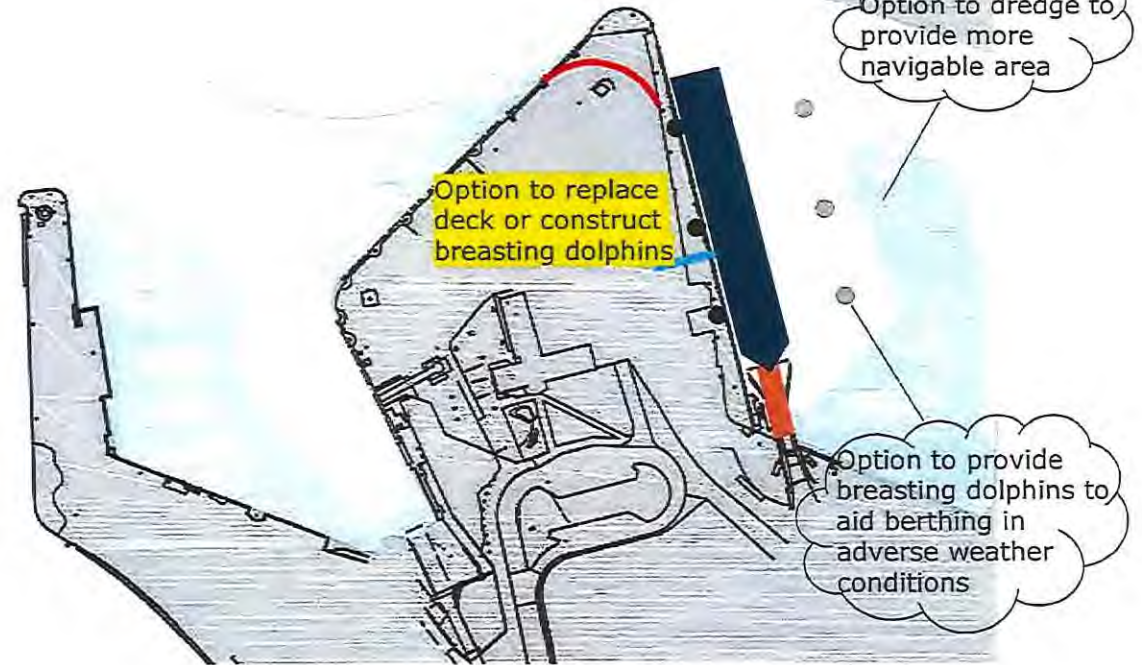
Not Taken Forward

Option to shorten Railway Pier discounted due to land ownership

Option to dredge to provide more navigable area

Option to replace deck or construct breasting dolphins

Option to provide breasting dolphins to aid berthing in adverse weather conditions



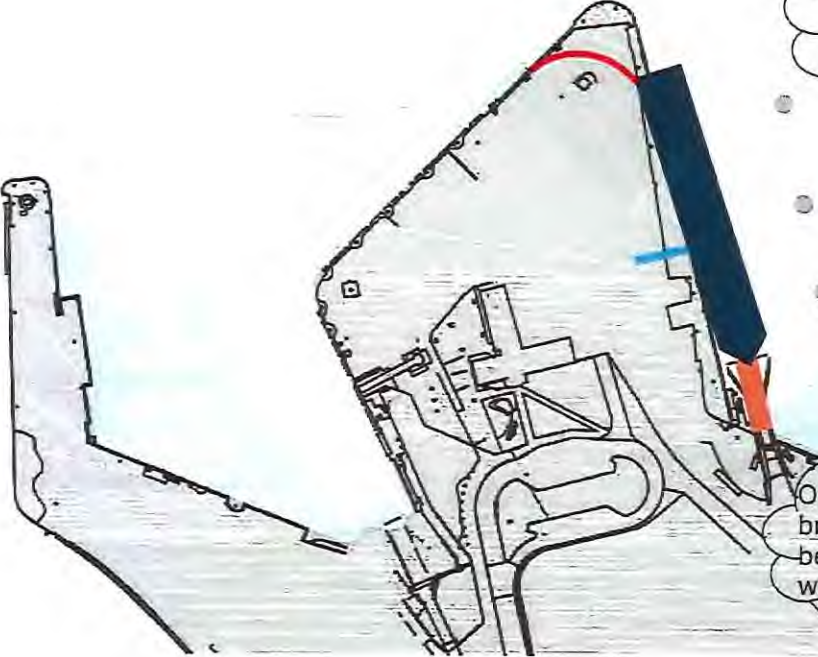
GMcG Meeting Notes
See 8 for comments

Not Taken Forward


Option to shorten Railway Pier - discounted due to land ownership

Option to dredge to provide more navigable area

Option to provide breasting dolphins for berthing in adverse weather conditions



Option 10 9	
Primary Berth	Irish
Secondary Berth	Arran
Arran Berth Works	
<ul style="list-style-type: none"> • Left as-is / maintenance works 	
Irish Berth Works	
<ul style="list-style-type: none"> • Demolition of suspended deck • Construction of new quay wall line including dredging • Replacement linkspan • Cut-out at Winton Pier • Possible dredging at turning area 	

Key:
 Approx area where current under keel clearance is not sufficient for Glen Sannox




GMcG Meeting Notes
See 8 for comments

Not Taken Forward

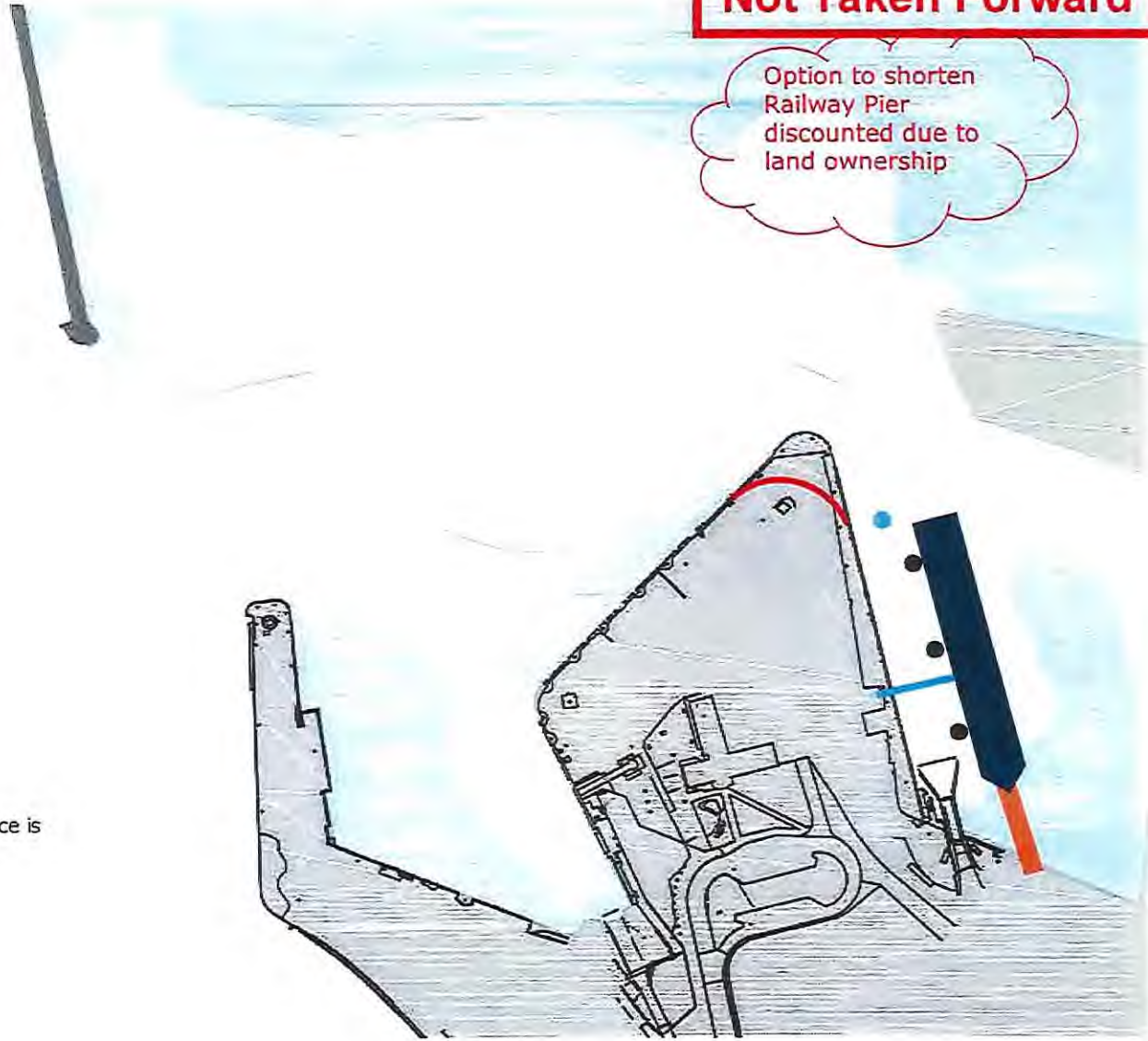
Option to shorten
Railway Pier
discounted due to
land ownership

Option 11 10	
Primary Berth	Irish
Secondary Berth	Arran
Arran Berth Works	
• Left as-is / maintenance works	
Irish Berth Works	
• Construction of breasting dolphins	
• Replacement linkspan	
• Cut-out at Winton Pier	
• Retain or remove suspended deck	
• Dredging at berth and possible dredging at turning area	

Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox


RAMBOLL



GMcG Meeting Notes
See 8 for comments

Option 12 11	
Primary Berth	Irish
Secondary Berth	Arran
Arran Berth Works	
• Left as-is / maintenance works	
Irish Berth Works	
• Construction of breasting dolphins (port side to)	
• Replacement linkspan	
• Cut-out at Winton Pier	
• Retractable PAS	
• Retain or remove suspended deck	
• Possible dredging at turning area	

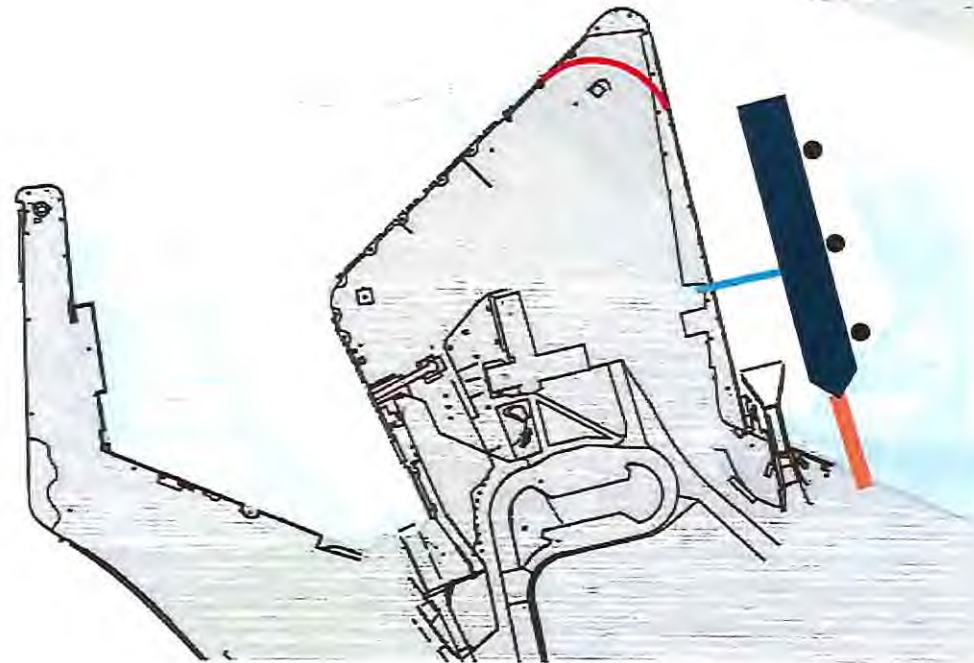
Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox

RAMBOLL

Not Taken Forward

Option to shorten
Railway Pier
discounted due to
land ownership



GMcG Meeting Notes

12 was not ruled out by Calmac and they could see the benefits but the devil will be in the detail of the geometry.


- Vessel can enter the harbour and use the turn to scrub off speed as current happens.
- could be challenging in certain wind conditions
- Wave climate / exposure needs exploring
- Linkspan needs protecting as potentially vulnerable to vessel strikes
- Potentially puts existing Arran berth out of use full time
- Linkspan geometry needs some work.
- Landside not ideal but it does work fairly well
- Agreed that Ramboll will initially do some more work on the linkspan geometry (two lanes of traffic) and then see if this should be taken forward some more but on the whole fairly well received.
- Both 12 and 13 have less construction work involved and are likely to be cheaper and quicker than Option 2, 6/7.

Breakwater
enhancement
requirements TBC

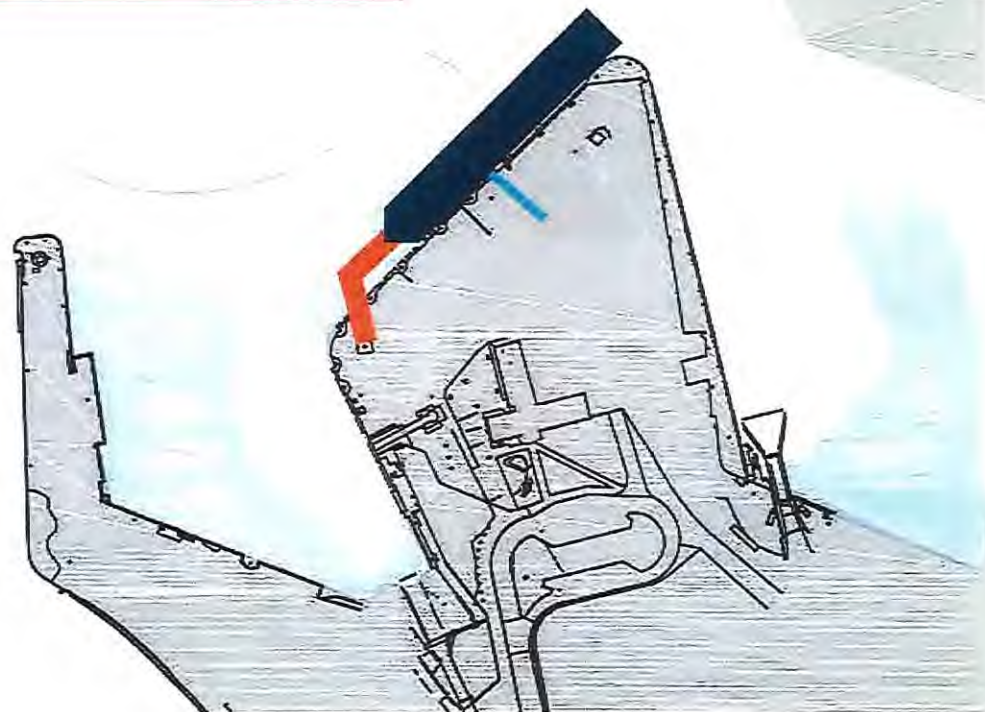
Taken Forward

Option 12	
Primary Berth	Winton Pier
Secondary Berth	Arran (or Irish)
Arran Berth Works	
• Left as-is / maintenance works	
Winton Pier	
• New linkspan	
• Fendering	
• Possible breakwater enhancement TBC	
• Possible need for dredging at turning area	

Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox

RAMBOLL



GMcG Meeting Notes

- As with 12 this was generally seen as a potential and worth exploring if the geometry works.
- Has added benefit over 12 that the Arran berth remains usable however probably blocks access to Irish berth (linkspan geometry to be confirmed)
 - Bow in berthing would give a problem of trying to stop in the available space.
 - Alternative would be to berth stern in and use the same turn as 12 to reduce speed.
 - Final manoeuvre on and off berth in this instance all under power (no roundhead or the like to walk round) so challenging but not insurmountable.
 - Landside is less favourable than 12 due to longer distances but is still workable.

Breakwater
enhancement
requirements TBC


Option ~~14~~ 13

Primary Berth	Winton Pier
Secondary Berth	Arran (or Irish)

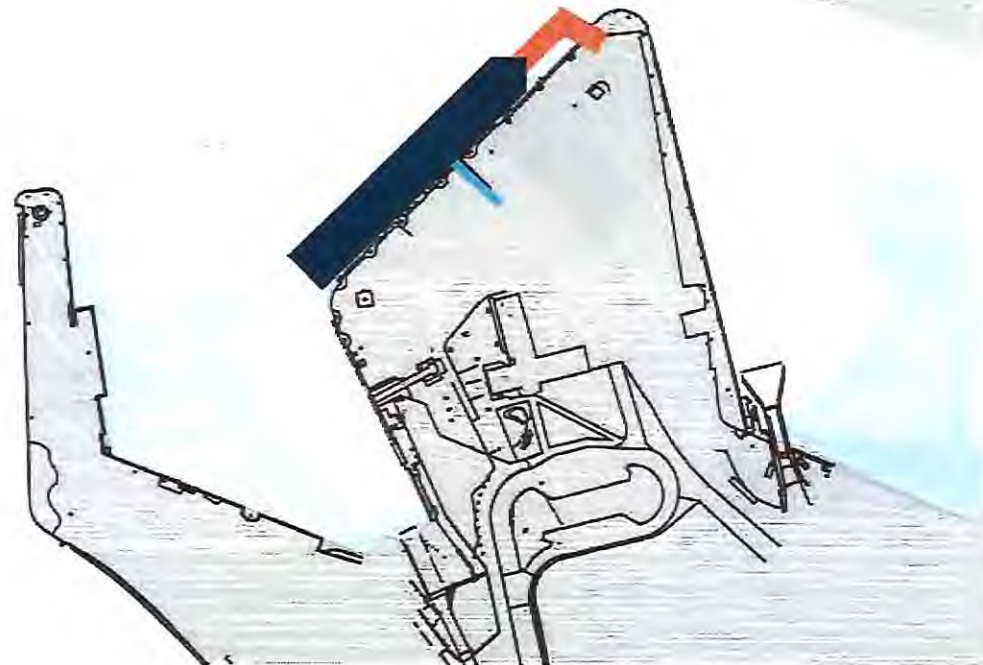
Arran Berth Works
• Left as-is / maintenance works

Winton Pier
• New linkspan
• Fendering
• Possible breakwater enhancement TBC
• Possible need for dredging at turning area

Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox

Taken Forward



RAMBOLL


GMcG Meeting Notes

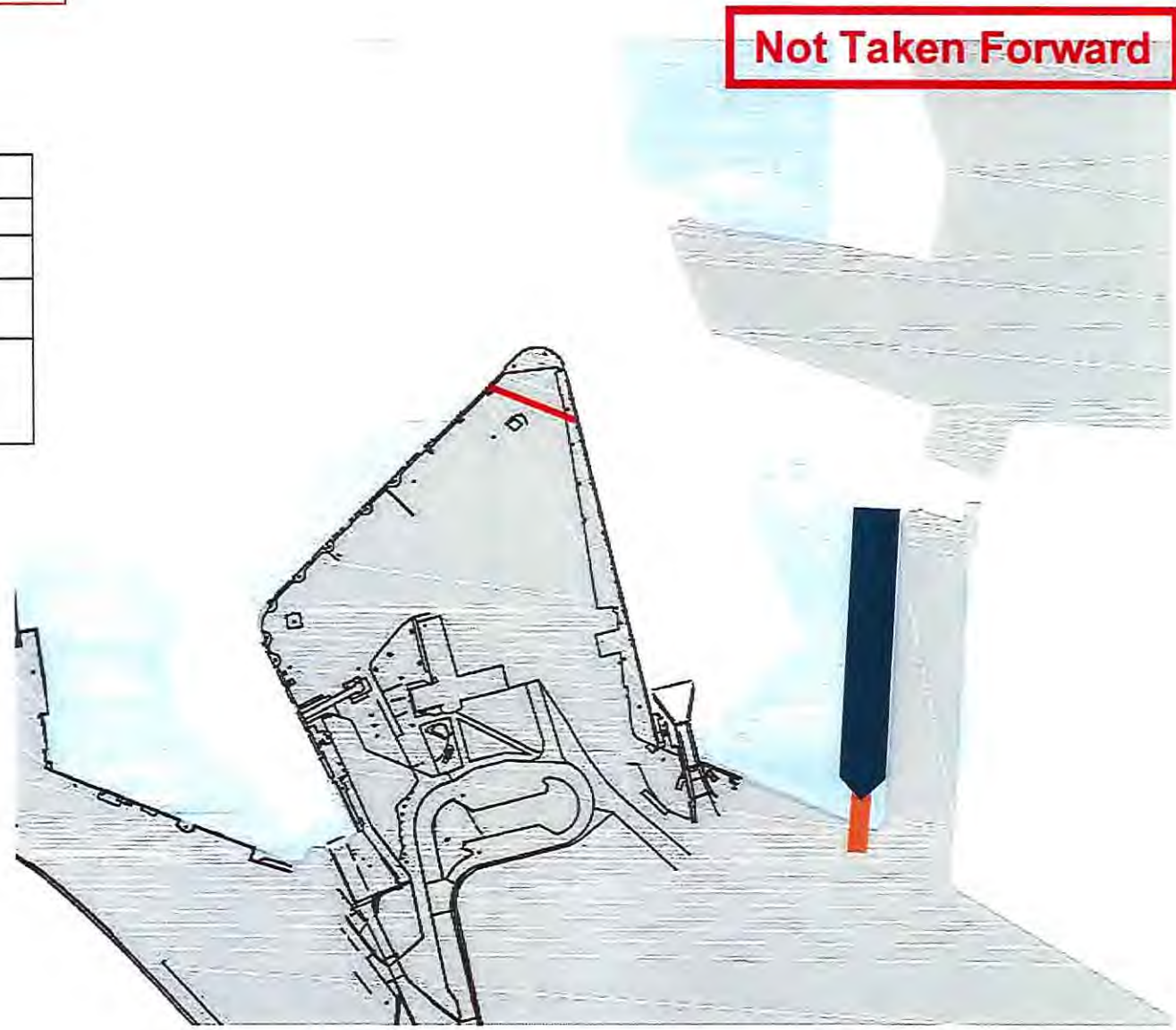
Too many unknowns and not discussed in any detail.

Not Taken Forward

Option 15 14	
Primary Berth	Marina Pier
Secondary Berth	Arran (or Irish)
Arran Berth Works	
• Left as-is / maintenance works	
Marina Pier	
• New linkspan	
• Fendering	
• Dredging	

Key:

 Approx area where current under keel clearance is not sufficient for Glen Sannox



ARDROSSAN HARBOUR DEVELOPMENT PREFERRED BERTH OPTION REVIEW

29th March 2019

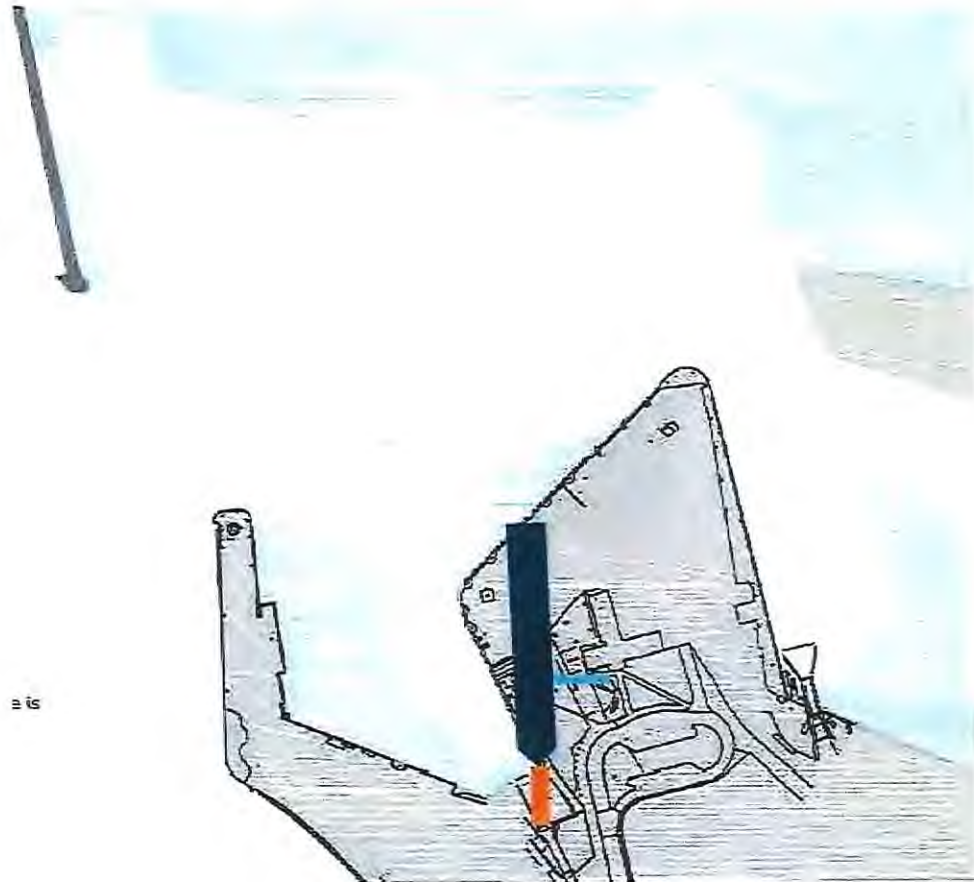
BERTH WORKSHOP 12TH FEBRUARY 2019

- 14 Long List options were reviewed
- 3 groups of Short List options were identified to be taken forwards:
 - Option 2 (Arran Berth)
 - Option 6/7 (Arran Berth)
 - Option 12/13 (Winton Pier)

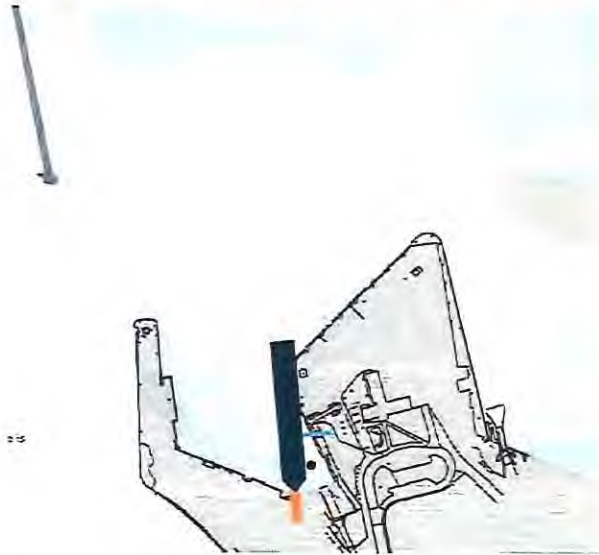
SHORT LISTED OPTIONS

Option 2

Taken forwards as a favoured option



SHORT LISTED OPTIONS 12TH FEBRUARY 2019



Option 6

Discounted as too similar to existing situation which has failed vessel simulation



RAMBOLL



Option 7

Taken forwards as a favoured option



SHORT LISTED OPTIONS 12TH FEBRUARY 2019

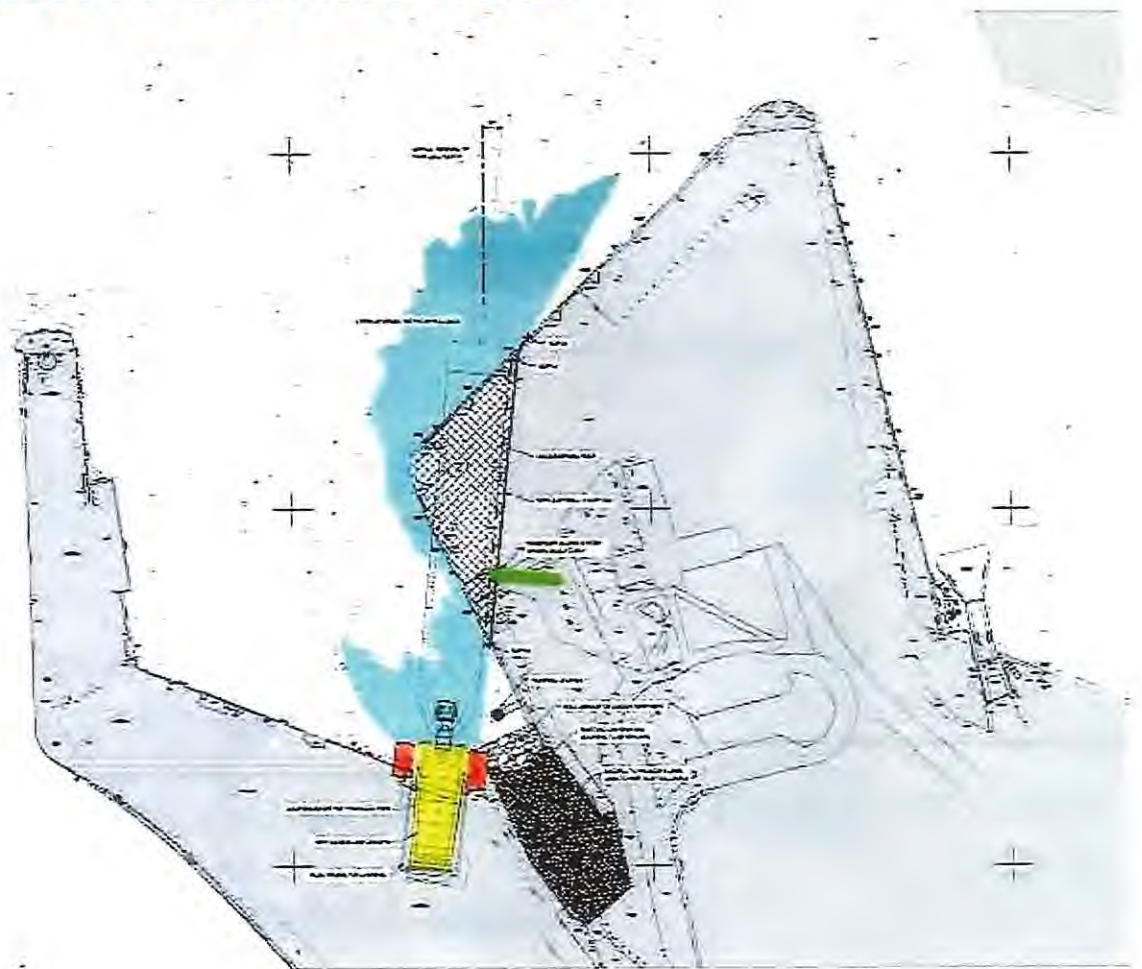
Option 7.1

New option introduced

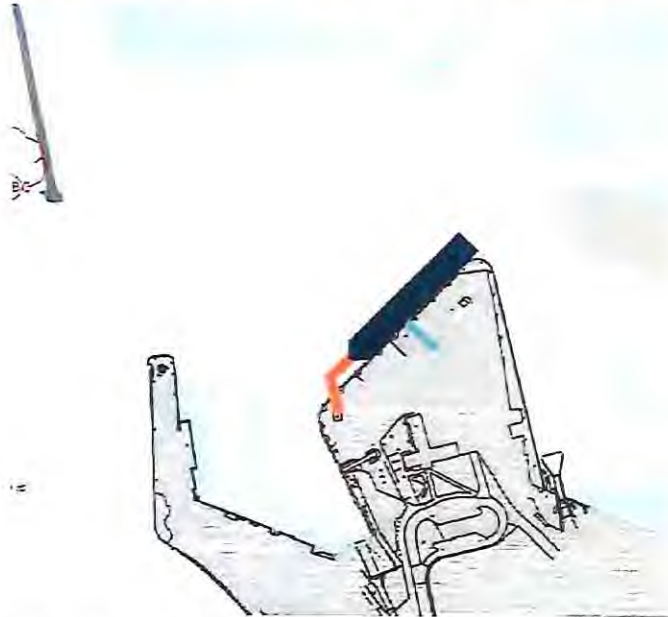
Taken forwards as a favoured option



RAMBOLL

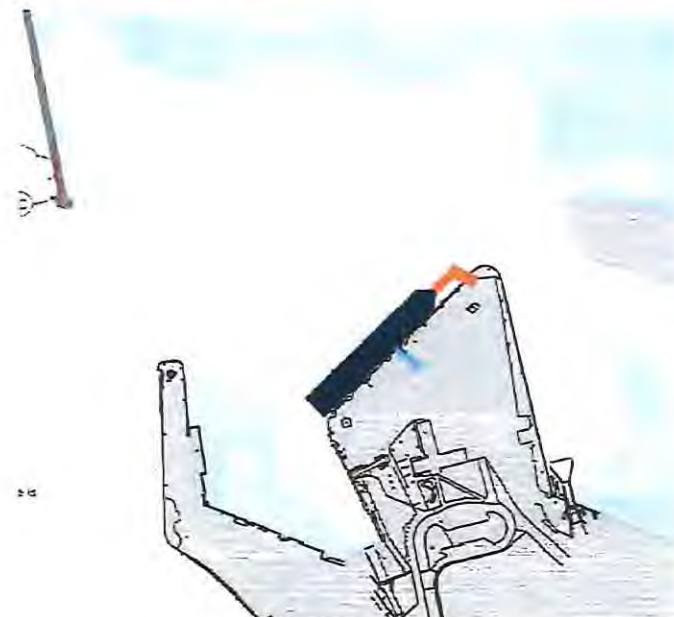


SHORT LISTED OPTIONS 12TH FEBRUARY 2019



Option 12

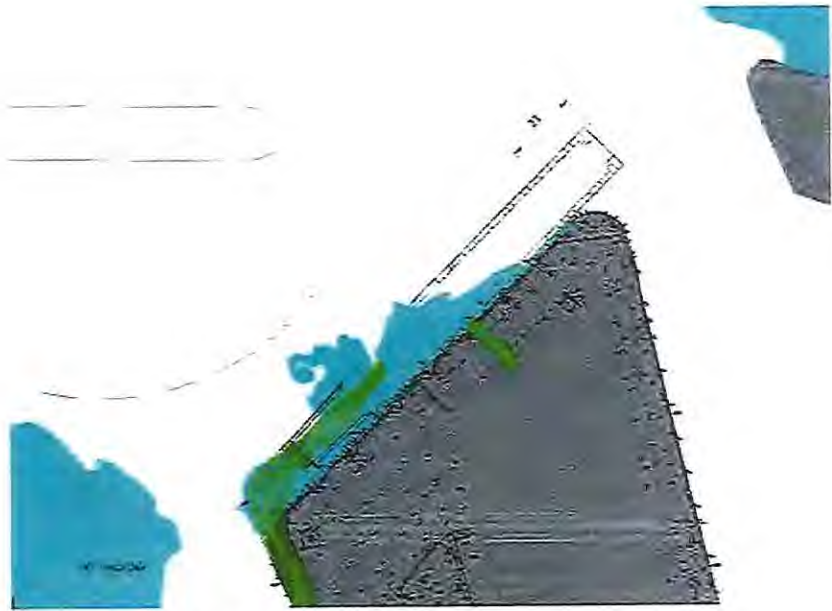
Vehicle tracking performed



Option 13

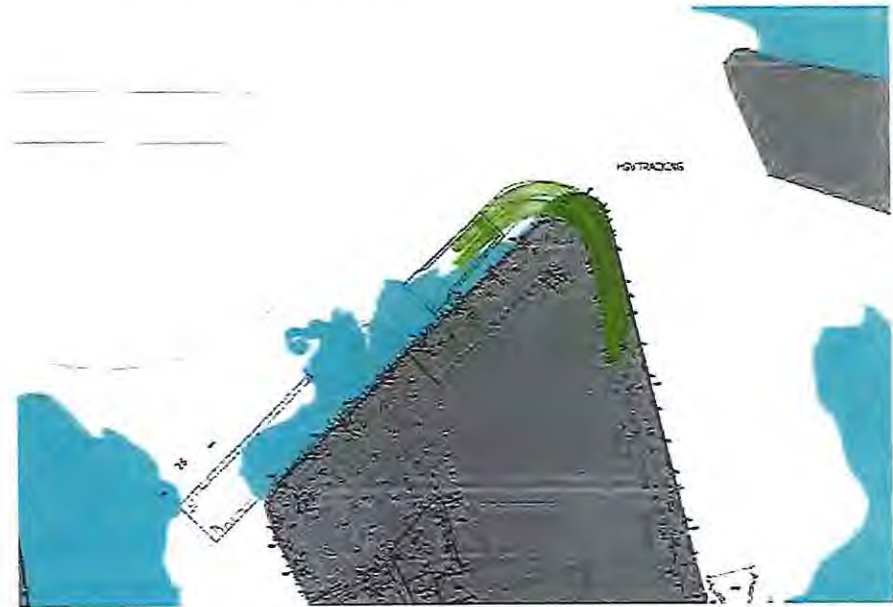
Vehicle tracking performed

SHORT LISTED OPTIONS 12TH FEBRUARY 2019



Option 12

Fixed bankseat



Option 13

Fixed bankseat



25m stern overhang. Discounted.



SHORT LISTED OPTIONS 12TH FEBRUARY 2019



Option 12

Turning pontoon

- Exposed location for pontoon
- Vulnerability to vessel collision
- Pontoon complexity and costs

RAMBOLL

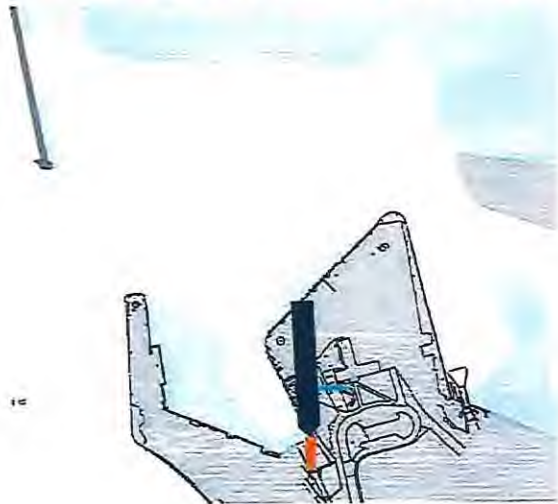


Option 13

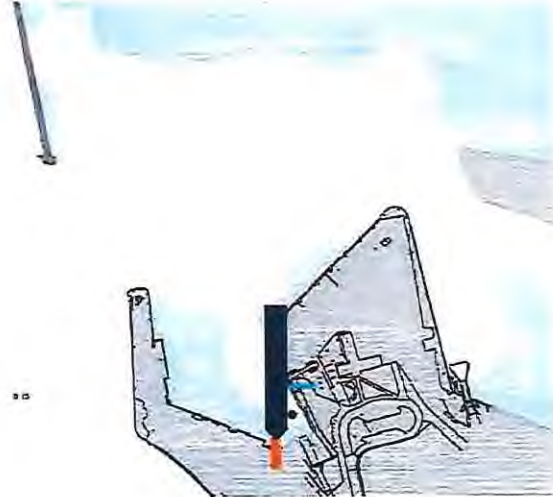
Turning pontoon



FAVOURED OPTIONS



Option 2



Option 7



Option 7.1

Progress Note dated 04th March 2019 issued recording work undertaken up to this point



OPTION 2 – DEVELOPED CONCEPT DRAWING



OPTION 7 – DEVELOPED CONCEPT DRAWING



OPTION 7.1 – DEVELOPED CONCEPT DRAWING





FAVOURED OPTIONS – DETAILED STUDIES

- Vessel simulation – 20th March
- Ground conditions and construction methodology
- Wave modelling
- Mooring analysis
- Estimate of construction durations
- Estimate of construction costs

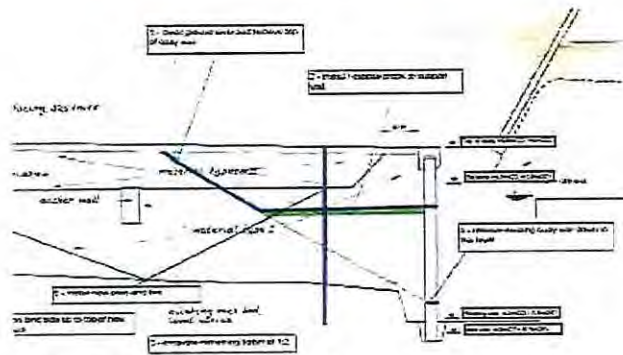
GROUND CONDITIONS



- 
1858 Pier Outline
 MASONRY WALL, NOT IDENTIFIED IN THE GROUND INVESTIGATION
- 
1895 Pier Outline
 CONSTRUCTED OF SANDSTONE BLOCKS. IDENTIFIED IN TT09.
- 
1963 Pier Outline
 CONSTRUCTED OF CONCRETE, IDENTIFIED IN TT04, TT05, AND TT09.
- 
1963 - 1974 Pier Outline
 BURIED STEPPED CONCRETE WALL, IDENTIFIED IN TT04, AND TT05.
- 
1974 Pier Outline
 SHEET PILED WALL TIED BACK WITH ANCHOR RODS TO A CONCRETE ANCHOR BEAM, IDENTIFIED IN TT04-08, TT06-08, TT08A-08 AND TT09-08.

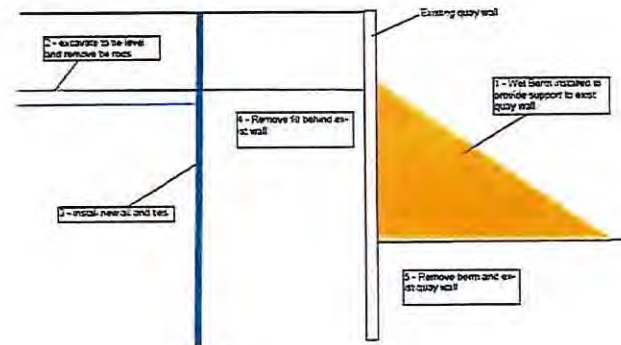
Strata	Depth to Top of Stratum (m bgl)	Thickness Range (m)	Brief Description
Made Ground	0.0	0.04 to 0.2	Mainly granular material of sand and gravel including hardcore and concrete, with occasional layers of clay.
Superficial Deposits	3.0 to 8.0	5.5 to 10.5	Sandy silty fine to coarse gravel and cobbles, with occasional layers of firm or stiff sandy clay, and occasional boulders
Bedrock	5.5 to 10.5	10.5 to 24.5 (proven)	<u>Generally</u> very weak to weak, occasionally medium strong, sandstone, and weak to medium strong bands of conglomerate

CONSTRUCTION METHODOLOGY



MATERIAL PLACED SUBSEQUENT TO PILING

Method A – Form batter



Method B – Construction bund

Connect existing tie rods to new wall on a rolling front

Method C –
Temporary tie rod connections

CONSTRUCTION METHODOLOGY

	Option 2	Option 7	Option 7.1
Existing structures affected	4 existing gravity quay walls.	2 existing gravity quay walls.	2 existing gravity quay walls.
	Tie rods in centre and at north end.	Tie rods and tie back structures throughout	Numerous existing perimeter wall tie rods.
Construction methodology assumed	Method C – Temporary tie rod connections	Method B- Construction bund	Method B - Construction bund. Method C could be applied

WAVE MODELLING

MOORING ANALYSIS

ESTIMATED MARINE CONSTRUCTION DURATIONS

Option 2: 18 months

Option 7: 12 months

Option 7.1: 15 months

For all options it is anticipated that the existing Arran berth will be out of service for the full construction period

ESTIMATED MARINE CONSTRUCTION COSTS

	Construction Cost	PPG Funding	Delta in funding	Optimism bias (40%)
Option 2				
Option 7				
Option 7.1				

- Construction costs only.
- Based on double lane linkspan (single lane linkspan costs to follow).
- Allowance for inflation to mid point of construction, based on a first quarter 2020 start.

SUMMARY

	Navigability	Ground conditions	Resilience	Landside interface	Construction duration / impact on service	Construction cost
Option 2	TBC	Less impact on tie backs			18 months	
Option 7	TBC	High impact on tie backs Relies on construction bund			12 months	
Option 7.1	TBC	Medium impact on tie backs			15 months	

ARDROSSAN HARBOUR DEVELOPMENT

PREFERRED LANDSIDE GA OPTION REVIEW

29th March 2019

IronsideFarrar
Environmental Consultants

BASE CASE

- PPG / NAC submission 2017
- Base Case provided for:
 - [REDACTED] marine investment
 - [REDACTED] landside investment
 - [REDACTED] TOTAL Capex
- Funding provided by:
 - Peel Ports Group [REDACTED]
 - NAC [REDACTED]
 - NAVT [REDACTED]
 - Others [REDACTED]
 - TOTAL [REDACTED]

MARINE INFRASTRUCTURE		No.	Cost	Peel			
Table 1							
Linkspan For New Ferry		1					
Temporary NV PAS Modifications		1					
Harbour Wall Improvements		Sum					
Navigation Aids		Sum					
Bollards / Fences / Quay Protection		Sum					
Dredge Pocket / Marine Works		1 No Linkspan					
Quay / Docking Arrangements For Brodick/ Campbelltown Ferries		Arran Quay / Irish Berth					
Sub - Total							
Fees & Associated Costs							
Optimism Bias							
Sub - Total Investment							
Landside Infrastructure		No.	Cost	Fees	NAAC	NAVT	Other
Table 2							
New Terminal Building		1200m2					
Town Centre Public Realm Connections		3,300m2					
Surface Main Car Park (450tp)		13,000m2					
Terminal External including landscaping / Lighting / CCTV-SMART Systems		3,000m2					
Access and Upgrade to Road / Pedestrian Mairings		250m					
Site Works / Utilities / Traffic Man							
Multi-Modal (Ferries) / Rail / Bus / Cycle Integration / Covered Walkway & DDA Work		100Un. M					
Lighting							
Extend Marshalling Capacity		150Un. m					
Car Park Management							
New Signage - Vehicle / Pedestrian Inc. Road Signs		3 Gantry					
Boundary Fencing		200m					
Sub-Total							
Fees & Associated Costs							
Optimism Bias (10%)							
Sub Total Investment							
Committed and Approved Investment			Cost				
Total Table 1							
Total Table 2							

LANDSIDE / TERMINAL OBJECTIVES

- Developing the Ardrossan Ferry Terminal in accordance with the Sponsors Requirements
- Developing a masterplan based on sustainable place that meets current / future needs and meets needs of the port
- Securing a layout that facilitates high intensity ferry operations and offers a simple, legible layout with operational and user benefits
- Supports user needs in terms of transport interchange and connections to Station & Town Centre
- Seeks within the context of above to minimise disruption, construction duration and minimise construction activity / user conflict



SRS LANDSIDE REQUIREMENTS

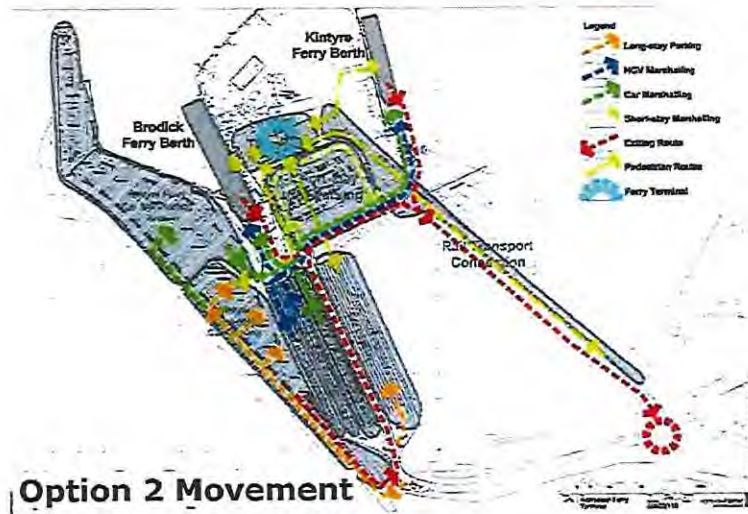
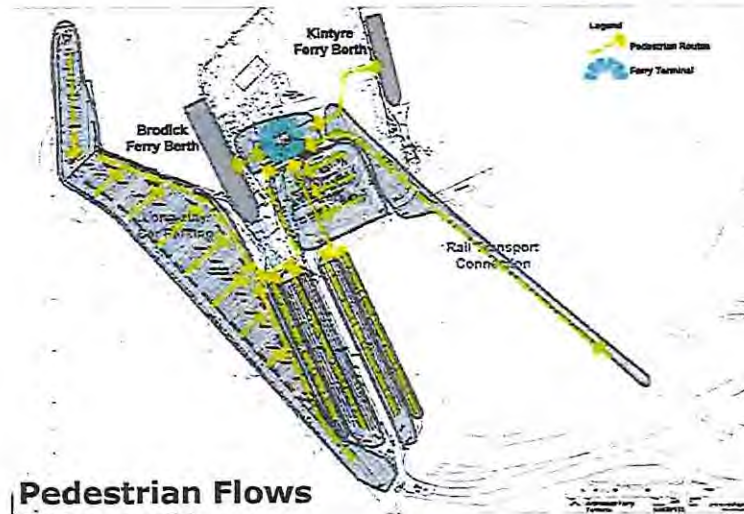
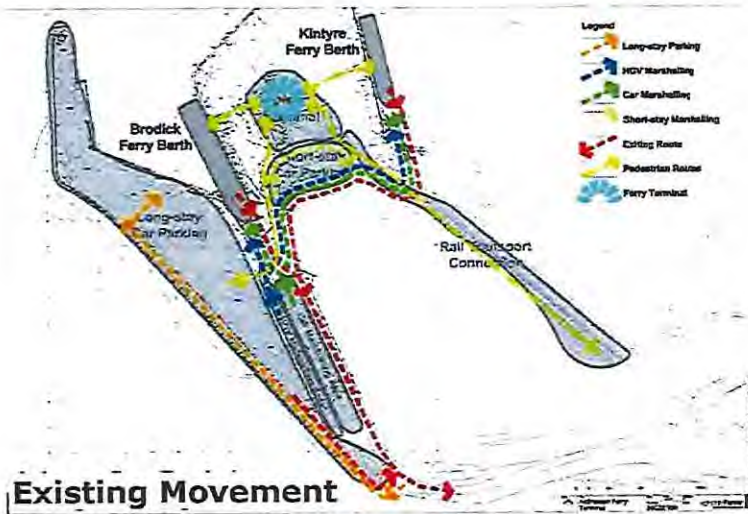
- 25 year Design Life
- Sponsor Approval to design specification
- Compliance with Eurocodes/BSI /Standards
- PI / Warranty Requirements
- Major Berth Amendments (Option 2/7)
- Revised Linkspan Specification
- Amended Scope/Scale of Construction

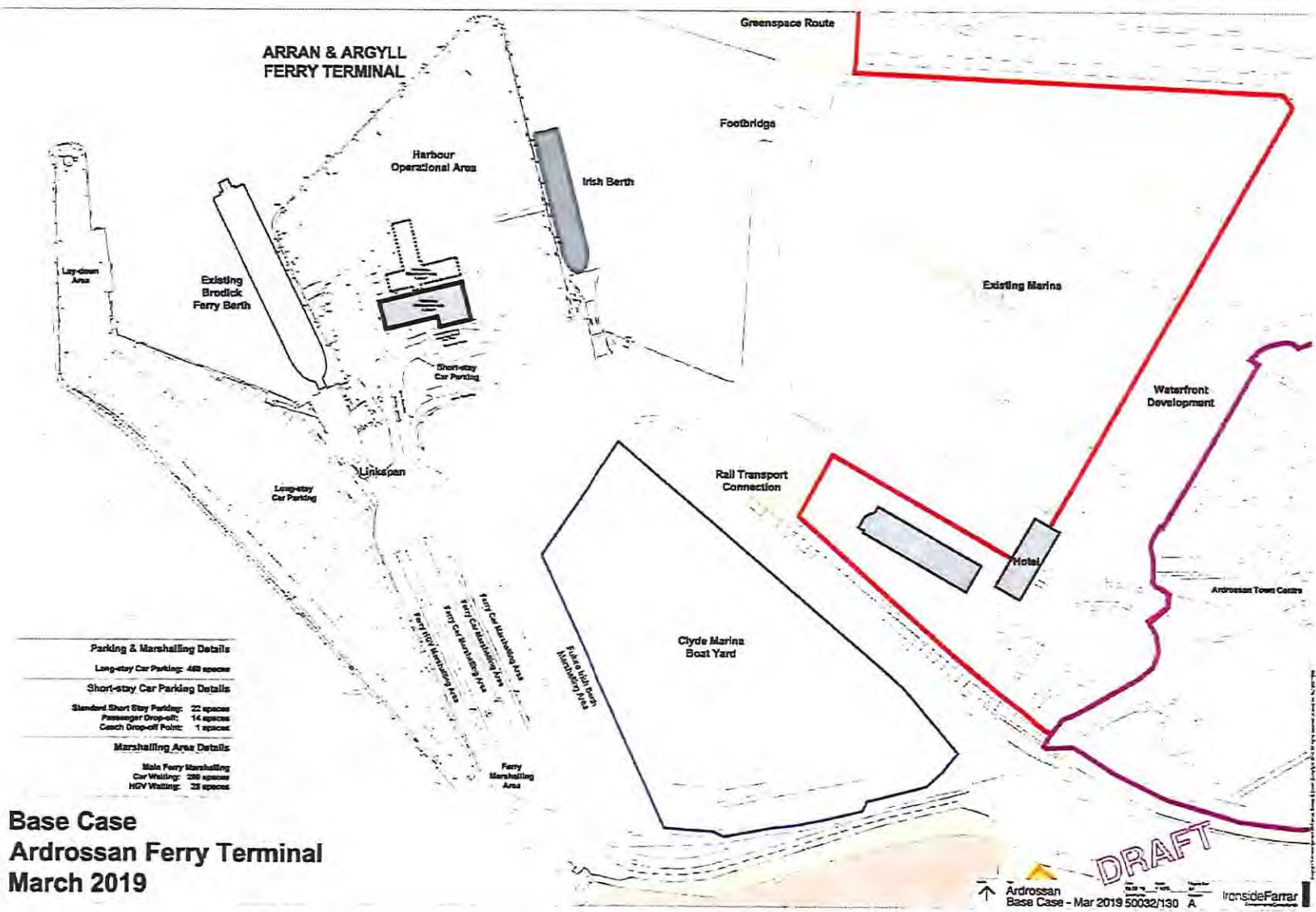
Para	Item	Add Cost (C) Prog (P)	Specification	Allowed in Base Case
1.5	Min design life all works 25 years	C / P	Full new specification to BS/ DMRB Requirement	No
1.5	NAC/PPG to secure approval of design life	C/ P	(see above)	N
1.6	Min require to meet BSI / Eurocodes	C/P	Full new specification to BS/ DMRB Requirement Material Testing Material Performance	No
1.6	H&S in Docks CoP	None	-	Yes
1.7	Project specification /contract specification based on SRS	C/ P	Requires SRS defined specification (see BSI /Eurocodes)	No
1.7	BIM Protocols	C	Requires Design Team to operate to BIM Protocol. Level unspecified	No
1.7	Requires assignation of design liability	C/P	Designer PI required. Scope and specification defined by PI	No
1.7	Warranty Requirements	C/P	See above	No
1.7	PI requirements	C/P	See above	No
1.7	Risk Transfer	TBC	TBC	No
2.0	Health & safety , Service continuity	C/ P	Scope of Works change by addition of major berthing amendments	No
2.0	Operational Facility	C/P	Scope of Works change by addition of major berthing amendments	Yes But less complex / shorter duration
2.0	Technical Studies	C/P	Additional Tech. Studies required to address changed project scope	Yes But very Limited
2.0	Consultation & Engagement	C/P	Additional and more extensive Consultation Required	Yes But very Limited
3.1	PAS	C/P (TS)	No allowance for PAS. Funded by CMAL/TS	No
	Terminal Bldg	C/P	Calmac Schedule of Requirements not in SRS (confirm)	No
5	Site Infrastructure	C/P	Scope of Works change by addition of major berthing amendments	Yes But less complex / shorter duration
6	Other Requirements	C/P	Scope of Works change by addition of major berthing amendments Implications: • Roads / Signage • Utilities/Ducts incl Temp • Gantries • LNG / Access • Waste • Bunkering • Accommodation • Construction Management • Programme / Prelims / Inflation • Etc	Yes But less complex / more limited

DESIGN REQUIREMENTS

- Safe movement and capacity for safe operations in port environment (Services/Operators/Users)
- High capacity (volume/time) to secure vessel loading/unloading
- Capacity to meet MV Glen Sannox vessel capacity in terms of marshalling / car parking/ user needs and public transport connectivity
- Enhanced connections and legibility to Town Centre, enhanced facilities for public transport and enhanced provision for active travel modes
- Safeguard future adaptability and meet needs of other port operators/operations







**ARRAN & ARGYLL
FERRY TERMINAL**

Parking & Marshalling Details

Long-stay Car Parking: 480 spaces

Short-stay Car Parking Details

Standard Short Stay Parking: 22 spaces

Passenger Drop-off: 14 spaces

Catch Drop-off Point: 1 space

Marshalling Area Details

Main Ferry Marshalling

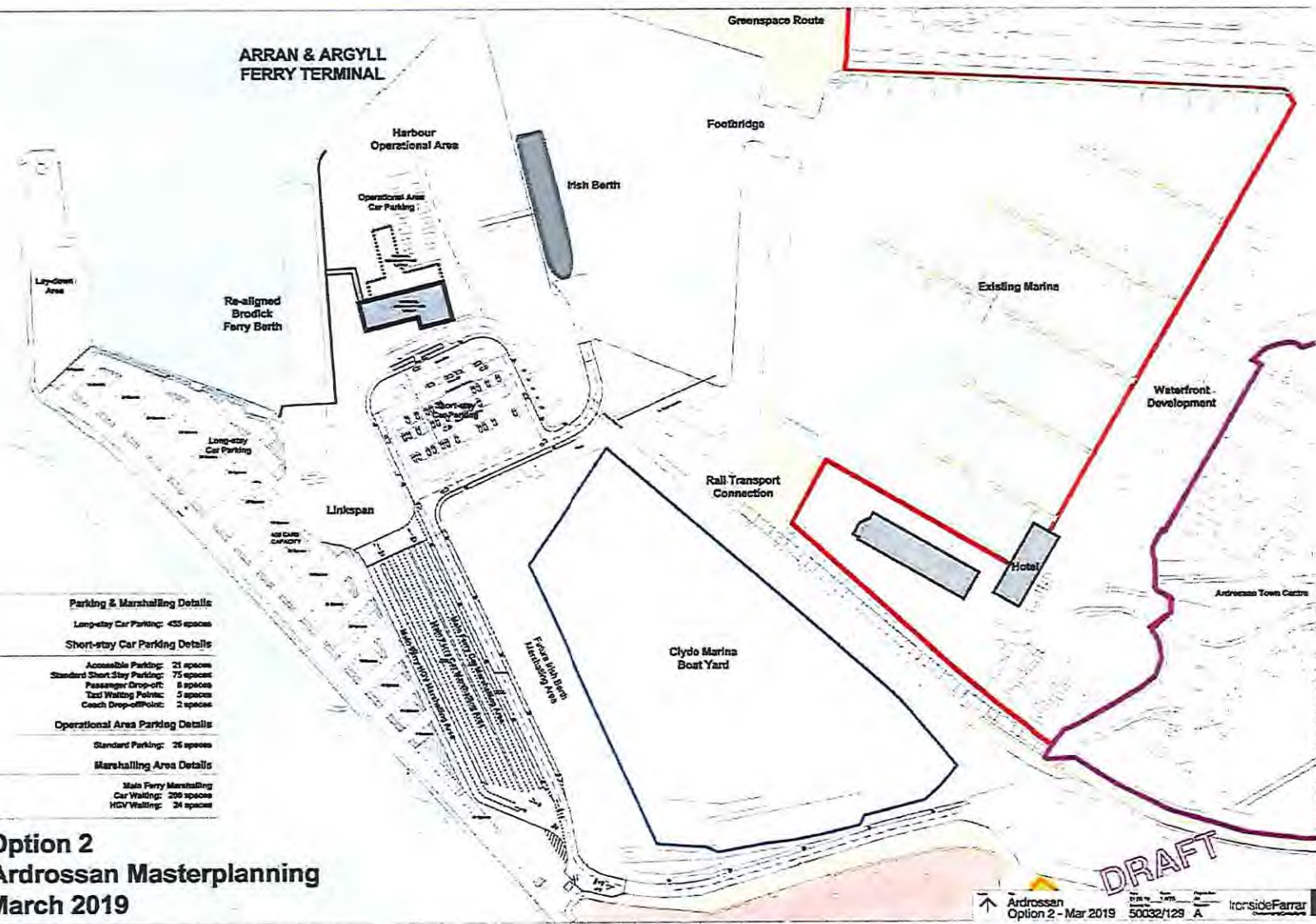
Car Waiting: 200 spaces

HGV Waiting: 23 spaces

**Base Case
Ardrossan Ferry Terminal
March 2019**

DRAFT

ARRAN & ARGYLL FERRY TERMINAL



Parking & Marshalling Details

Long-stay Car Parking: 433 spaces

Short-stay Car Parking Details

- Accessible Parking: 21 spaces
- Standard Short Stay Parking: 75 spaces
- Passenger Drop-off: 8 spaces
- Taxi Waiting Points: 5 spaces
- Coach Drop-off/Point: 2 spaces

Operational Area Parking Details

Standard Parking: 26 spaces

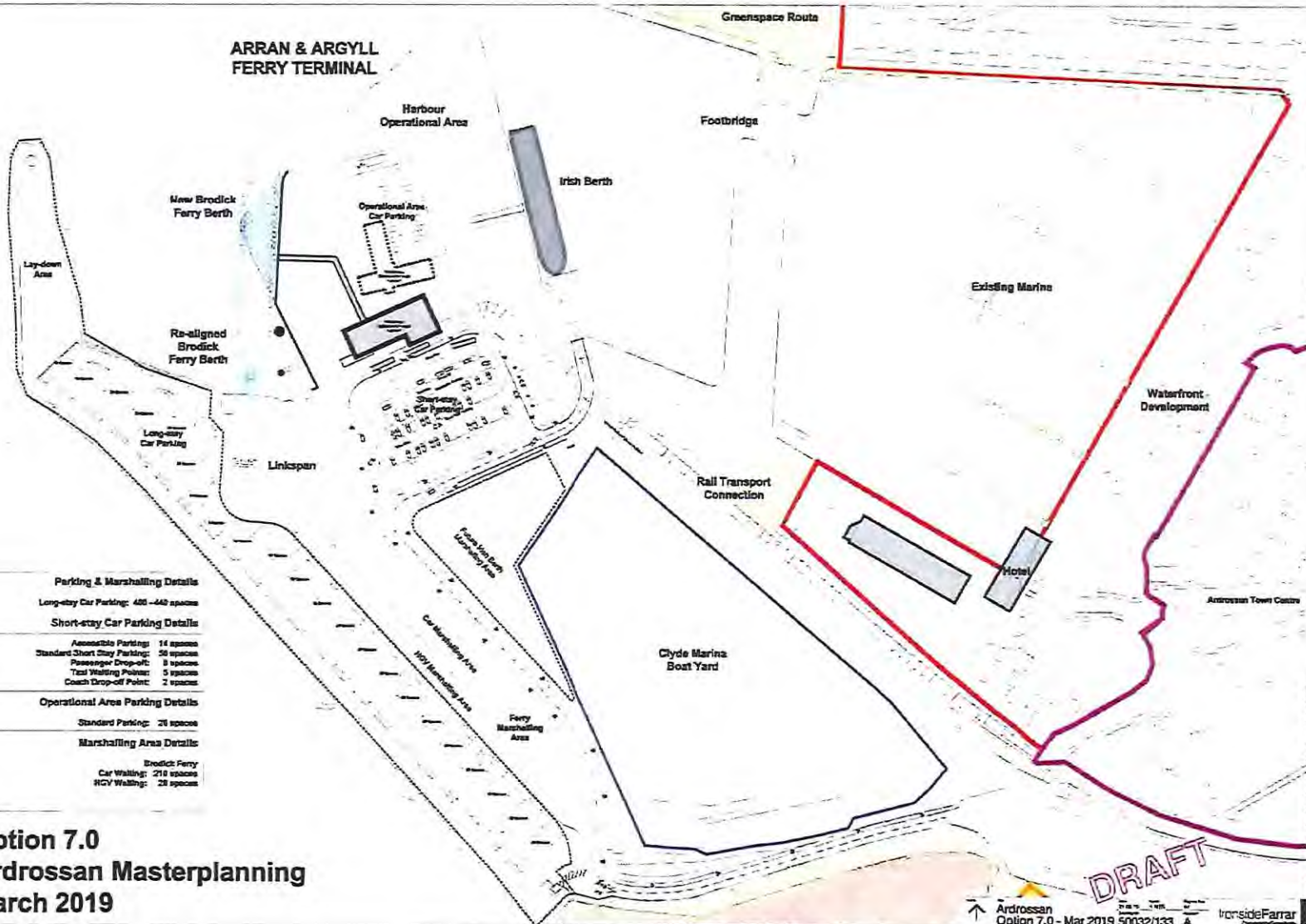
Marshalling Area Details

- Main Ferry Marshalling
- Car Waiting: 200 spaces
- HGV Waiting: 34 spaces

**Option 2
Ardrossan Masterplanning
March 2019**

DRAFT

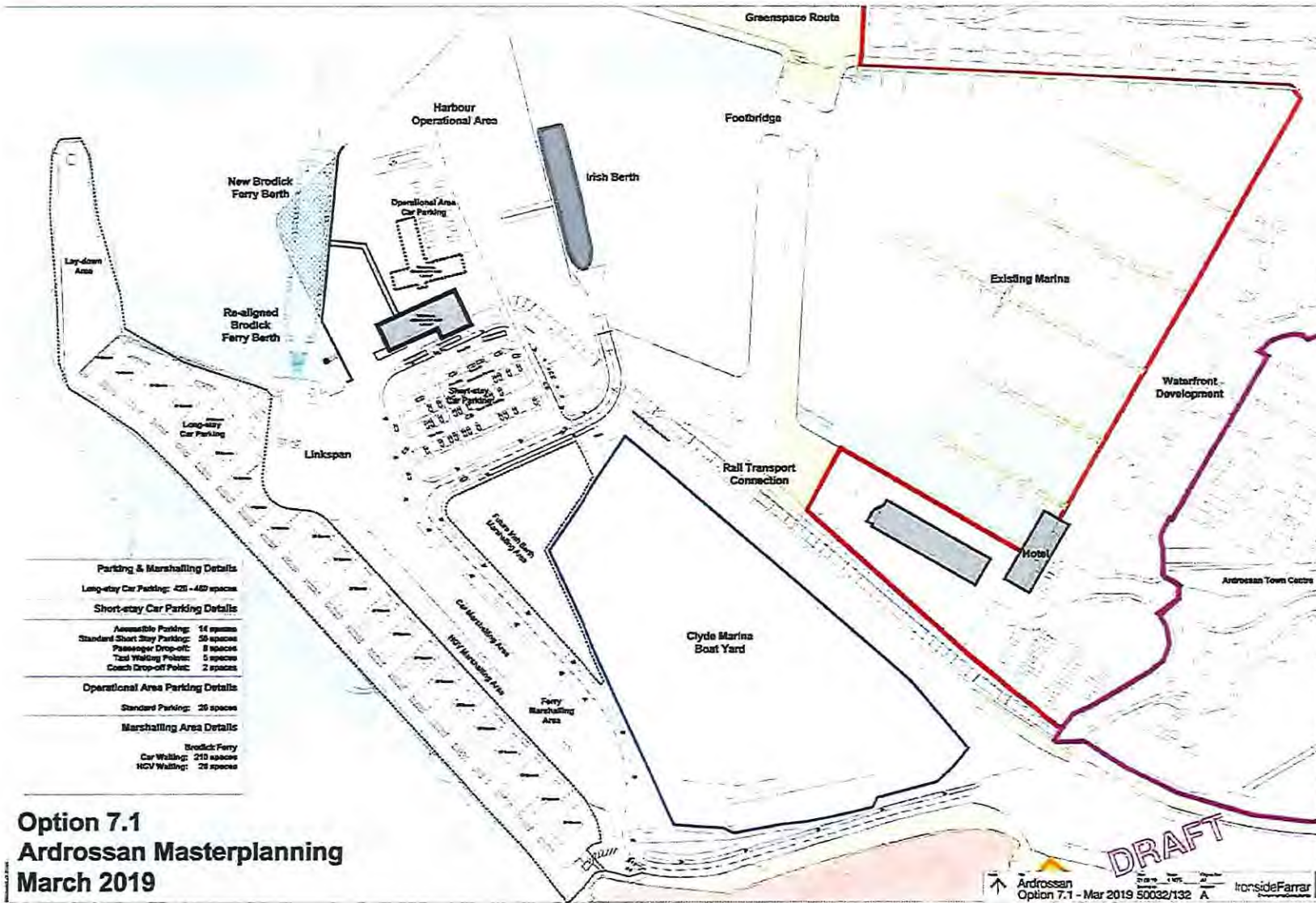
ARRAN & ARGYLL FERRY TERMINAL



- Parking & Marshalling Details**
- Long-stay Car Parking: 480 - 640 spaces
 - Short-stay Car Parking Details
 - Accessible Parking: 14 spaces
 - Standard Short Stay Parking: 56 spaces
 - Passenger Drop-off: 8 spaces
 - Taxi Waiting Point: 5 spaces
 - Coach Drop-off Point: 2 spaces
 - Operational Area Parking Details
 - Standard Parking: 26 spaces
 - Marshalling Area Details
 - Brodick Ferry
 - Car Waiting: 210 spaces
 - HGV Waiting: 28 spaces

Option 7.0
Ardrossan Masterplanning
March 2019

DRAFT



ESTIMATED LANDSIDE CONSTRUCTION COSTS

	Construction Cost	PPG/ NAC / Total Funding	Delta Funding	Optimism bias (25%)
Base Case				10%
Option 2				25%
Option 7				25%
Option 7.1				25%

- Cost based on Construction mid-point Q1 2021
- Exclude VAT

ITEMISED LANDSIDE COST BREAKDOWN

Option 2 Cost Breakdown (excl. VAT)

Estimated Construction Costs

Optimism Bias

Management Fee

Contingency

Inflation

Total Estimated Construction Cost

Spend to Date

Overall Total

Estimated Construction Programme



18 Months

Option 7 Cost Breakdown (excl. VAT)

Estimated Construction Costs

Optimism Bias

Management Fee

Contingency

Inflation

Total Estimated Construction Cost

Spend to Date

Overall Total

Estimated Construction Programme



ITEMISED LANDSIDE CHANGE ITEMS

- Construction Cost Additions – SRS Compliance
 - Site Area Works / Demolitions
 - SRS Specification Roads & Infrastructure
 - SRS Specification Marshalling/Car Parks
- Pierhead Post Marine Works Resurfacing
- Optimism Bias 25%
- Fees raised to 12.5%
- Inflation allowance



Option 2 Cost Breakdown (excl. VAT)

Estimated Construction Costs
 Optimism Bias
 Management Fee
 Contingency
 Inflation
Total Estimated Construction Cost



Estimated Construction Programme 18 Months

Option 7 Cost Breakdown (excl. VAT)

Estimated Construction Costs
 Optimism Bias
 Management Fee
 Contingency
 Inflation
Total Estimated Construction Cost



Estimated Construction Programme 18 Months



ESTIMATED CONSTRUCTION DURATIONS

	Construction Cost	Contract Duration Marine	Contract Duration Landside	Assumes Port Closure
Base Case		6 months	12 months	No
Option 2		18 months	18 months	Yes
Option 7		12-15 months	18 months	Yes
Option 7.1		12-15 months	18 months	Yes

Programme:

- Procurement Q4 2019
- Site Start Q2 2020
- Completion of Works Q4 2021



FAVOURED OPTION COMPARISON

	Total score	Navigability and reliance		Ground conditions and construction risk		Interface with Landside Masterplan		Marine Construction Duration and impact on service		Landside Construction Duration and impact on service		Costs	
		Commentary	Score out of 10	Commentary	Score out of 10	Commentary	Score out of 10	Commentary	Score out of 10	Commentary	Score out of 10	Commentary	Score out of 10
Option 2	50	Vessel simulation found this option to the best option. Highest wave in NW. Lowest Waves in a SW	10		5		10		1		10		7
Option 7	13		1		1		5		10		1		5
Option 7.1	21		5		5		1		5		5		5

SUMMARY

	Navigability	Ground conditions	Resilience	Landside interface	Construction duration / impact on service	Construction cost
Option 2	***	**	***	***	18 months	**
Option 7	**	**	**	*	12 months	**
Option 7.1	**	**	**	**	15 months	**



**ARDROSSAN HARBOUR REDEVELOPMENT
PROOF OF CONCEPT REPORT**

**APPENDIX 7
BERTH CONSTRUCTION DURATION SUMMARY**

Ardrossan Harbour Development

Berth Works - Estimated Construction Durations
21/03/2019

	Estimated Period (months)	Risk Rating	Quarter 1			Quarter 2			Quarter 3			Quarter 4			Quarter 1			Quarter 2			Quarter 3		
			Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21
Months with higher weather delay risk																							
Option 2 Construction	15	+3																					
Option 2 Arran Berth out of use	13	+3																					
Option 2 Irish Berth out of use	4	ind																					
Marine works likely effected by weather																							
Option 7 Construction	11	+2																					
Option 7 Arran Berth out of use	11	+2																					
Option 7 Irish Berth out of use	4	ind																					
Marine works likely effected by weather																							
Option 7.1 Construction	13	+2																					
Option 7.1 Arran Berth out of use	12	+2																					
Option 7.1 Irish Berth out of use	4	ind																					
Marine works likely effected by weather																							

Notes:

↓ Mid point of construction / price point for inflation

↓ Duration applied in assessment of budget costs

Assumed 1Q 2020 start on site

Estimated construction period based on what is known / assumptions at this stage

Duration for Irish berth are very indicative at this stage as there is no design.

- Option 2 - assume 2 month overlap between Arran berth use and construction while new works progress south
- Option 7 - assume no overlap between Arran berth use and construction as first activity is to install construction bund
- Option 7.1 - assume 1 month overlap between Arran berth use and construction while new works progress south

**ARDROSSAN HARBOUR REDEVELOPMENT
PROOF OF CONCEPT REPORT**

**APPENDIX 8
BERTH CONSTRUCTION COST ESTIMATE**



ARDROSSAN HARBOUR REDEVELOPMENT - PROOF OF CONCEPT

BERTH CONSTRUCTION COST ESTIMATES: OPTIONS 2, 7 & 7.1 (With Op. 2 Narrative)

11th April 2019

17/267



Executive Summary

Option 2			
Estimated Construction Cost, (Double Lane Linkspan)	£		Excluding VAT
Optimism Bias	£		Excluding VAT
Total Estimated Construction Cost, (Double Lane Linkspan)	£		Excluding VAT
Estimated Reduction for Single Lane Linkspan, (including reduction in Optimism Bias)	£		Excluding VAT
Total Estimated Construction Cost, (Single Lane Linkspan)	£		Excluding VAT
Estimated Construction Programme		18 months	

Option 7			
Estimated Construction Cost, (Double Lane Linkspan)	£		Excluding VAT
Optimism Bias	£		Excluding VAT
Total Estimated Construction Cost, (Double Lane Linkspan)	£		Excluding VAT
Estimated Reduction for Single Lane Linkspan, (including reduction in Optimism Bias)	£		Excluding VAT
Total Estimated Construction Cost, (Single Lane Linkspan)	£		Excluding VAT
Estimated Construction Programme		13 months	

Option 7.1			
Estimated Construction Cost, (Double Lane Linkspan)	£		Excluding VAT
Optimism Bias	£		Excluding VAT
Total Estimated Construction Cost, (Double Lane Linkspan)	£		Excluding VAT
Estimated Reduction for Single Lane Linkspan, (including reduction in Optimism Bias)	£		Excluding VAT
Total Estimated Construction Cost, (Single Lane Linkspan)	£		Excluding VAT
Estimated Construction Programme		15 months	

Cost Summary

This report presents the updated berth cost for Option 2 and new berth costs for Options 7 and 7.1.

The costs for Option 2 are calculated using the historic costs developed in 2018 and updated to allow for inflation, additional identified scopes of work to the original estimate and the addition of allowance for Optimism Bias. Costs for Option 2 are presented on this basis below. Further comparison of the 2018 and 2019 costs for Option 2 are provided in following pages.

Costs for Options 7 and 7.1 have been developed in 2019 and a breakdown of these costs is provided in the following pages.

The estimated construction costs are subject to the Basis of Estimates:

Description		2018 Scheme	Schemes Developed in 2019	
		Option 2 Totals Dbl Lane Linkspan	Option 7 Totals Dbl Lane Linkspan	Option 7.1 Totals Dbl Lane Linkspan
1 Linkspan and Quay Works	£:			
2 Inflation from 2018 to Mid Point of Construction, (BCIS TPI)	£:			
3 Additional Costs for Option 2 against previous estimate:				
Double lane linkspan	£:		included	Included
Piled perimeter to linkspan	£:		included	Included
Infilling of existing linkspan void	£:		included	Included
Removal of existing structures	£:		included	Included
Increased depth of excavation	£:		included	Included
Mooring Bollards review	£:		included	Included
Dredging	£:		included	Included
MRC's, Preliminaries, OHP, etc	£:		included	Included
Inflation from 2018 to Mid Point of Construction, (BCIS TPI), on additional costs only	£:		included	Included
Sub Totals, (inflation adjusted)	£:			
4 Provisional allowance for Quay Wall Repairs	£:			
5 Provisional allowance for tie-in detail at Winton Pier, (between old and new quay to allow dredging locally)	£:			
Sub Totals, (inflation adjusted)	£:			
6 Optimism Bias, (15%)	£:			
Totals, (inflation adjusted & Excluding VAT)	£:			
Estimated Programme Duration, (including programme risk allowance)		18 months	13 months	15 months
Mid-point of Construction for Inflation		4 Qtr 2020	3 Qtr 2020	4 Qtr 2020

Single Lane Linkspan Option

The estimated construction costs for a single lane linkspan option are detailed below:

Description		Option 2 Totals Single Lane Linkspan	Option 7 Totals Single Lane Linkspan	Option 7.1 Totals Single Lane Linkspan
Double Lane Option	£:			
Less				
Deduction for reduced Linkspan	£:			
Reduced Volume of Excavation	£:			
Reduced Length of Pile Wall	£:			
Reduced MRC's, etc	£:			
Inflation on above	£:			
Optimism Bias on above	£:			
Totals, (inflation adjusted & Excluding VAT)	£:			
This is a potential saving, (Excluding VAT), of	£:			

Basis of Estimates

The estimate is based on the following design information received previously on or before 15th March 2018:

- Ramboll Option 2 design information as listed in previous cost estimates for the selected schemes.

The estimate is also based on the following design information received on or before 15th March 2019:

- Ramboll drawing 1620005121-RAM-XX-00-SK-CW-0007 P01 - Berth Short List Option 2
- Ramboll drawing 1620005121-RAM-XX-00-SK-CW-0009 P01 - Berth Short List Option 7
- Ramboll drawing 1620005121-RAM-XX-00-SK-CW-0010 P01 - Berth Short List Option 7.1
- Ramboll drawing 1620005121-RAM-XX-00-SK-CW-0011 P02 - Buried Structure Plan
- Ramboll drawing DWDR-RAM-BHC-12-DR-CW-10100 C01 - 150t Bollard Plan
- "Costing Package" issued by Ramboll, (L. Bradley), by email on 28/02/19
- Volumes for dredge material provided by Ramboll
- Updated depths for excavation provided by Ramboll
- Geology commentary in relation to drill & blast requirements in Ramboll email, (L. Bradley), dated 12/03/19.

The following form the basis of the cost estimates:

- Costs for the double lane linkspan are based on the 2018 Macgregor quote, updated for inflation.
- Costs for the single lane linkspan are based on March 2019 advice from Macgregor with allowance for design development.
- A provisional allowance for quay wall repairs generally has been made pending confirmation of requirements.
- A provisional allowance for a tie-in detail between new quay wall and existing quay wall construction at Winton Pier has been made pending confirmation of requirements. This is to allow dredging locally.
- Works carried out in a single continuous contract with no intermediate demobilisation and remobilisation of the main contractor.
- Alterations to existing services infrastructure is by others.
- Alterations to passenger access systems, including PAS, control room, terminal, etc, is by others where required.
- Prevailing surface levels adjacent to the edge of new works is brought up to formation level only.
- Costs for dredging are limited to volumes confirmed by Ramboll and to locations next to existing quays.
- Costs for any other dredging is by others.
- Dredging work is by excavator on a barge and disposed of on shore. No allowance is made for backhoe or other dredgers, nor for pre-treatment of rock, (drilling and blasting).
- Excavation/dredging of material where existing quays are removed is carried out by land based plant.
- No harbour dues or pilotage fees are applied.
- Existing site and infrastructure is capable of receiving new works where necessary.
- No significant environmental measures are required, (e.g. MMO, silt curtains, bubble curtains, etc).
- No site investigation has been reviewed beyond the buried structure plan.
- 2018 prices adjusted for inflation using the RICS Tender Price Index, (TPI).
- Competitive tendering and good market interest.
- No contractors design.
- Construction works take priority over harbour users, including ferry operations, etc.
- No significant site restraints and space is available to deliver, handle and store materials such as piles and to dry out dredged material prior to disposal.
- Area is available to pre-cast concrete and prepare reinforcement, formwork and other construction related activities to help maintain programme. Storage is available locally for materials and deliveries, (such as piles), can be made by sea if required.
- Efficient vehicular movements are achieved through implementation of a circular 1-way system or similar for the removal of excavated material.
- Material arising from the works is disposed either on site, or locally.
- Installation of mooring, breasting dolphins and the like is carried out from land by re-using bund material to allow access. No allowance is made for large plant such as jack-up barges.
- Optimism Bias is applied at 15%. No other Client Risk / Contingency fund is included.

In addition, the following items are excluded from cost estimate. It is recommended that an appropriate allowance is maintained by the Client for these:

- "Landside" works scope, (by others).
- Works to Winton Pier generally beyond the local tie-in detail with new quay walls.
- Marine Dredging, except by excavator on a barge, is excluded.
- LNG and other fuel installations, distribution and associated infrastructure, etc.
- Professional Fees.
- Site investigations and surveys, including any client required diving support.
- Contamination and associated investigations, testing, remedial works and the like.
- Environmental Impact Assessments and similar studies.
- Marine License and any associated implications.
- Statutory consents and fees and any Crown Estates costs.
- Weather forecasting and monitoring beyond contractor's obligations.
- Other Client direct costs.
- VAT.

Estimated programme durations are intended as a high level indication of potential programme periods and is subject to the following:

- Ongoing specialist input from the marketplace as the design progresses.
- Final contractor methodologies and sequencing of the works, including temporary works strategies, etc.
- Adequate work-faces being available to progress the works.
- Periods of winter and/or seasonal working to be determined.

Breakdown & Summary Narrative of Option 2

The following table provides a breakdown of the 2018 estimate for Option 2 compared to the 2019 estimate for Option 2 excluding optimism bias, and the allowances for Quay Wall Repairs and works to Winton Pier. Additional costs for Method Related Charges have been applied between the linkspan and wedge areas on a pro-rata basis.

Costs are subject to the Basis of Estimates:

Description	Sub-Total	Option 2 2018	Sub-Total	Option 2 2019	Summary of Changes between 2018 and 2019
1 Linkspan Area					
1.1 Link Span Replacement					<p>The 2018 cost estimate included a single lane linkspan. At that time the information from the market suggested a saving of [REDACTED] for a single lane linkspan against the cost of a double linkspan.</p> <p>In order to update the 2018 Option 2 cost to provide a double lane linkspan, the £130K deduction previously applied against budget costs has been omitted.</p>
1.2 General Demolitions					
1.3 Earthworks					<p>The cost estimates assume excavated material can be disposed of locally, either on a different part of the harbour's estate, or at some other local disposal point. This activity requires the transportation of material, typically by 6 - 8 wheel lorries, by road to the disposal point.</p> <p>The current proposals are to infill the void left due to rotating the proposed linkspan away from the current location. The 2018 Option 2 proposals could not take advantage of this due to forming an embankment in this area to avoid the cost of providing a fully piled linkspan perimeter.</p> <p>It is assumed this infilling will be carried out predominantly by placing part of the excavated material in this void and by doing so avoid incurring the transportation cost required to dispose of this material elsewhere. This results in a saving that has been applied against this cost heading.</p>
1.4 Concrete					
1.5 Miscellaneous Metalwork					
1.6 Piling					<p>The 2018 cost estimate was based on forming a sloped embankment around the linkspan. This slope away from the linkspan allowed the omission of part of the piled wall to perimeter of the linkspan that would otherwise be required to retain the quayside.</p> <p>The current design is to have a piled wall to the perimeter of the linkspan and the estimated cost for this is to be added to the 2018 Option 2 cost.</p> <p>The length of quay wall required to be added back, (along with associated ancillary works), is in the order of 85m.</p>
1.7 Roads and Paving					
1.8 Dredging - included in "Wedge" costs					

Description	Sub-Total	Option 2 2018	Sub-Total	Option 2 2019	Summary of Changes between 2018 and 2019
1.9 Method Related Charges / Preliminaries / OHP					During the preparation of the updated cost estimates, the scope of work, (including the additional works and issues identified above), along with anticipated construction methodologies and indicative timescales were discussed at a high level with an experienced marine civil engineering contractor. Their views on overall programme timescales and potential methodologies have been considered as part of a full review of the updated Option 2 scope.
					Also, the change in the anticipated scope of work between 2018 to 2019 and the additional site investigate information available has been considered in terms of sequencing of the work, etc. Ultimately the anticipated programme duration has increased, resulting in time related cost allowances, (e.g. contractor staff/management, common use plant, etc), also increasing.
2 Wedge Area					
2.1 Link Span Replacement					
2.2 General Demolitions					Further site investigation and/or information has been made available since the 2018 cost estimates were prepared. A number of structures have been identified that were previously unknown and these structures require to be removed either in whole or in part.
					These structures include anchor walls and tie-rods for the current quay wall, along with historic quay walls that have been covered up as the harbour expanded since the 1800's.
					These structures are expected to be a mixture of concrete and masonry walls and a cost allowance for the safe, methodical demolition and removal of these structures requires to be added to the 2018 Option 2 cost estimate.
2.3 Earthworks					An additional 400mm depth of excavation has been added to the area of the "wedge" that is being removed. This is a straight addition to the 2018 Option 2 cost estimate and equates to approximately 900m3 of additional excavation and disposal.
2.4 Concrete					
2.5 Miscellaneous Metalwork, (inc foundations for mooring bollards)					We have reviewed the rate applied for mooring bollards cast into the concrete cope to the top of the new quay wall and this results in a slight increase to the 2018 Option 2 cost, (£6K in total to wedge and linkspan areas).
					In addition, cost allowances have been added for 3nr mooring bollards offset from the quay wall along with large concrete pad and plinth foundations.
2.6 Piling & Dolphins					
2.7 Roads and Paving					
2.8 Dredging - by barge, onshore disposal					The 2018 Option 2 costs excluded any dredging beyond the area of the "wedge".
					The dredging of material is now to be included in the cost estimates and this is a straight addition to the Option 2 estimate.
					An allowance has been made for dredging 3,500m3 of material by barge/excavator, stockpile and dry-out onshore and to then dispose of this material off site in the same way as other excavated material.
2.9 Method Related Charges / Preliminaries / OHP (Including temporary works, etc)					As above.
3 Inflation					The 2018 Option 2 costs were exclusive of inflation allowances. This has been added.
Total, (Excl VAT)	£:				

Breakdown of Options 7 and 7.1

The breakdown of the estimated costs for Options 7 and 7.1 are detailed below. Costs for Option 7.1 are based on limited information compared to that available for option 7 and are therefore subject to a greater risk of change.

Costs are subject to the Basis of Estimates:

Description	Sub-Total	Option 7 Totals Dbl Lane Linkspan	Sub-Total	Option 7.1 Totals Dbl Lane Linkspan
1 Linkspan Area				
1.1 Link Span Replacement				
1.2 General Demolitions				
1.3 Earthworks				
1.4 Concrete				
1.5 Miscellaneous Metalwork				
1.6 Piling				
1.7 Roads and Paving				
1.8 Dredging - included in "Wedge" costs				
1.9 Method Related Charges / Preliminaries / OHP (Including temporary works, etc)				
2 Wedge Area				
2.1 Link Span Replacement				
2.2 General Demolitions				
2.3 Earthworks				
2.4 Concrete				
2.5 Miscellaneous Metalwork, (inc foundations for mooring bollards)				
2.6 Piling & Dolphins				
2.7 Roads and Paving				
2.8 Dredging - by barge, onshore disposal				
2.9 Method Related Charges / Preliminaries / OHP (Including temporary works, etc)				
Total, (Excl VAT)	£:			

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Aberdeen

t: 01224 589560

Edinburgh

t: 0131 656 5820

Glasgow

t: 0141 241 4600

London

t: 0207 250 0993

www.doigandsmith.co.uk

