

# **Vattenfall Wind Power Ltd**

## **Thanet Extension Offshore Wind Farm**

Annex B to Appendix 22 to Deadline 6

Submission: PLA published risk assessment  
template

Relevant Examination Deadline: 6

Submitted by Vattenfall Wind Power Ltd

Date: May 2019

Revision A

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Date of Approval:	May 2019
Revision:	A

Revision A	Original document submitted to the Examining Authority

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PORT OF LONDON AUTHORITY: PROJECT NAVIGATION RISK ASSESSMENT METHODOLOGY

DEFINITION

- Risk** is a measure of the likelihood and consequence of a hazard occurring.
- Hazard** is an occurrence that can create an unsafe situation.
- Initial Risk** is a measure of risk prior to additional risk controls being added (existing risk controls are included in this assessment).
- Residual Risk** is a measure of risk once additional risk controls have been added that were not in place at the time of the assessment.

ASSESSMENT OF RISK

Risk is the product of the consequence and the likelihood of an unwanted event. The International Maritime Organisation (IMO) Guidelines define a hazard as “something with the potential to cause harm, loss or injury”, the realisation of which results in an incident or accident. The potential for a hazard to be realised can be combined with an estimated or known consequence of outcome. This combination is termed ‘risk’. Risk is therefore a measure of the likelihood and consequence of a particular hazard occurring.

The **Likelihood** of a hazard accruing is sometimes difficult to assess. Quantitative methods can be utilised to inform the likelihood of a particular hazard occurring. Records of incidents can be helpful in determining likelihood rates, however they are not, solely in themselves a measure of likelihood suitable for assessing the risk of a future developments where a change in the system being assessed has occurred (it should occur to any operator that because a hazard has not been recorded in accident records it does not mean it is not likely to occur). Other methods of determining likelihood include data analysis, simulation or trials.

To assess frequency and, to a lesser extent, consequence, it is necessary to use a combination of historical incident (including near miss data) statistics, local stakeholder judgement, quantitative modelling and analysis, and professional judgement.

The combination of consequence and frequency of occurrence of a hazard is combined using a risk matrix (see below), which enables hazards to be ranked and a risk score assigned. The resulting scale can be divided into three general categories:

- Acceptable;
- As Low As Reasonably Practicable (ALARP); and
- Intolerable.

RISK ASSESSMENT MATRIX: RISK CRITERIA		FREQUENCY				
		Level 1	Level 2	Level 3	Level 4	Level 5
		Rare	Unlikely	Possible	Likely	Almost Certain
		One or more times greater than 100	One or more times 100 year	One or more times in 10 years	One or more times per year	Ten or more times per year
Consequence	5 – Loss of vessel or severe damage to vessel. Multiple fatalities International news coverage. Serious long-term impact on environment and/or permanent damage.	Moderate (5)	High (10)	Extreme (15)	Extreme (20)	Extreme (25)
	4 – Major damage to vessel. Single Fatality. National news coverage. Significant impact on environment with medium to long term effects	Minor (4)	Moderate (8)	High (12)	Extreme (16)	Extreme (20)
	3 – Moderate damage to vessel. Moderate / major injury Regional news coverage. Limited impact on environment with short-term or long-term effects	Minor (3)	Moderate (6)	Moderate (9)	High (12)	Extreme (15)
	2 - Minor or superficial damage to vessel. Minor injuries and local news coverage. Minor impact on environment with no lasting effects	Slight (2)	Minor (4)	Moderate (6)	Moderate (8)	High (10)
	1 - Insignificant or no damage to vessel / equipment. No injuries. Insignificant impact on environment	Slight (1)	Slight (2)	Minor (3)	Minor (4)	Moderate (5)
ACTION KEY	Slight (1 – 2)	No Action is required				
	Minor (3 – 4)	No additional controls are required, monitoring is required to ensure no changes in circumstances				
	Moderate (5 – 9)	Efforts should be made to reduce risk to ‘As low as reasonably practicable’ (ALARP), but activity may be undertaken				
	High (10 – 14)	Efforts should be made to reduce risk to ‘As low as reasonably practicable’ (ALARP). Activity can only be undertaken with further additional controls.				
	Extreme (15 – 25)	Intolerable risk. Activity not authorised				

RISK REDUCTION

Risk controls aim to reduce the risk of a hazard occurring, and can affect both the likelihood or consequence of that hazard (for example buoyage reduces the likelihood of vessel grounding whereas lifeboats can be said to reduce the consequences of a grounding occurring). It is possible to estimate or calculate the effectiveness of a risk control is at reducing the risk of a hazard occurring and thereby determine risk control effectiveness.

This is beneficial in determining the merits (either absolute or relative) of implementing risk controls, which can also lead on to effective cost benefit analysis.

The effectiveness of additional risk controls is assessed against a nominal scale, which applies differing percentage reductions, based on their estimated effectiveness. The percentage reduction is then made to either / or both, the likelihood or consequence values, essentially entailing a further calculation using the risk matrix, and a “residual” risk score is calculated.

As an example, take a hazard with a consequence score equivalent to £100,000. An additional risk control judged to reduce the consequence of this hazard by 20% will generate a residual consequence value, equivalent to £80,000, and the risk matrix is used to determine the residual risk score. The combined risk score in terms of likelihood and consequence is calculated the same as for baseline risk.

The application of additional risk control measures is assessed using a compound calculation. From the example above, a further risk control could be applied at 20%, which would reduce the consequence cost, from £80,000 to £64,000. A third risk control, with 10% effectiveness, would reduce the same property cost from £64,000 to £57,600, and so on. The residual risk score, with all these risk control measures in place, would therefore utilise the £57,600 consequence value in the calculation of risk.

It should be noted that as risk by definition is a non-dimensional number (being a combination of likeliness and consequence), a 50% reduction in frequency of hazard occurrence will not result in a 50% reduction in risk, because no similar reduction in consequences has been applied.

Also, it can be difficult to determine the exact effectiveness of risk controls in a dynamic and changing system such as a port, and, as such, a significant degree of subjectivity is commonly used where quantitative methods are not available or are prohibitively expensive to assess. However, given that a standardised framework is applied across all hazards, then the resulting scores can be used to judge the relative and absolute merits of implementing additional risk controls.

### RISK METHODOLOGY

- 1 Identify the following:
  - Hazard ID (Sequential No. - Filled out by the spread sheet)
  - Hazard Area(User defined)
  - Category of Hazard (e.g. Collision, Grounding, Contact)
  - Hazard Title (User defined)
  - Hazard Causes
- 2 Input the Assessment of Hazard Likelihood and Consequence based on the risk matrix above.
- 3 An "Initial Risk Score" is calculated - this should include any risk controls that were in place at the time of the assessment.
- 4 Follow the action key in the matrix above to determine if further action is required to reduce the risk score to an acceptable level.
- 5 If the identification and implementation of additional risk control measures are required as part of the action key, then it is necessary to add in a Risk Control Title.
- 6 For each additional risk control added, estimate or calculate it's effectiveness at reducing the likelihood and/or consequences of that hazard occurring. This is achieved by entering a % reduction value in the "% Likelihood Reduction" and "% Consequence Reduction" field.
- 7 It is possible to switch on or off additional risk controls by typing in "Yes" or "No" in the "Include Risk Control" column.
- 8 A calculation is performed to determine the effectiveness of multiple risk controls on the "Hazard Risk Score"
- 9 Where necessary identify the likelihood and consequence that the risk control measure is trying to target by referring to Credible Hazard Outcome ID [Consequ

### RISK REDUCTION TABLES

Risk reduction tables are given to indicate the level of risk reduction applied to a hazard risk score based on the percentage reduction utilised.

Note that in terms of % reduction for likelihood when dealing with frequent hazards it is necessary to utilise high levels of risk reduction to show significant changes in risk.

% Reduction	CONSEQUENCE VALUES				
0	£1,000	£10,000	£100,000	£1,000,000	£10,000,000
5	£950	£9,500	£95,000	£950,000	£9,500,000
10	£900	£9,000	£90,000	£900,000	£9,000,000
15	£850	£8,500	£85,000	£850,000	£8,500,000
20	£800	£8,000	£80,000	£800,000	£8,000,000
25	£750	£7,500	£75,000	£750,000	£7,500,000
30	£700	£7,000	£70,000	£700,000	£7,000,000
35	£650	£6,500	£65,000	£650,000	£6,500,000
40	£600	£6,000	£60,000	£600,000	£6,000,000
45	£550	£5,500	£55,000	£550,000	£5,500,000
50	£500	£5,000	£50,000	£500,000	£5,000,000
55	£450	£4,500	£45,000	£450,000	£4,500,000
60	£400	£4,000	£40,000	£400,000	£4,000,000
65	£350	£3,500	£35,000	£350,000	£3,500,000
70	£300	£3,000	£30,000	£300,000	£3,000,000
75	£250	£2,500	£25,000	£250,000	£2,500,000
80	£200	£2,000	£20,000	£200,000	£2,000,000
85	£150	£1,500	£15,000	£150,000	£1,500,000
90	£100	£1,000	£10,000	£100,000	£1,000,000
95	£50	£500	£5,000	£50,000	£500,000
100	£0	£0	£0	£0	£0

% Reduction	RETURN PERIODS				
0	0.1	1	10	100	>100 (e.g. 1000)
5	0.105	1.1	10.5	105.3	
10	0.11	1.1	11.1	111.1	
20	0.13	1.3	12.5	125.0	
30	0.14	1.4	14.3	142.9	
50	0.20	2.0	20.0	200.0	
70	0.33	3.3	33.3	333.3	
80	0.50	5.0	50	500	
90	1.00	10.0	100		
95	2.00	20.0	200		
96	2.50	25.0	250		
97	3.33	33.3	333		
98	5	50	500		
99	10	100			
99.5	20	200			
99.6	25	250			
99.7	33	333			
99.8	50	500			
99.9	100				
99.95	200				
99.98	500				
100	1000	1000	1000	1000	1000

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Date:		Project:		Balckfriars Pier Relocation										Version:		Vs1		Author:						
Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with		Risk Reduction										Results	Control Actionee	Complete
										Likelihood	Consequence	Risk Control ID	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place						
										Likelihood	Consequence	Baseline Risk						Likelihood Return Period [yr]	Consequence Cost	Cumulative Risk Score				
1	21	24	In vicinity of pier	Collision	Collision - Freight/Cargo ICW Freight/Cargo					2	3	6.0	Baseline with no additional risk controls					100.0	£100,000	6.0	Baseline Risk			
						C1	Minor injuries.	L9	Mechanical defect / failure.				1	Require inbound "Reporting Vessels" to always use No. 3 Arch when the arch is open for navigation.	L11, L15, L4, L13	Yes	25%	0%	133.3	£100,000	5.6	6.0		
						C13	Major damage to vessels.	L8	Master / Skipper error.				2	When "Reporting Vessels" have to use No. 2 Arch: tows are to be restricted to a maximum of one rank of two barges.	L8, L12, L13, L15, C1, C13, C18	Yes	25%	25%	177.8	£75,000	5.0			
						C18	Tier 1 pollution.	L12	Pilot error.				3	When "Reporting Vessels" have to use No. 2 Arch: require passenger vessels to vacate Blackfriars Pier prior a "Reporting Vessel" passing the pier.		No	25%	0%	177.8	£75,000	5.0	Baseline Level		
						C20	Local adverse publicity.	L13	Result of avoiding action with 3rd party vessel.				4	When "Reporting Vessels" have to use No. 2 Arch: warning lights are to be activated on Blackfriars Pier to notify passenger vessels of the approach of a "Reporting Vessel".		No	25%	0%	177.8	£75,000	5.0	Moderate		
								L11	Passenger vessel congestion round the pier.				5	Develop plans and procedures to maintain river navigation when No. 3 Arch is closed.	L8, L12, L13, L11, L15, L4	Yes	25%	0%	237.0	£75,000	4.7			
								L2	Adverse weather conditions / reduced visibility.				6	Develop contingency plans to maintain river navigation in the event of No. 3 Arch plus one of No. 2 or No. 4 Arch is closed.	L8, L12, L13, L11, L15, L4	Yes	50%	0%	474.1	£75,000	3.8	Residual Risk		
								L15	Uncertainty related to use of Arch No.2 Blackfriars.				7	All East bound passenger services' passage plans are to require vessels to use No. 3 or 4 Arch of Blackfriars Bridge (Not No. 2 Arch).	L8, L12, L13, L11, L15, L4	Yes	25%	0%	632.1	£75,000	3.4	2.9		
								L5	Failure to adhere to local & national legislation / risk controls.				8	Implementation of pier slot timetabling.	L13, L11	Yes	15%	0%	743.6	£75,000	3.2			
								L4	East bound passenger craft using Bf No. 2 Arch.				9	Policing of pier slot timetabling.	L13, L11	Yes	15%	0%	874.9	£75,000	3.0	Residual Level		
													10	Only allow vessels able to berth with and against tidal stream to use pier during busy periods.	L13, L11	Yes	15%	0%	1000.0	£75,000	2.9			
													11	Implement timetables minimising crossing of the authorised channel.	L8, L12, L13	Yes	15%	0%	1000.0	£75,000	2.9	Minor		
													12	Enhanced fendering on pier.		No	0%	25%	1000.0	£75,000	2.9			
													13	Do not permit unattended overnight berthing on Blackfriars Pier.		No	50%	0%	1000.0	£75,000	2.9	Risk Reduction		
													14	Install marker beacon or notice boards to warn of presence of sub-surface sheet piling in vicinity of the downstream small craft V-berth.		No	50%	0%	1000.0	£75,000	2.9	3.1		
				15			No	0%	0%	1000.0	£75,000	2.9												
2	6	10	In vicinity of pier	Collision	Collision - Freight/Cargo ICW HSC & Man. Class 5					1.8	4.5	8.1	Baseline with no additional risk controls				158.0	£3,160,000	8.1	Baseline Risk				
						C4	Major injuries or multiple fatalities.	L9	Mechanical defect / failure.				1	Require inbound "Reporting Vessels" to always use No. 3 Arch when the arch is open for navigation.		No	75%	0%	158.0	£3,160,000	8.1	8.1		
						C13	Major damage to vessels.	L8	Master / Skipper error.				2	When "Reporting Vessels" have to use No. 2 Arch: tows are to be restricted to a maximum of one rank of two barges.	L8, L12, L13, L15, C1, C13, C18	Yes	25%	25%	210.7	£2,370,000	7.3			
						C18	Tier 1 pollution.	L12	Pilot error.				3	When "Reporting Vessels" have to use No. 2 Arch: require passenger vessels to vacate Blackfriars Pier prior a "Reporting Vessel" passing the pier.		No	25%	0%	210.7	£2,370,000	7.3	Baseline Level		
						C22	National adverse publicity.	L13	Result of avoiding action with 3rd party vessel.				4	When "Reporting Vessels" have to use No. 2 Arch: warning lights are to be activated on Blackfriars Pier to notify passenger vessels of the approach of a "Reporting Vessel".		No	25%	0%	210.7	£2,370,000	7.3	Moderate		
								L11	Passenger vessel congestion round the pier.				5	Develop plans and procedures to maintain river navigation when No. 3 Arch is closed.	L8, L12, L13, L11, L15, L4	Yes	25%	0%	280.9	£2,370,000	6.8			
								L2	Adverse weather conditions / reduced visibility.				6	Develop contingency plans to maintain river navigation in the event of No. 3 Arch plus one of No. 2 or No. 4 Arch is closed.	L8, L12, L13, L11, L15, L4	Yes	50%	0%	561.8	£2,370,000	5.5	Residual Risk		
								L15	Uncertainty related to use of Arch No.2 Blackfriars.				7	All East bound passenger services' passage plans are to require vessels to use No. 3 or 4 Arch of Blackfriars Bridge (Not No. 2 Arch).	L8, L12, L13, L11, L15, L4	Yes	25%	0%	749.0	£2,370,000	4.9	4.4		
								L5	Failure to adhere to local & national legislation / risk controls				8	Implementation of pier slot timetabling.	L13, L11	Yes	15%	0%	881.2	£2,370,000	4.6			
								L4	East bound passenger craft using Bf No. 2 Arch.				9	Policing of pier slot timetabling.	L13, L11	Yes	15%	0%	1000.0	£2,370,000	4.4	Residual Level		
													10	Only allow vessels able to berth with and against tidal stream to use pier during busy periods.	L13, L11	Yes	15%	0%	1000.0	£2,370,000	4.4			
													11	Implement timetables minimising crossing of the authorised channel.	L8, L12, L13	Yes	15%	0%	1000.0	£2,370,000	4.4	Minor		
				12	Enhanced fendering on pier.		No	0%	25%	1000.0	£2,370,000	4.4												







Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with		Risk Reduction									Results	Control Actionee	Complete	
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place					
																			Likelihood Return Period [yr]	Consequence Cost				Cumulative Risk Score
												9	Policing of pier slot timetabling.	L13, L11, L3	Yes	15%	0%	1000.0	£7,500,000	4.9				
												10	Only allow vessels able to berth with and against tidal stream to use pier during busy periods.	L13, L11, L3	Yes	15%	0%	1000.0	£7,500,000	4.9	Residual Level			
												11	Implement timetables minimising crossing of the authorised channel.	L8, L13, L11, L3	Yes	15%	0%	1000.0	£7,500,000	4.9	Moderate			
												12	Enhanced fendering on pier.		No	0%	25%	1000.0	£7,500,000	4.9				
												13	Do not permit unattended overnight berthing on Blackfriars Pier.		No	50%	0%	1000.0	£7,500,000	4.9	Risk Reduction			
												14	Install marker beacon or notice boards to warn of presence of sub-surface sheet piling in vicinity of the downstream small craft V-berth.		No	50%	0%	1000.0	£7,500,000	4.9	3.6			
												15			No	0%	0%	1000.0	£7,500,000	4.9				
													Baseline with no additional risk controls					199.0	£10,000,000	8.5	Baseline Risk			
												1	Require inbound "Reporting Vessels" to always use No. 3 Arch when the arch is open for navigation.		No	75%	0%	199.0	£10,000,000	8.5	8.5			
												2	When "Reporting Vessels" have to use No. 2 Arch: tows are to be restricted to a maximum of one rank of two barges.	L8, L13, L15, C4, C13, C18	Yes	25%	25%	265.3	£7,500,000	7.7				
												3	When "Reporting Vessels" have to use No. 2 Arch: require passenger vessels to vacate Blackfriars Pier prior a "Reporting Vessel" passing the pier.		No	25%	0%	265.3	£7,500,000	7.7	Baseline Level			
												4	When "Reporting Vessels" have to use No. 2 Arch: warning lights are to be activated on Blackfriars Pier to notify passenger vessels of the approach of a "Reporting Vessel".		No	25%	0%	265.3	£7,500,000	7.7	Moderate			
												5	Develop plans and procedures to maintain river navigation when No. 3 Arch is closed.	L8, L13, L11, L3, L4	Yes	25%	0%	353.8	£7,500,000	7.1				
												6	Develop contingency plans to maintain river navigation in the event of No. 3 Arch plus one of No. 2 or No. 4 Arch is closed.	L8, L13, L11, L3, L4	Yes	50%	0%	707.6	£7,500,000	5.6	Residual Risk			
												7	All East bound passenger services' passage plans are to require vessels to use No. 3 or 4 Arch of Blackfriars Bridge (Not No. 2 Arch).	L8, L13, L11, L3, L4	Yes	25%	0%	943.4	£7,500,000	5.0	4.9			
												8	Implementation of pier slot timetabling.	L13, L11, L3	Yes	15%	0%	1000.0	£7,500,000	4.9				
												9	Policing of pier slot timetabling.	L13, L11, L3	Yes	15%	0%	1000.0	£7,500,000	4.9				
												10	Only allow vessels able to berth with and against tidal stream to use pier during busy periods.	L13, L11, L3	Yes	15%	0%	1000.0	£7,500,000	4.9	Residual Level			
												11	Implement timetables minimising crossing of the authorised channel.	L8, L13, L11, L3	Yes	15%	0%	1000.0	£7,500,000	4.9	Moderate			
												12	Enhanced fendering on pier.		No	0%	25%	1000.0	£7,500,000	4.9				
												13	Do not permit unattended overnight berthing on Blackfriars Pier.		No	50%	0%	1000.0	£7,500,000	4.9	Risk Reduction			
												14	Install marker beacon or notice boards to warn of presence of sub-surface sheet piling in vicinity of the downstream small craft V-berth.		No	50%	0%	1000.0	£7,500,000	4.9	3.6			
												15			No	0%	0%	1000.0	£7,500,000	4.9				
													Baseline with no additional risk controls					199.0	£1,000,000	6.8	Baseline Risk			
												1	Require inbound "Reporting Vessels" to always use No. 3 Arch when the arch is open for navigation.		No	75%	0%	199.0	£1,000,000	6.8	6.8			
												2	When "Reporting Vessels" have to use No. 2 Arch: tows are to be restricted to a maximum of one rank of two barges.	L8, L13, L11, L4, C3, C13, C18	Yes	25%	25%	265.3	£750,000	6.1				
												3	When "Reporting Vessels" have to use No. 2 Arch: require passenger vessels to vacate Blackfriars Pier prior a "Reporting Vessel" passing the pier.		No	25%	0%	265.3	£750,000	6.1	Baseline Level			
												4	When "Reporting Vessels" have to use No. 2 Arch: warning lights are to be activated on Blackfriars Pier to notify passenger vessels of the approach of a "Reporting Vessel".		No	25%	0%	265.3	£750,000	6.1	Moderate			
												5	Develop plans and procedures to maintain river navigation when No. 3 Arch is closed.	L8, L13, L11, L4	Yes	25%	0%	353.8	£750,000	5.6				
												6	Develop contingency plans to maintain river navigation in the event of No. 3 Arch plus one of No. 2 or No. 4 Arch is closed.	L8, L13, L11, L4	Yes	50%	0%	707.6	£750,000	4.5	Residual Risk			



Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with			Risk Reduction									Results	Control Actionee	Complete									
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place														
																			Likelihood Return Period [yr]	Consequence Cost	Cumulative Risk Score												
10	3	5	In vicinity of pier	Collision	Collision - Trad. Class 5 ICW Trad. Class 5			L2	Adverse weather conditions / reduced visibility	1.7	5	8.5	5	Develop plans and procedures to maintain river navigation when No. 3 Arch is closed.	L8, L13, L11, L3, L4	Yes	25%	0%	353.8	£7,500,000	7.1	Moderate											
								L3	Crossing traffic (HSC & Man. Class 5) due to timetable / route.				6	Develop contingency plans to maintain river navigation in the event of No. 3 Arch plus one of No. 2 or No. 4 Arch is closed.	L8, L13, L11, L3, L4	Yes	50%	0%	707.6	£7,500,000	5.6	Residual Risk											
								L5	Failure to adhere to local & national legislation / risk controls.				7	All East bound passenger services' passage plans are to require vessels to use No. 3 or 4 Arch of Blackfriars Bridge (Not No. 2 Arch).	L8, L13, L11, L3, L4	Yes	25%	0%	943.4	£7,500,000	5.0	4.9											
								L4	East bound passenger craft using Bf No. 2 Arch.				8	Implementation of pier slot timetabling.	L13, L11, L3	Yes	15%	0%	1000.0	£7,500,000	4.9												
													9	Policing of pier slot timetabling.	L13, L11, L3	Yes	15%	0%	1000.0	£7,500,000	4.9												
													10	Only allow vessels able to berth with and against tidal stream to use pier during busy periods.	L13, L11, L3	Yes	15%	0%	1000.0	£7,500,000	4.9	Residual Level											
													11	Implement timetables minimising crossing of the authorised channel.	L8, L13, L11, L3	Yes	15%	0%	1000.0	£7,500,000	4.9	Moderate											
													12	Enhanced fendering on pier.		No	0%	25%	1000.0	£7,500,000	4.9	3.6											
													13	Do not permit unattended overnight berthing on Blackfriars Pier.		No	50%	0%	1000.0	£7,500,000	4.9		Risk Reduction										
													14	Install marker beacon or notice boards to warn of presence of sub-surface sheet piling in vicinity of the downstream small craft V-berth.		No	50%	0%	1000.0	£7,500,000	4.9												
																					15			No	0%	0%	1000.0	£7,500,000	4.9				
						11	12	11	In vicinity of pier				Collision	Collision - Trad. Class 5 ICW Workboats & other small vessels					1.7	4	6.8		Baseline with no additional risk controls				199.0	£1,000,000	6.8	Baseline Risk			
															C3	Major injuries or single fatality.	L9	Mechanical defect / failure.				1	Require inbound "Reporting Vessels" to always use No. 3 Arch when the arch is open for navigation.		No	75%	0%	199.0	£1,000,000	6.8	6.8		
															C13	Major damage to vessels.	L8	Master / Skipper error.				2	When "Reporting Vessels" have to use No. 2 Arch: tows are to be restricted to a maximum of one rank of two barges.	L8, L13, L11, L4, C3, C13, C18	Yes	25%	25%	265.3	£750,000	6.1			
																						C18	Tier 1 pollution.	L13	Result of avoiding action with 3rd party vessel.	3	When "Reporting Vessels" have to use No. 2 Arch: require passenger vessels to vacate Blackfriars Pier prior a "Reporting Vessel" passing the pier.		No	25%	0%	265.3	£750,000
				C20	Local adverse publicity.					L11	Passenger vessel congestion round the pier.	4			When "Reporting Vessels" have to use No. 2 Arch: warning lights are to be activated on Blackfriars Pier to notify passenger vessels of the approach of a "Reporting Vessel".		No	25%				0%	265.3	£750,000	6.1	Moderate							
										L2	Adverse weather conditions / reduced visibility	5			Develop plans and procedures to maintain river navigation when No. 3 Arch is closed.	L8, L13, L11, L4	Yes	25%				0%	353.8	£750,000	5.6	3.9							
										L5	Failure to adhere to local & national legislation / risk controls.	6			Develop contingency plans to maintain river navigation in the event of No. 3 Arch plus one of No. 2 or No. 4 Arch is closed.	L8, L13, L11, L4	Yes	50%				0%	707.6	£750,000	4.5		Residual Risk						
										L4	East bound passenger craft using Bf No. 2 Arch.	7			All East bound passenger services' passage plans are to require vessels to use No. 3 or 4 Arch of Blackfriars Bridge (Not No. 2 Arch).	L8, L13, L11, L4	Yes	25%				0%	943.4	£750,000	4.0								
												8			Implementation of pier slot timetabling.	L13, L11	Yes	15%				0%	1000.0	£750,000	3.9								
												9			Policing of pier slot timetabling.	L13, L11	Yes	15%				0%	1000.0	£750,000	3.9	3.9							
												10			Only allow vessels able to berth with and against tidal stream to use pier during busy periods.	L13, L11	Yes	15%				0%	1000.0	£750,000	3.9		Residual Level						
												11			Implement timetables minimising crossing of the authorised channel.	L8, L13, L11, L4	Yes	15%				0%	1000.0	£750,000	3.9		Minor						
												12			Enhanced fendering on pier.		No	0%				25%	1000.0	£750,000	3.9	2.9							
												13			Do not permit unattended overnight berthing on Blackfriars Pier.		No	50%				0%	1000.0	£750,000	3.9		Risk Reduction						
												14			Install marker beacon or notice boards to warn of presence of sub-surface sheet piling in vicinity of the downstream small craft V-berth.		No	50%				0%	1000.0	£750,000	3.9								
												15			No	0%	0%	1000.0	£750,000	3.9													
														Baseline with no additional risk controls				199.0	£1,000,000	6.8	Baseline Risk												
						C3	Major injuries or single fatality.	L9	Mechanical defect / failure.				1	Require inbound "Reporting Vessels" to always use No. 3 Arch when the arch is open for navigation.		No	75%	0%	199.0	£1,000,000	6.8	6.8											
						C11	Major damage to small recreational vessel.	L8	Master / Skipper error.				2	When "Reporting Vessels" have to use No. 2 Arch: tows are to be restricted to a maximum of one rank of two barges.	L8, L13, L11, L4, C3, C11, C5	Yes	25%	25%	265.3	£750,000	6.1												

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with		Risk Reduction							Results	Control Actionee	Complete											
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction				Residual Risk Score with RC in place										
																						Likelihood Return Period [yr]	Consequence Cost	Cumulative Risk Score								
12	12	11	In vicinity of pier	Collision	Collision - Trad. Class 5 ICW Small Recreational vessels	C6	Minimal damage to Trad. Class 5.	L13	Result of avoiding action with 3rd party vessel.	1.7	4	6.8	3	When "Reporting Vessels" have to use No. 2 Arch: require passenger vessels to vacate Blackfriars Pier prior a "Reporting Vessel" passing the pier.		No	25%	0%	265.3	£750,000	6.1	Baseline Level										
						C21	Regional adverse publicity.	L11	Passenger vessel congestion round the pier.				4	When "Reporting Vessels" have to use No. 2 Arch: warning lights are to be activated on Blackfriars Pier to notify passenger vessels of the approach of a "Reporting Vessel".		No	25%	0%	265.3	£750,000	6.1	Moderate										
						C16	No pollution.	L2	Adverse weather conditions / reduced visibility (e.g. no nav. lights).				5	Develop plans and procedures to maintain river navigation when No. 3 Arch is closed.	L8, L13, L11, L4	Yes	25%	0%	353.8	£750,000	5.6	Residual Risk										
								L14	Small recreational vessel not easily visible (e.g. no nav. lights).				6	Develop contingency plans to maintain river navigation in the event of No. 3 Arch plus one of No. 2 or No. 4 Arch is closed.	L8, L13, L11, L4	Yes	50%	0%	707.6	£750,000	4.5	3.9										
								L6	Inexperience of small recreational craft crew in Central London.				7	All East bound passenger services' passage plans are to require vessels to use No. 3 or 4 Arch of Blackfriars Bridge (Not No. 2 Arch).	L8, L13, L11, L4	Yes	25%	0%	943.4	£750,000	4.0	Minor										
								L18	Wash from passing river traffic.				8	Implementation of pier slot timetabling.	L13, L11	Yes	15%	0%	1000.0	£750,000	3.9	Residual Level										
								L5	Failure to adhere to local & national legislation / risk controls.				9	Policing of pier slot timetabling.	L13, L11	Yes	15%	0%	1000.0	£750,000	3.9	Minor										
								L4	East bound passenger craft using Bf No. 2 Arch.				10	Only allow vessels able to berth with and against tidal stream to use pier during busy periods.	L13, L11	Yes	15%	0%	1000.0	£750,000	3.9	Risk Reduction										
													11	Implement timetables minimising crossing of the authorised channel.	L8, L13, L11, L4	Yes	15%	0%	1000.0	£750,000	3.9	2.9										
													12	Enhanced fendering on pier.		No	0%	25%	1000.0	£750,000	3.9	Minor										
													13	Do not permit unattended overnight berthing on Blackfriars Pier.		No	50%	0%	1000.0	£750,000	3.9	Risk Reduction										
													14	Install marker beacon or notice boards to warn of presence of sub-surface sheet piling in vicinity of the downstream small craft V-berth.		No	50%	0%	1000.0	£750,000	3.9	2.9										
													15			No	0%	0%	1000.0	£750,000	3.9	Minor										
						13	20	11	In vicinity of pier				Collision	Collision - Workboats & other small vessels ICW Workboats & other small vessels				1.6	4	6.4		Baseline with no additional risk controls					251.0	£1,000,000	6.4	Baseline Risk		
															C3	Major injuries or single fatality.	L9				Mechanical defect / failure.	1	Require inbound "Reporting Vessels" to always use No. 3 Arch when the arch is open for navigation.		No	25%	0%	251.0	£1,000,000	6.4	6.4	
C13	Major damage to vessels.	L8	Master / Skipper error.	2	When "Reporting Vessels" have to use No. 2 Arch: tows are to be restricted to a maximum of one rank of two barges.					L8, L13, L11, L4, C3, C13, C18	Yes	25%			25%	334.7	£750,000				5.7	Baseline Level										
C18	Tier 1 pollution.	L13	Result of avoiding action with 3rd party vessel.	3	When "Reporting Vessels" have to use No. 2 Arch: require passenger vessels to vacate Blackfriars Pier prior a "Reporting Vessel" passing the pier.						No	25%			0%	334.7	£750,000				5.7	Moderate										
C20	Local adverse publicity.	L11	Passenger vessel congestion round the pier.	4	When "Reporting Vessels" have to use No. 2 Arch: warning lights are to be activated on Blackfriars Pier to notify passenger vessels of the approach of a "Reporting Vessel".						No	25%			0%	334.7	£750,000				5.7	Residual Risk										
		L2	Adverse weather conditions / reduced visibility (e.g. no nav. lights).	5	Develop plans and procedures to maintain river navigation when No. 3 Arch is closed.					L8, L13, L11, L4	Yes	25%			0%	446.2	£750,000				5.2	3.9										
		L5	Failure to adhere to local & national legislation / risk controls.	6	Develop contingency plans to maintain river navigation in the event of No. 3 Arch plus one of No. 2 or No. 4 Arch is closed.					L8, L13, L11, L4	Yes	50%			0%	892.4	£750,000				4.1	Minor										
		L4	East bound passenger craft using Bf No. 2 Arch.	7	All East bound passenger services' passage plans are to require vessels to use No. 3 or 4 Arch of Blackfriars Bridge (Not No. 2 Arch).					L8, L13, L11, L4	Yes	25%			0%	1000.0	£750,000				3.9	Residual Level										
				8	Implementation of pier slot timetabling.					L13, L11	Yes	15%			0%	1000.0	£750,000				3.9	Minor										
				9	Policing of pier slot timetabling.					L13, L11	Yes	15%			0%	1000.0	£750,000				3.9	Minor										
				10	Only allow vessels able to berth with and against tidal stream to use pier during busy periods.					L13, L11	Yes	15%			0%	1000.0	£750,000				3.9	Risk Reduction										
				11	Implement timetables minimising crossing of the authorised channel.					L8, L13, L11, L4	Yes	15%			0%	1000.0	£750,000				3.9	2.5										
				12	Enhanced fendering on pier.						No	0%			25%	1000.0	£750,000				3.9	Minor										
				13	Do not permit unattended overnight berthing on Blackfriars Pier.						No	50%			0%	1000.0	£750,000				3.9	Risk Reduction										
				14	Install marker beacon or notice boards to warn of presence of sub-surface sheet piling in vicinity of the downstream small craft V-berth.						No	50%			0%	1000.0	£750,000				3.9	2.5										
				15			No	0%	0%	1000.0	£750,000	3.9	Minor																			
													Baseline with no additional risk controls				199.0	£1,000,000	6.8	Baseline Risk												

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with			Risk Reduction							Results	Control Actionee	Complete		
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place					
																			Likelihood Return Period [yr]				Consequence Cost	Cumulative Risk Score
14	12	11	In vicinity of pier	Collision	Collision - Workboats & other small vessels ICW Small Recreational vessels	C3	Major injuries or single fatality.	L9	Mechanical defect / failure.	1.7	4	6.8	1	Require inbound "Reporting Vessels" to always use No. 3 Arch when the arch is open for navigation.		No	75%	0%	199.0	£1,000,000	6.8	6.8		
						C13	Major damage to vessels.	L8	Master / Skipper error.					Yes	25%	25%	265.3	£750,000	6.1					
						C18	Tier 1 pollution.	L13	Result of avoiding action with 3rd party vessel.					No	25%	0%	265.3	£750,000	6.1	Baseline Level				
						C20	Local adverse publicity.	L11	Passenger vessel congestion round the pier.					No	25%	0%	265.3	£750,000	6.1	Moderate				
								L2	Adverse weather conditions / reduced visibility					Yes	25%	0%	353.8	£750,000	5.6					
								L14	Small recreational vessel not easily visible (e.g. no nav. lights).					Yes	50%	0%	707.6	£750,000	4.5	Residual Risk				
								L6	Inexperience of small recreational craft crew in Central London.					Yes	25%	0%	943.4	£750,000	4.0	3.9				
								L18	Wash from passing river traffic.					Yes	15%	0%	1000.0	£750,000	3.9					
								L5	Failure to adhere to local & national legislation / risk controls.					Yes	15%	0%	1000.0	£750,000	3.9					
								L4	East bound passenger craft using Bf No. 2 Arch.					Yes	15%	0%	1000.0	£750,000	3.9	Residual Level				
														Yes	15%	0%	1000.0	£750,000	3.9	Minor				
														No	0%	25%	1000.0	£750,000	3.9					
														No	50%	0%	1000.0	£750,000	3.9	Risk Reduction				
														No	50%	0%	1000.0	£750,000	3.9	2.9				
														No	0%	0%	1000.0	£750,000	3.9					
15	12	11	In vicinity of pier	Collision	Collision - Small Recreational vessels ICW Small Recreational vessels				1.7	4	6.8		Baseline with no additional risk controls					199.0	£1,000,000	6.8	Baseline Risk			
						C3	Major injuries or single fatality.	L9				Mechanical defect / failure.		No	75%	0%	199.0	£1,000,000	6.8	6.8				
						C13	Major damage to vessels.	L8				Master / Skipper error.		Yes	25%	25%	265.3	£750,000	6.1					
						C18	Tier 1 pollution.	L13				Result of avoiding action with 3rd party vessel.		No	25%	0%	265.3	£750,000	6.1	Baseline Level				
						C20	Local adverse publicity.	L11				Passenger vessel congestion round the pier.		No	25%	0%	265.3	£750,000	6.1	Moderate				
								L2				Adverse weather conditions / reduced visibility		Yes	25%	0%	353.8	£750,000	5.6					
								L14				Small recreational vessel not easily visible (e.g. no nav. lights).		Yes	50%	0%	707.6	£750,000	4.5	Residual Risk				
								L6				Inexperience of small recreational craft crew in Central London.		Yes	25%	0%	943.4	£750,000	4.0	3.9				
								L18				Wash from passing river traffic.		Yes	15%	0%	1000.0	£750,000	3.9					
								L5				Failure to adhere to local & national legislation / risk controls.		Yes	15%	0%	1000.0	£750,000	3.9					
								L4				East bound passenger craft using Bf No. 2 Arch.		Yes	15%	0%	1000.0	£750,000	3.9	Residual Level				
														Yes	15%	0%	1000.0	£750,000	3.9	Minor				
														No	0%	25%	1000.0	£750,000	3.9					
														No	50%	0%	1000.0	£750,000	3.9	Risk Reduction				
														No	50%	0%	1000.0	£750,000	3.9	2.9				
					No	0%	0%	1000.0	£750,000	3.9														

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with			Risk Reduction							Results	Control Actionee	Complete		
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place					
																			Likelihood Return Period [yr]				Consequence Cost	Cumulative Risk Score
16	10	21	In vicinity of pier	Contact	Contact - Freight/Cargo with pier					1.8	4	7.2	15			No	0%	0%	1000.0	£750,000	3.9	2.9		
														Baseline with no additional risk controls					158.0	£1,000,000	7.2	Baseline Risk		
						C4	Major injuries or multiple fatalities.	L9	Mechanical defect / failure.				1	Require inbound "Reporting Vessels" to always use No. 3 Arch when the arch is open for navigation.	L8, L12, L13, C4, C12, C14, C18, C15, C22	Yes	75%	25%	632.0	£750,000	4.6	7.2		
						C12	Major damage to vessel.	L8	Master / Skipper error.				2	When "Reporting Vessels" have to use No. 2 Arch: tows are to be restricted to a maximum of one rank of two barges.	L8, L12, L13, C4, C12, C14, C18, C15, C22	Yes	25%	25%	842.7	£562,500	4.0			
						C14	Major damage to pier.	L12	Pilot error.				3	When "Reporting Vessels" have to use No. 2 Arch: require passenger vessels to vacate Blackfriars Pier prior a "Reporting Vessel" passing the pier.	L8, L12, L13, L11	Yes	25%	0%	1000.0	£562,500	3.8	Baseline Level		
						C18	Tier 1 pollution.	L13	Result of avoiding action with 3rd party vessel.				4	When "Reporting Vessels" have to use No. 2 Arch: warning lights are to be activated on Blackfriars Pier to notify passenger vessels of the approach of a "Reporting Vessel".	L8, L12, L13, L11	Yes	50%	0%	1000.0	£562,500	3.8	Moderate		
						C15	Pier out of service.	L11	Passenger vessel congestion round the pier.				5	Develop plans and procedures to maintain river navigation when No. 3 Arch is closed.	L8, L12, L13, L11	Yes	25%	0%	1000.0	£562,500	3.8	3.6		
						C22	National adverse publicity.	L2	Adverse weather conditions / reduced visibility.				6	Develop contingency plans to maintain river navigation in the event of No. 3 Arch plus one of No. 2 or No. 4 Arch is closed.	L8, L12, L13, L11	Yes	50%	0%	1000.0	£562,500	3.8		Residual Risk	
								L5	Failure to adhere to local & national legislation / risk controls.				7	All East bound passenger services' passage plans are to require vessels to use No. 3 or 4 Arch of Blackfriars Bridge (Not No. 2 Arch).	L8, L12, L13, L11	Yes	25%	0%	1000.0	£562,500	3.8	3.6		
								L4	East bound passenger craft using Bf No. 2 Arch.				8	Implementation of pier slot timetabling.	L8, L12, L13, L11	Yes	15%	0%	1000.0	£562,500	3.8			
													9	Policing of pier slot timetabling.	L8, L12, L13, L11	Yes	15%	0%	1000.0	£562,500	3.8	Residual Level		
													10	Only allow vessels able to berth with and against tidal stream to use pier during busy periods.	L8, L12, L13, L11	Yes	15%	0%	1000.0	£562,500	3.8			
													11	Implement timetables minimising crossing of the authorised channel.		No	15%	0%	1000.0	£562,500	3.8	Minor		
													12	Enhanced fendering on pier.	C12, C14, C15	Yes	0%	25%	1000.0	£421,875	3.6	3.6		
													13	Do not permit unattended overnight berthing on Blackfriars Pier.		No	50%	0%	1000.0	£421,875	3.6		Risk Reduction	
													14	Install marker beacon or notice boards to warn of presence of sub-surface sheet piling in vicinity of the downstream small craft V-berth.		No	50%	0%	1000.0	£421,875	3.6	3.6		
													15			No	0%	0%	1000.0	£421,875	3.6			
17	1	9	In vicinity of pier	Contact	Contact - Freight/Cargo with vessel alongside pier					2	5	10.0		Baseline with no additional risk controls				100.0	£10,000,000	10.0	Baseline Risk			
						C4	Major injuries or multiple fatalities.	L9	Mechanical defect / failure.				1	Require inbound "Reporting Vessels" to always use No. 3 Arch when the arch is open for navigation.	L8, L12, L13, C4, C12, C14, C18, C15, C22	Yes	75%	25%	400.0	£7,500,000	6.8	10.0		
						C12	Major damage to vessel.	L8	Master / Skipper error.				2	When "Reporting Vessels" have to use No. 2 Arch: tows are to be restricted to a maximum of one rank of two barges.	L8, L12, L13, C4, C12, C14, C18, C15, C22	Yes	25%	25%	533.3	£5,625,000	6.0			
						C14	Major damage to pier.	L12	Pilot error.				3	When "Reporting Vessels" have to use No. 2 Arch: require passenger vessels to vacate Blackfriars Pier prior a "Reporting Vessel" passing the pier.	L8, L12, L13, L11	Yes	25%	0%	711.1	£5,625,000	5.5	Baseline Level		
						C18	Tier 1 pollution.	L13	Result of avoiding action with 3rd party vessel.				4	When "Reporting Vessels" have to use No. 2 Arch: warning lights are to be activated on Blackfriars Pier to notify passenger vessels of the approach of a "Reporting Vessel".	L8, L12, L13, L11	Yes	25%	0%	948.1	£5,625,000	4.9	High		
						C15	Pier out of service.	L11	Passenger vessel congestion round the pier.				5	Develop plans and procedures to maintain river navigation when No. 3 Arch is closed.	L8, L12, L13, L11	Yes	75%	0%	1000.0	£5,625,000	4.8	4.5		
						C22	National adverse publicity.	L2	Adverse weather conditions / reduced visibility.				6	Develop contingency plans to maintain river navigation in the event of No. 3 Arch plus one of No. 2 or No. 4 Arch is closed.	L8, L12, L13, L11	Yes	25%	0%	1000.0	£5,625,000	4.8		Residual Risk	
								L5	Failure to adhere to local & national legislation / risk controls.				7	All East bound passenger services' passage plans are to require vessels to use No. 3 or 4 Arch of Blackfriars Bridge (Not No. 2 Arch).	L8, L12, L13, L11	Yes	25%	0%	1000.0	£5,625,000	4.8	4.5		
								L4	East bound passenger craft using Bf No. 2 Arch.				8	Implementation of pier slot timetabling.	L8, L12, L13, L11	Yes	15%	0%	1000.0	£5,625,000	4.8			
													9	Policing of pier slot timetabling.	L8, L12, L13, L11	Yes	15%	0%	1000.0	£5,625,000	4.8	Residual Level		
													10	Only allow vessels able to berth with and against tidal stream to use pier during busy periods.	L8, L12, L13, L11	Yes	15%	0%	1000.0	£5,625,000	4.8			
													11	Implement timetables minimising crossing of the authorised channel.		No	15%	0%	1000.0	£5,625,000	4.8	Moderate		
													12	Enhanced fendering on pier.	C12, C14, C15	Yes	0%	25%	1000.0	£4,218,750	4.6			



Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Title	Baseline Risk	Baseline Level	Residual Risk	Residual Level	Risk Reduction
1	1	1	0	1.0	Slight	1.0	Slight	0.0
2	1	1	0	1.0	Slight	1.0	Slight	0.0
3	1	1	0	1.0	Slight	1.0	Slight	0.0
4	1	1	0	1.0	Slight	1.0	Slight	0.0
5	1	1	0	1.0	Slight	1.0	Slight	0.0
6	1	1	0	1.0	Slight	1.0	Slight	0.0
7	1	1	0	1.0	Slight	1.0	Slight	0.0
8	1	1	0	1.0	Slight	1.0	Slight	0.0
9	1	1	0	1.0	Slight	1.0	Slight	0.0
10	1	1	0	1.0	Slight	1.0	Slight	0.0
11	1	1	0	1.0	Slight	1.0	Slight	0.0
12	1	1	0	1.0	Slight	1.0	Slight	0.0
13	1	1	0	1.0	Slight	1.0	Slight	0.0
14	1	1	0	1.0	Slight	1.0	Slight	0.0
15	1	1	0	1.0	Slight	1.0	Slight	0.0
16	1	1	0	1.0	Slight	1.0	Slight	0.0
17	1	1	0	1.0	Slight	1.0	Slight	0.0
18	1	1	0	1.0	Slight	1.0	Slight	0.0
19	1	1	0	1.0	Slight	1.0	Slight	0.0
20	1	1	0	1.0	Slight	1.0	Slight	0.0
21	1	1	0	1.0	Slight	1.0	Slight	0.0
22	1	1	0	1.0	Slight	1.0	Slight	0.0
23	1	1	0	1.0	Slight	1.0	Slight	0.0
24	1	1	0	1.0	Slight	1.0	Slight	0.0
25	1	1	0	1.0	Slight	1.0	Slight	0.0
26	1	1	0	1.0	Slight	1.0	Slight	0.0
27	1	1	0	1.0	Slight	1.0	Slight	0.0
28	1	1	0	1.0	Slight	1.0	Slight	0.0
29	1	1	0	1.0	Slight	1.0	Slight	0.0
30	1	1	0	1.0	Slight	1.0	Slight	0.0
31	1	1	0	1.0	Slight	1.0	Slight	0.0
32	1	1	0	1.0	Slight	1.0	Slight	0.0
33	1	1	0	1.0	Slight	1.0	Slight	0.0
34	1	1	0	1.0	Slight	1.0	Slight	0.0
35	1	1	0	1.0	Slight	1.0	Slight	0.0
36	1	1	0	1.0	Slight	1.0	Slight	0.0
37	1	1	0	1.0	Slight	1.0	Slight	0.0
38	1	1	0	1.0	Slight	1.0	Slight	0.0
39	1	1	0	1.0	Slight	1.0	Slight	0.0
40	1	1	0	1.0	Slight	1.0	Slight	0.0
41	1	1	0	1.0	Slight	1.0	Slight	0.0
42	1	1	0	1.0	Slight	1.0	Slight	0.0
43	1	1	0	1.0	Slight	1.0	Slight	0.0
44	1	1	0	1.0	Slight	1.0	Slight	0.0
45	1	1	0	1.0	Slight	1.0	Slight	0.0
46	1	1	0	1.0	Slight	1.0	Slight	0.0
47	1	1	0	1.0	Slight	1.0	Slight	0.0
48	1	1	0	1.0	Slight	1.0	Slight	0.0
49	1	1	0	1.0	Slight	1.0	Slight	0.0
50	1	1	0	1.0	Slight	1.0	Slight	0.0