Business Management Sys	Document No:	Page:
Guideline	IB-TE-PR-3100-IB-G-04	1 of 8
Design Hazard Elimination and Risk Re	Effective Date: 26-Oct-2023	4
Issuing Process: Engineering and Technical Services	Date Last Revi 22-Sep-2	

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Date		Revision
Modified	Reason for Changes	Revision
01/03/2020	Initial Release	0
16/02/2023	Periodic review, document title changed	1
13/03/2023	Clarified Risk Rating, added Hazard Guideword definitions	2
03/08/2023	Included the hazard wheel as an additional tab.	3
26/10/2023	Minor improvements / clarifications	4

## **DESIGN HAZARD ELIMINATION & RISK REDUCTION REGISTER**

Document Number:	Designers Risk Assessment
Project Title:	East Coast Railway - Phase 3 - CCA1
Project Number:	D3658302
Client:	Iarnród Éireann Irish Rail
Project Manager:	Damian Keneghan
Design Manager	Jon Denner
Local HSEiD Advisor	Hugh O'Sullivan

Revision	Issue	Revision Description	Prepared	Checked	Reviewed	Approved
	Date		Bv	Bv	Βv	Bv
۸.4	05 Jan 24	Droft for Concept Stage	David	Rita	Jill	
A.1	05-Jan-24	Draft for Concept Stage	Thomas	Martins	Gambrill	Jon Denner
				Jill Savory		
A.2	07-Oct-24	Emerging Preferred Scheme Concept	Emily	(nee		
			Marshall	Gambrill)	Jill Savory	Jon Denner
		FIRST ISSUE				Damien
Α	15-Aug-25	FIRST ISSUE	Matt Colley	Oliver Gill	Jill Savory	Keneghan

#### Introduction

This provides a means of identifying design hazards and recording design mitigation and risk reduction actions taken

All foreseeable design hazards for each discipline will be entered into the Design Hazard Elimination & Risk Reduction Register (DHERRR) by the Designers.

A single point of contact will be responsible for coordinating design stakeholder input to the DHERRR to ensure that there are no gaps in design information knowledge exchange.

The discipline lead designer(s) will be responsible for ensuring completeness and consistency of their design discipline across the project.

The full completed DHERRR shall form part of the design record for this project.

Drawings and documents which contain significant risks shall reference this document in the drawings or document notes.

Hazard / Risk	Register completion	
Column 1	Risk ID	Enter the Hazard/ Risk number, this should be sequential.
Column 2	Design Hazard Review Activity Description	State what activity the design hazard was identified (from pull down menu):  - Design - Interactive Design Safety Session - Hazzo Meeting - Hazid Meeting - Routine Design Team Meeting - Routine Design Team Meeting - Pre-Tender Design Review Meeting - Pre-Tender Design Review Meeting - Construction Phase Design Revision - HSE in Design Review
Column 3	Phase	Identify what phase of the project the Hazard applies to (from pull down menu):  • P - Pre-construction  • C - Construction  • M - Maintain / Clean  • U - Use as a workplace  • D - Demolish/Decommission
Column 4	Activity	Describe the Activity to be undertaken where a Hazard may be present
Column 5	Potential Hazard	Describe the Hazard associated with the described activity
Column 6	Who is at Risk	Identify who is at risk against each associated activity (from pull down menu):  - Construction - Commissioning - Operations - Walintenance - Decommissioning - Demolition - Demolition - Public
Column 7	Probability	Determine the Probability of the unmitigated Hazard (from pull down menu).  1 - Highly Unlikely 2 - Unlikely 3 - Possible 4 - Likely 5 - Highly Likely Undermine the Worst Potential Seventy (WPS) or the unmitigated Hazard (from pull down
Column 8	Worst Potential Severity (WPS)	menu).  1 - Nil or slight injury / illness, property damage or environmental issue.  2 - Minor injury / illness, property damage or environmental issue.  3 - Moderate injury or illness, property damage or environmental issue.  4 - Major injury or illness, property damage or environmental issue.  5 - Fatal or long term disabling injury or illness. Significant property damage or environmental issue.
Column 9 Severity	Initial Risk Rating	Calculates the Initial Risk Rating of the unmitigated hazard (Probability x WPS) Automatic RAG for status 1-5 - Green 6-10 - Amber -10 - Red
Column 10 Risk	Designer	C10 - Red Select the design discipline raising the hazard (amend to suit in the 'Reference' tab) - *Architect - *Mechanical - *Electrical - *Civil/Structural - *Environmental - *Control / Instrumentation - *Piping - *HVAC - *Commissioning - *Non Jacobs Designer - *Client - *User entry - *User entry - *User entry - *Instrumental - *I
Column 11	Design Measures To Eliminate Hazard	- All Disciplines     Describe the Design Measures to be implemented to Eliminate the Hazard as a     FIRST CHOICE
Column 12	Design Measures To Reduce Risk	Describe the Design Measures to be implemented to Reduce the Risk associated with the Hazard SECOND CHOICE
Column 13	Residual Probability	Determine the Probability of the <b>residual risk</b> from the hazard (from pull down menu). Selection per column 7
Column 14	Residual WPS	Determine the Severity of the <b>residual risk</b> from the Hazard (from pull down menu). Selection per column 8
Column 15	Residual Risk Rating	Calculates the Residual Risk Rating from the hazard (Probability x WPS) Automatic RAG for status
Column 16	Residual Risk Description	Describe clearly the Residual Risk associated with the Hazard to be managed by those using the Design List the documents where the Residual Risk has been communicated to those using the
Column 17	Included in Drawing No(s)	Design
Column 18	Action By	State who the action is to be taken/completed ( Name or Role)
Column 19	Target Date	Insert the initial target completion date here. This date should not be revised
Column 20	Revised Target Date	Insert the latest revised target completion date here.
Column 21	Date Action Complete	Insert the date the Action was completed - or was transferred to a subsequent action
Column 22	Tracker Status	Automatic RAG rating for status. GREEN indicates that the action is ongoing with time in hand. AMBER is imminently due and RED indicates due or overdue
Column 23	Comments	Insert comments here relating to current status, whether the action is fully closed out, or is subsumed into another action etc
Column 24	Primary Legislation	Identify the primary legislation in the country where the design hazard relates to (where applicable).

The HSE in Design Review shall confirm that the Design Hazard Elimination and Risk Reduction process has been completed and that the Residual Risks are acceptable to the Project.

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Project Name: East Coast Railway - Phase 3 - CCA1

Project Number: D3658302

Client: larnród Éireann Irish Rail

# DESIGN HAZARD ELIMINATION & RISK REDUCTION REGISTER OF DESIGN REVIEWS

DESIGN REVIEW DESCRIPTION	DATE HELD	MINUTES REFERENCE

#### CRITICAL RISK SUMMARY REPORT



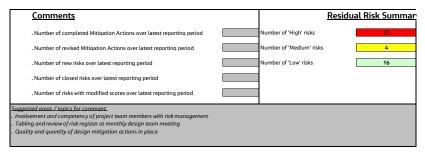
Project Number: D3658302 Project Title: East Coast Railway - Phase 3 - CCA1

Project Manager: Damian Keneghan

Design Manager Jon Denner

Date of Issue: 19/08/25

**OVERVIEW OF CRITICAL RISKS ASSOCIATED WITH THE PROJECT.** This identifies the top 20 hazards/risks associated with design, construction, operation, maintenance and demolition of the project.



#### NOTE: Please do not add or remove lines to the table below as this will disable the "Update Critical Risk Table" macro. "Risk ID" is to be retained in Cell B42.

1	4	5	12	16	18	22	23
Risk ID.	Activity	Potential Hazard	design Measures to Reduce	Residual Risk Description	Action By (Name or Role)	Tracker Status	Comments
1	Use of	Transportation over	Access points to be identified	Transportation over	Contractor	ONGOING	Contractor to include appropriate traffic management and
	vehicles/plant on site - Public	foreshore and access ramps, etc. Potential plant	and to be incorporated during design development.	foreshore and access ramps, etc. Potential plant			works segregation in method statements with mitigation and reduction measures to separate vehicles and public.
		overturning leading to		overturning leading to			
		potential for injury/death to members of public with		potential for injury/death to members of public with			
		access to the foreshore.		access to the foreshore.			
2	Use of vehicles/plant	Transportation over foreshore and access	Access points and restrictions to be incorporated at	Transportation over foreshore and access ramps.	Contractor	ONGOING	Contractor to include site access routes and working areas with mitigation and reduction measures in method
	on site -	ramps, etc. Potentially	preliminary design stage. At a	etc. Potentially leading to			statements.
	Construction	leading to potential	minimum, existing access	potential injury/death to Construction staff resulting			detailed design to consider access restrictions (e.g. ramp
	Staff	injury/death to Construction staff resulting	points will be maintained, and additional access points will be	from vehicles overturning.			loadings)
4	Existing Services	Damage to existing	Full services survey to be	Damage to existing services	designer /	ONGOING	Full services search to be undertaken at detailed design stage
		services during	undertaken during detailed	during construction leading	Contractor		Contractor to survey location prior to excavation works, when
		construction leading to death or injury to site	design development.	to death or injury to site personnel.			reasonable. Working methods for excavations to be develope to detect, locate and identify services.
5	Unforeseen	Striking of live services	Full services survey to be	Striking of live services	Contractor	ONGOING	Full services search to be undertaken at detailed design stage
,	services present	causing electrocution,	undertaken during design	causing electrocution,	Contractor	ONGOING	Contractor to survey location prior to excavation works, when
		explosion, flooding and / or	development.	explosion, flooding and / or			reasonable. Working methods for excavations to be develope
7	Unstable ground	Potential for site operatives or plant to become stuck in	Inform contractor of risk of soft ground from GI and	Potential for site operatives or plant to become stuck in	designer /	ONGOING	Contractor to prepare method statement and safe systems of
	conditions	pockets of soft or lose	geotechnical analysis in	pockets of soft ground.	Contractor		work. Risk to be updated following completion GI and geotechnical
		ground. Instability of plant	detailed design.	Instability of plant working in			analysis.
		working in area of low soil strength. Risk of		area of low soil strength. Risk of suffocation, crash injuries			
		suffocation, crash injuries		from sinking into			
		from sinking into		ground/loss or damage to			
8	In temporary	ground/loss or damage to Failure of partially	The partially constructed new	plant. Demolition of existing	designer /	ONGOING	Contractor to have competent experience of working in tidal
-	state the	completed works leading to	revetment will be subject to	structures during may	Contractor		environment.
	elements of the construction will	damage of surrounding structures.	the temporary loading in a transient state. The design	impacts the performance of sea defences.			Contractor to develop safe systems of work in intertidal areas including the provision of appropriate PPE.
	be subject to	Potential failure in	transient states will be	These locations will be			Contractor to obtain frequent weather reports and be
	wave and tidal	temporary condition	identified and considered in	identified and construction			
	conditions	leading to injury to workers.	the detailed design Stage. These are considered to be	sequencing will be considered in the detailed			accordingly. Contractor's temporary works design to include storm
			minimal due to the new works	design to minimise impact.			conditions.
			adding to existing structures, with no intentional damage to	Contractor expected to consider protection			
			existina structures.	measures for the partially		ONGOING	
12	Use of concrete or other	Contamination of the environment. Injury to site	The design prioritises use of prefabrecated elements to	Contamination of the	Contractor	ONGOING	designer to minimise concrete insitu works. Contractor to insure experienced and trained personnel to
	potentially	operatives.	result working time on site to	environment.			handle potentially contaminating materials.
	contaminating materials		minimise the volume of insitu				Contractor to provide thorough method statement and safe system of work.
	materials		concrete. During detailed design, where				system of work.
			required, joints to be spaced				
			closely spaced to allow for preparation, casting and				
13	Use of concrete	Injury of operatives	The design prioritises use of	Injury of operatives	Contractor	ONGOING	designer to minimise concrete insitu works.
	or other potentially	(burns,)	prefabrecated elements to	(burns,)			Contractor to insure experienced and trained personnel to
	potentially contaminating		result working time on site to minimise the volume of insitu				handle potentially hazardous materials and provide adequate PPE.
	materials		concrete.				Contractor to provide thorough method statement and safe
			During detailed design, where required, insitu works to be				system of work.
			simplified to minimise				
15	Works between construction	Risk of cutting, trip hazard. The precast construction	Minimise insitu rebar connections by using precast.	Risk of cutting, trip hazard. The precast construction	designer / Contractor	ONGOING	designer to design and minimise dowel connections during detailed design stage.
	phases	may involve dowel bars on	connections by using precase.	may involve dowel bars on	Contractor		Contractor to provide coloured plastic caps to every
		the ground or starter bar		the ground or starter bar protruding out from			protruding bar.
17							
17		protruding out from	71		4	oneome.	
	Lifting operations	Risk of plant overturning	The proposed Concept design solutions can be adjusted to	Risk of plant overturning on	designer / Contractor	ONGOING	designer to assess the bearing capacity of the existing concrete structures.
	operations		solutions can be adjusted to reduce the risk following	Risk of plant overturning on slope or temporary working platform - Contractor to	designer / Contractor	ONGOING	concrete structures. Contractor to prepare method statement of lifting and safe
	operations	Risk of plant overturning during moving or lifting on	solutions can be adjusted to reduce the risk following results of the GI and	Risk of plant overturning on slope or temporary working platform - Contractor to undertake safe working	designer / Contractor	ONGOING	concrete structures.
	Lifting operations	Risk of plant overturning during moving or lifting on	solutions can be adjusted to reduce the risk following results of the GI and geotechnical analysis. Allowable bearing capacity of	Risk of plant overturning on slope or temporary working platform - Contractor to	designer / Contractor	ONGOING	concrete structures. Contractor to prepare method statement of lifting and safe
	Litting operations	Risk of plant overturning during moving or lifting on	solutions can be adjusted to reduce the risk following results of the GI and geotechnical analysis. Allowable bearing capacity of slope revernent to be checked	Risk of plant overturning on slope or temporary working platform - Contractor to undertake safe working	designer / Contractor	ONGOING	concrete structures. Contractor to prepare method statement of lifting and safe
	Litting operations	Risk of plant overturning during moving or lifting on	solutions can be adjusted to reduce the risk following results of the GI and geotechnical analysis. Allowable bearing capacity of slope revetment to be checked and shared with Contractor for	Risk of plant overturning on slope or temporary working platform - Contractor to undertake safe working	designer / Contractor	ONGOING	concrete structures. Contractor to prepare method statement of lifting and safe
22	operations  Transportation	Risk of plant overturning during moving or lifting on slope.  Striking of live services	solutions can be adjusted to reduce the risk following results of the GI and geotechnical analysis. Allowable bearing capacity of slope revertment to be checked and shared with Contractor for temporary works design. Known services identified on	Risk of plant overturning on slope or temporary working platform - Contractor to undertake safe working practices	designer / Contractor	ONGOING	concrete structures.  Contractor to prepare method statement of lifting and safe temporary working platform.
22	operations	Risk of plant overturning during moving or lifting on slope.  Striking of live services overhead rail cables	solutions can be adjusted to reduce the risk following results of the Gl and geotechnical analysis. Allowable bearing capacity of slope revetment to be checked and shared with Contractor for temporary works design.	Risk of plant overturning on slope or temporary working platform - Contractor to undertake safe working practices  Striking of live services overhead rail cables causing	Contractor		concrete structures.  Contractor to prepare method statement of lifting and safe temporary working platform.  Client to agree procedures for cable isolation.  Contractor to provide thorough method statement and safe
	operations  Transportation of precast units	Risk of plant overturning during moving or lifting on slope.  Striking of live services overhead rail cables causing electrocution,	solutions can be adjusted to reduce the risk following results of the GI and geotechnical analysis. Allowable bearing capacity of slope revetment to be checked and shared with Contractor for temporary works design. Known services identified on drawings	Risk of plant overturning on slope or temporary working platform - Contractor to undertake safe working practices  Striking of live services overhead rail cables causing electrocution, and/or	Contractor	ONGOING	concrete structures.  Contractor to prepare method statement of lifting and safe temporary working platform.  Client to agree procedures for cable isolation.  Contractor to provide thorough method statement and safe system of work.
22	operations  Transportation	Risk of plant overturning during moving or lifting on slope.  Striking of live services overhead risk services causing electrocution, Striking of live services overhead rail cables	solutions can be adjusted to reduce the risk following results of the GI and geotechnical analysis. Allowable bearing capacity of slope revetment to be checked and shared with Contractor for temporary works design. Known services identified on drawings.	Risk of plant overturning on slope or temporary working platform - Contractor to undertake safe working practices Satiking of live services overhead rail cables causing electrocution, and/or Striking of live services overhead rail cables	Contractor		concrete structures.  Contractor to prepare method statement of lifting and safe temporary working platform.  Client to agree procedures for cable isolation.  Contractor to provide thorough method statement and safe system of work.  Client to agree procedures for cable isolation.  Client to gree procedures for cable isolation.  Client to agree procedures for cable isolation.
	operations  Transportation of precast units  Transportation	Risk of plant overturning during moving or lifting on slope.  Striking of live services overhead rail cables causing electrocution, Striking of live services overhead rail cables damaging cables and	solutions can be adjusted to reduce the risk following results of the GI and geotechnical analysis. Allowable bearing capacity of slope revetment to be checked and shared with Contractor for temporary works design. Known services identified on drawings	Risk of plant overturning on slope or temporary working platform - Contractor to undertake safe working practices  Striking of live services overhead rail cables causing electrocution, and/or Striking of live services overhead rail cables damaging cables and	Contractor	ONGOING	concrete structures.  Contractor to prepare method statement of lifting and safe temporary working platform.  Client to agree procedures for cable isolation.  Contractor to provide thorough method statement and safe system of work.
23	Transportation of precast units  Transportation of precast units	Risk of plant overturning during moving or lifting on slope.  Striking of live services overhead rail cables causing electrocution, Striking of live services overhead rail cables damaging cables and causing train concellations	solutions can be adjusted to reduce the risk following results of the GI and postechnical analysis. Allowable bearing capacity of slope reventment to be checked and shared with Contractor for temporary works design. Known services identified on drawings.  Known services identified on drawings.	Risk of plant overturning on slope or temporary working platform - Contractor to undertake safe working practices  Striking of live services overhead rail cables causing electrocution, and/or Striking of live services overhead rail cables causing train carcellations causing train carcellations	Contractor	ONGOING ONGOING	concrete structures.  Contractor to prepare method statement of lifting and safe temporary working platform.  Client to agree procedures for cable isolation.  Contractor to provide thorough method statement and safe system of work.  Client to agree procedures for cable isolation.  Contractor to provide thorough method statement and safe system of work.  Client to agree procedures for cable isolation.  Client to agree procedures for cable isolation.
	operations  Transportation of precast units  Transportation of precast units  Working within a	Risk of plant overturning during moving or lifting on slope.  Striking of live services overhead rail cables causing electrocution,  Striking of live services overhead rail cables damaging cables damaging cables. The services overhead rail cables damaging cables that the services overhead rail cables damaging cables. The trik of environmental the services overhead rail cables damaging cables.	solutions can be adjusted to reduce the risk following results of the Gl and geoscherical analysis. Allowable bearing capacity of slope revertients to be checked and shared with Contractor for emproyary work design. Known services identified on drawings.  Known services identified on drawings.	Risk of plant overturning on slope or temporary working platform - Contractor to undertake safe working practices  Striking of live services overhead rail cables causing electrocution, and/or Striking of live services overhead rail cables damaging cables and	Contractor  Contractor  Contractor	ONGOING	concrete structures.  Contractor to proper method statement of lifting and safe temporary working platform.  Claims to agree procedures for cable inclation.  Contractor to provide thorough method statement and safe pattern of units.  Claims to agree procedures for cable inclation.  Contractor to provide thorough method statement and safe pattern of units.  Claims to agree procedures for cable inclation.
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23	operations  Transportation of precast units  Transportation of precast units  Working within a designated site	Bake of plant overturning during moving or lifting on slope.  Scribing of live services overhead and tables overhead and tables overhead and tables overhead and tables during movements.  Scribing of live services overhead and cables damaging cables and causing pain cancellations.  The risk of environmental damage through movement of material, processing the cancellations.	solutions can be adjusted to reduce the risk following results of the GI and generalized the reduce the risk following results of the GI and generalized analysis. Althousable bearing capacity of Althousable bearing capacity of temporary works design. Known services identified on drawings results of the results of the reduced of the re	Date of place oversuring or large or temporary working platform. Contractor to undertake safe working practices.  Soiking of live services overhead rial cubbic sousing determinant and/or Soiking of live services overhead rial cubbic sousing determinant places overhead rial cubbic sousing contract conting soiking of live services overhead rial cubbic damaging cubbic and contaging takes and contaging takes and contaging takes contaging contagin	Contractor  Contractor  Contractor  designer / Contractor	ONGOING ONGOING ONGOING	concrete structures.  Contractor to propeare method statement of lifting and safe temporary working platform.  Client to agree procedures for cable isolation.  Contractor to provide thorough method statement and safe system of work.  Client to agree procedures for cable isolation.  Contractor to provide thorough method statement and safe system of work.  Client to agree procedures for cable isolation.  Client to provide thorough method statement and safe system of work.  Contractor to provide thorough method statement and safe system of work.  Eat provided at detailed design stage.
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25	operations  Transportation of precast units  Transportation of precast units  Transportation of precast units  Working within a designated site mispacts on marine habitat	Bak of plant construring during moving or lifting on slope.  Striking of life services coverhead rail cables causing elementarial cables causing elementarial cables causing elementarial cables demanging cables and causing to services overhead rail cables services services services services services vibration caused.	solutions can be adjusted to reduce the risk following results of the GI and results of the GI and results of the GI and Allowable bearing capacity of slope revettment to be checked and shared with Consector for temporary works design. Known services identified on drawings. Known services identified on drawings. Correct permissions etc obtained in order to complete works. Conditions of permit to be followed. Correct permissions etc obtained in order to complete control of the control of the control of the control works. Conditions of permit to be followed. Correct permissions etc obtained in order to complete obtained in order to complete works. Conditions of permit to habitary-listfiller if required. Works are generally high up the beach and therefore present less of a concern for A desalled fee gap stage, R. Concerns of the concern for A desalled fee gap stage, R. Concerns of R. Concerns of R. Concer	Date of place oversuring or looper of temporary working platform - Contractor to condensate and the contractor condensate and the contractor contractor of contractor	Contractor  Contractor  Contractor  designer / Contractor  designer / Contractor	ONGOING ONGOING ONGOING ONGOING	concrete structures.  Contractor to propear method statement of lifting and safe temporary working platform.  Client to agree procedures for cable isolation.  Contractor to provide thorough method statement and safe system of work.  Client to agree procedures for cable isolation.  Contractor to provide thorough method statement and safe system of work.  Contractor to provide thorough method statement and safe system of work.  Contractor to provide thorough method statement and safe system of work. EAP provided at detailed design stage.  Contractor to provide thorough method statement and safe system of work. EAP provided at detailed design stage.
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23 25 26 26 32	Transportation Transportation of precast units Transportation of precast units Transportation of precast units Working within a designated site Mosile / office action impacts on marine habitat  Managing public access to works  Most public access to works  Managing public access to works  Most public ac	The department of the continued of the c	solutions can be adjusted to reduce the risk following results of the Cl and government of the Cl and shared with Contractor for temporary works design. Known services identified on drawings.  Correct permissions etc. detailed in order to complete works. Conditions of permit to be followed:  Correct permissions etc. detailed in order to complete works. Conditions of permit to be followed:  Correct permissions etc. detailed in order to complete works. Conditions of permit to be followed:  Correct permissions etc. detailed in order to complete works. Conditions of permit will allow for protection of habitatary-indiffier frequiend. Who has not set to the contractor to address public access concerns a part of method statement, and existing signs should be installed design stage, concretactor to address public access concerns as part of method statement, and control the flood wall conto the constructed outwish all track access points through the flood wall conto the constructed outwish all track access points through the flood wall conto the government where conditions allow. Strict requisitors guidelines must be enquality or guidelines must be enquality or guidelines must be enquality or guidelines and the constructed outwish all track access points through the guidelines and the constructed outwish all track access points through the guidelines and the constructed outwish all track access points through the guidelines must be enquality and guidelines a	Said of jack contraining on Jack contraining on Jack contrained	Contractor  Contractor  Contractor  designer / Contractor  designer / Contractor  designer / Contractor  designer / Contractor	ONGOING ONGOING ONGOING ONGOING ONGOING	concrete structures.  Contractor to proper method statement of lifting and safe temporary working platform.  Client to agree procedures for cable incladion.  Client to agree procedures for cable incladion actement and safe system of work.  Client to agree procedures for cable incladion.  Contractor to provide thorough method statement and safe system of work. EAP provided at detailed design stage.  Contractor to provide thorough method statement and safe system of work. EAP provided at detailed design stage.  Contractor to provide thorough method statement and safe system of work. EAP provided at detailed design stage.  Contractor to propagate method statement and safe systems of some stage of the safe systems of some stage of the safe systems of some stage systems. EAP provided at detailed design stage.  Contractor to propagate method statement and safe systems of some stage systems of safe systems of systems of systems of safe systems of safe systems of systems of safe s
23 25 26 27 32	Transportation Transportation of precast units Transportation of precast units Transportation of precast units Working within a designated site Mosile / office action impacts on marine habitat  Managing public access to works  Most public access to works  Managing public access to works  Most public ac	The department of the continued of the c	solutions can be adjusted to reduce the risk following results of the Cl and government of the Cl and shared with Contractor for temporary works design. Known services identified on drawings.  Correct permissions etc. detailed in order to complete works. Conditions of permit to be followed:  Correct permissions etc. detailed in order to complete works. Conditions of permit to be followed:  Correct permissions etc. detailed in order to complete works. Conditions of permit to be followed:  Correct permissions etc. detailed in order to complete works. Conditions of permit will allow for protection of habitatary-indiffier frequiend. Who has not set to the contractor to address public access concerns a part of method statement, and existing signs should be installed design stage, concretactor to address public access concerns as part of method statement, and control the flood wall conto the constructed outwish all track access points through the flood wall conto the constructed outwish all track access points through the flood wall conto the government where conditions allow. Strict requisitors guidelines must be enquality or guidelines must be enquality or guidelines must be enquality or guidelines and the constructed outwish all track access points through the guidelines and the constructed outwish all track access points through the guidelines and the constructed outwish all track access points through the guidelines must be enquality and guidelines a	Said of jack contraining on Jack contraining on Jack contrained	Contractor  Contractor  Contractor  designer / Contractor  designer / Contractor  designer / Contractor  designer / Contractor	ONGOING ONGOING ONGOING ONGOING ONGOING	concrete structures.  Contractor to propage method statement of lifting and safe temporary working platform.  Gleen to agree procedures for cable isolation.  Cleen to agree procedures for cable isolation.  Contractor to provide thorough method statement and safe system of work. EA provided at detailed design stage.  Contractor to provide thorough method statement and safe systems of work. EA provided at detailed design stage.  Contractor to propage method statement and safe systems or solation in the safe systems of work. EA provided at detailed design stage.  Contractor to propage method statement and safe systems or solation in the safe systems of safe systems of safe systems of safe systems
23 25 26 26 32	Transportation Transportation of precast units Transportation of precast units Transportation of precast units Working within a designated site Mosile / office action impacts on marine habitat  Managing public access to works  Most public access to works  Managing public access to works  Most public ac	The department of the continued of the c	solutions can be adjusted to reduce the risk following results of the GI and generated the risk following results of the GI and generated results and purpose the risk of the GI and generated results and shared with Contractor for temporary world design. Known services identified on drawings  Correct permissions etc.  Correct permissions etc. design of the GI and G	Said of jack contraining on Jack contraining on Jack contrained	Contractor  Contractor  Contractor  designer / Contractor  designer / Contractor  designer / Contractor  designer / Contractor	ONGOING ONGOING ONGOING ONGOING ONGOING	concrete structures.  Contractor to propage method statement of lifting and safe temporary working platform.  Client to agree procedures for cable isolation.  Client to agree procedure for cable isolation.  Contractor to provide thorough method statement and safe system of work. EAA provided at detailed design stage.  Contractor to provide thorough method statement and safe systems of work. EAA provided at detailed design stage.  Contractor to propage method statement and safe systems of safe safe systems of safe safe systems of safe safe safe systems of safe safe safe systems of safe safe safe safe safe safe safe saf

design HAZARD ELIMINATION AND RISK REDUCTION REGISTER

13 Total high risks4 Total med risks16 Total low risks

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1 2 isk design Hazard Review Stage P Description	3 4 Phase Activity	5 Potential Hazard	6 Person(s) Most at Risk	7 8 Prob WPS	9 Initial Risk Rating	10 designer	11 design Measures to Eliminate Hazards	12 design Measures to Reduce Risk	13 1 Residual Resi Prob Wi	dual	15 Residual Risk Rating	16 Residual Risk Description	17 Included on Drawing No(s) or other doc. (give ref.)	18 Action By (Name or Role)	19 Target Date	20 21  Revised Date Action Target Date Complete	22 Tracker Status	0 1 1 2 3 4 5 nts	24 Primary Legislatio
#### 5: design Stage Review	C Transportation of precast un	Striking of live services overhead rail cables causing electrocution, and/or explosion.	Staff	4 5	20	Civil / Structural	Hazard not eliminated at this Concept design Stage.	Known services identified on drawings	4 !		20	Striking of live services overhead rail cables causing electrocution, and/or explosion.	Contractor Buildability/Method Statement [this is not a Jacobs document]	Contractor	Phase 4		ONGOING	Client to agree procedures for cable isolation.  Contractor to provide thorough method statement and safe system of work.	HSA
#### 5: design Stage Review	C Existing Services	Damage to existing services during construction leading to death or injury to site personnel.	Staff	3 5	15	Civil / Structural	Preliminary identification of services included on Plan II drawings. Hazard not eliminated at this Concept design Stage.	Full services survey to be undertaken during detailed design development.	3 4	,	15	Damage to existing services during construction leading to death or injury to site personnel.	Drawings & Documents (to be prepared at DD stage)  Contractor Buildability/Method Statement (this is not a Jacobs document)	designer / Contractor	Phase 4		ONGOING	Full services search to be undertaken at detailed design stage. Contractor to survey location prior to excavation works, where reasonable. Working methods for excavations to be developed to detect, locate and identify services.	HSA
#### 5: design Stage Review	C Unforeseen services prese	Striking of live services causing electrocution, explosion, flooding and / or disruption of services.	Staff	3 5	15	Civil / Structural	l Hazard not eliminated at this Concept design Stage.	Full services survey to be undertaken during design development.	3 8		15	Striking of five services causing electrocution, explosion, flooding and / or disruption of services.	Contractor Buildability/Method Statement [this is not a Jacobs document]	Contractor	Phase 4		ONGOING	Full services search to be undertaken at detailed design stage.  Contractor to survey location prior to excavation works, where reasonable.  Working methods for excavations to be developed to detect, locate and identify services.	HSA
#### 5: design Stage Review	C Transportation of precast un	Striking of live services overhead rail cables damaging cables and causing train cancellations and delays.	Client	3 5	15	Civil / Structural	ll Hazard not eliminated at this Concept design Stage.	Known services identified on drawings	3 5		15	Striking of live services overhead rail cables damaging cables and causing train cancellations and delays.	Contractor Buildability/Method Statement [this is not a Jacobs document]	Contractor	Phase 4		ONGOING	Client to agree procedures for cable isolation. Contractor to provide thorough method statement and safe system of work.	HSA
#### 5: design Stage Review	Public accessing beach are during storm conditions	as Risk of drowning	Public	3 5	15	Civil / Structural	Hazard not eliminated at this Concept design Stage.	designer to advise Client that warning signs should be installed at the access points to to coastal defence (i.e. at access points through the flood wall onto the promenade)	he 3 5		15	Risk of drowning	Documents [to be prepared at DD stage]	designer / Client	Phase 4		ONGOING	Client to ensure signage is installed at visible locations along the access points. Signs should also be provided to warn pedestrians of presence of maintenance vehicles	HSA
1 5: design Stage Review	C Use of vehicles/plant on sit Public	Transportation over foreshore and access ramps, etc. Potential plant overturning leading to potential for injury/death to members of public with access to the foreshore.	Public	2 5	10	Civil / Structural	Hazard not eliminated at this Concept design Stage.	Access points to be identified and to be incorporated during design development.	2 .	•	10	Transportation over foreshore and access ramps, etc. Potential plant overturning leading to potential for injury/death to members of public with access to the foreshore.	Contractor Buildability/Method Statement [this is not a Jacobs document]	Contractor	Phase 4		ONGOING	Contractor to include appropriate traffic management and works segregation in method statements with mitigation and reduction measures to separate vehicles and public.	HSA
2 5: design Stage Review	C Use of vehicles/plant on sit Construction Staff	vehicles overturning.	Staff	2 5	10	Civil / Structural	Hazard not eliminated at this Concept design Stage.	Access points and restrictions to be incorporated at preliminary design stage. At a minimum, existing access points will be maintained, and additional access points will be considered.	2 !		10	Transportation over foreshore and access ramps, etc. Potentially leading to potential injury/death to Construction staff resulting from vehicles overturning.	Contractor Buildability/Method Statement [this is not a Jacobs document]	Contractor	Phase 4		ONGOING	Contractor to include site access routes and working areas with mitigation and reduction measures in method statements. detailed desion to consider access restrictions (e.g. ramp loadings)	HSA
3 5: design Stage Review	C Unstable ground condition	Potential for site operatives or plant to become stuck in pockets of soft or lose ground. Instability of Jant working in area of low soil strength. Risk of suffocation, creath injuries from sinking into groundfloss or damage to plant.	Staff	3 5	15	Civil / Structural	ll Hazard not eliminated at this Concept design Stage.	Inform contractor of risk of soft ground from GI and geotechnical analysis in detailed des	ign. 2		10	Potential for site operatives or plant to become stuck in pockets of soft ground. Instability of plant working in area of low soil strength. Risk of sulfocation, crash injuries from sinking into groundloss or damage to plant.	Drawings & Documents (to be prepared at DD stage)  Contractor Buildability/Method Statement (this is not a Jacobs document)	designer / Contractor	Phase 4		ONGOING	Contractor to prepare method statement and sale systems of work. Risk to be updated following completion GI and geotechnical analysis.	HSA
4 5: design Stage Review	C Use of concrete or other pote contaminating materials		Staff	3 4	12	Civil / Structural	ll Hazard not eliminated at this Concept design Stage.	The design prioritisses use of prefathrecated elements to result working time on site to minimise the volume of insitu concrete. During detailed design, where required, joints to be spaced closely spaced to allow for preparation, casting and adequate curing within tides.	2 4	5	10	Contamination of the environment.	Contractor Buildability/Method Statement [this is not a Jacobs document]	Contractor	Phase 4		ONGOING	designer to minimise concrete insitu works. Contractor to insure experienced and trained personnel to handle potentially contaminating materials. Contractor to provide thorough method statement and safe system of work.	HSA
5 5: design Stage Review	C Use of concrete or other pote contaminating materials		Staff	3 4	12	Civil / Structural	ll Hazard not eliminated at this Concept design Stage.	The design prioritises use of prefabrecated elements to result working time on site to minimise the volume of insitu concrete. During detailed design, where required, insitu works to be simplified to minimise exposu-	2 g	,	10	livjury of operatives (burns,)	Contractor Buildability/Method Statement [this is not a Jacobs document]	Contractor	Phase 4		ONGOING	designer to minimise concrete insitu works.  Contractor to insure experienced and trained personnel to handle potentially hazardous materials and provide adequate PPE.  Contractor to provide thorough method statement and sale system of work.	HSA
6 5: design Stage Review	Lifting operations	Risk of plant overturning during moving or lifting on slope.	Staff	3 5	15	Civil / Structural	Hazard not eliminated at this Concept design Stage.	The proposed Concept design solutions can be adjusted to reduce the risk following res of the GI and gettechnical analysis.  Allowable bearing capacity of slope revetment to be checked and shared with Contracto temporary works design.		•	10	Risk of plant overturning on slope or temporary working platform - Contractor to undertake safe working practices	Contractor Buildability/Method Statement [this is not a Jacobs document]	designer / Contractor	Phase 4		ONGOING	designer to assess the bearing capacity of the existing concrete structures. Contractor to prepare method statement of lifting and safe temporary working platform.	HSA
7 5: design Stage Review	C Managing public access to w	Potential for public to become injured if gaining access to site works while heavy plant etc are working.	Public	2 5	10	Civil / Structural	l Hazard not eliminated at this Concept design Stage.	At detailed design stage, contractor to address public access concerns as part of metho statement.			10	Risk of injury to public due to access gained to site.	Drawings [to be prepared at DD stage]  Contractor Buildability/Method Statement [this is not a Jacobs document]	designer / Contractor	Phase 4		ONGOING	Contractor to prepare method statement and safe systems of work. These will ensure that the chance of public access to the site is limited as much as practically possible.	HSA
8 5: design Stage Review	C Proximity to Trainline		Staff	2 5	10	Civil / Structural	Il Risk not eliminated at this Concept design Stage.	New structures are to be constructed outwith rail track safety clearances where conditionallow. Strict regulatory guidelines must be followed. Worker training provision required tradvise on hazards of working near trainlines.	ns 2 t		10	Collision with train, vibrations from train causing rock fall	Documents [to be prepared at DD stage]	designer / Client	Phase 4		ONGOING	Client to ensure signage is installed at visible locations along the access points. Signs should also be provided to warn pedestrians of presence of maintenance vehicles	HSA
5: design Stage Review	In temporary state the elementhe construction will be subjet wave and tidal conditions	Failure of partially completed works leading to damage of surrounding structures.  ts of Potensial failure in temporary condition leading to injury to workers.  tt to	Construction	3 4	12	Civil / Structural	ll Hazard not eliminated at this Concept design Stage.	The partially constructed new revetment will be subject to the temporary loading in a transient state. The design transient states will be identified and considered in the detail design Stage. These are considered to be minimal dute to the new works adding to exist structures, with no intentional damage to existing structures.	ed 2		8	Demolition of existing structures during may impacts the performance of sea defences. These locations will be identified and construction sequencing will be considered in the detailed design to minimise impact. Contractor expected to consider protection measures for the partially constructed new structure.	Drawings & Documents (to be prepared at DD stage)  Contractor Buildability/Method Statement (this is not a Jacobs document)	designer / Contractor	Phase 4		ONGOING	Contractor to have competent experience of working in tidal environment. Contractor to develop sale systems of work in intertidal areas including the provision of appropriate PPE. Contractor to obtain frequent weather reports and be proactive in the assessment of weather conditions and adapt accordingly. Contractor's termograry works depon to include storm conditions.	HSA
0 5: design Stage Review	C Works between constructi phases	Risk of cutting, trip hazard.  The precast construction may involve dowel bars on the ground or starter bar protruding out from concrete.	Staff	3 2	6	Civil / Structural	Il Hazard not eliminated at this Concept design Stage.	Minimise insitu rebar connections by using precast.	3 2		6	Risk of cutting, trip hazard.  The precast construction may involve dowel bars on the ground or starter bar protruding out from concrete.	Contractor Buildability/Method Statement [this is not a Jacobs document]	designer / Contractor	Phase 4		ONGOING	designer to design and minimise dowel connections during detailed design stage.	HSA
1 5: design Stage Review	C Working within a designated	The right of an incompated domains through managed of material	Environment	3 3	9	Civil / Structural	l Hazard not eliminated at this Concept design Stage.	Correct permissions etc obtained in order to complete works. Conditions of permit to be followed	2 :		6	Environmental damage.	To be covered in EIA and Contractor Buildability/Method Statement [this is not a Jacobs document]	designer / Contractor	Phase 4		ONGOING	Contractor to provide coloured plastic caps to every protruding bar.  Contractor to provide thorough method statement and safe system of work.  EIA provided at detailed design stage.	HSA
2 5: design Stage Review	C Noise/vibration impacts on m	prince Disruption to wildlife due to site/plant activities, in relation to noise and vibration caused.	Environment	3 3	9	Civil / Structural	Hazard not eliminated at this Concept design Stage.	Correct permissions etc obtained in order to complete works. Conditions of permit will a for protection of habitativalidifie if required. Works are generally high up the beach and therefore present less of a concern for marine life.	low 2 :		6	Disruption to marine life.	To be covered in EIA and Contractor Buildability/Method Statement [this is not a Jacobs document]	designer / Contractor	Phase 4		ONGOING	Contractor to provide thorough method statement and safe system of work. EIA provided at detailed design stage.	HSA
3 5: design Stage Review	Risk of discovery of Unexplo	Possible presence on site of unexploded ordnance. Loss of life, injury (including hearing damage) due to explosion.	Staff	1 5	5	Civil / Structural	ll Hazard not eliminated at this Concept design Stage.	UXO Desk study to be undertaken during detailed design development	1 8		5	Possible presence on site of unexploded ordnance. Loss of life, injury (including hearing damage) due to explosion.	Drawings & Documents (to be prepared at DD stage)  Contractor Buildability/Method Statement (this is not a Jacobs document)	designer / Contractor	Phase 4		ONGOING	Risk Assessment to be updated after undertaking UXO survey.	HSA
4 5: design Stage Review	C Working on the coast. Working the tidal range. Incoming tide can rise rapidly.	Tidal working on an exposed coast has a heightened risk of drowning and loss of equipment due to un-expected storms or wave/current regime.	Staff	3 5	15	Civil / Structural	Il Hazard not eliminated at this Concept design Stage.	The design prioritises use of prefabreciated elements to result working time on site. However, construction in tidal zone unavoidable, but minimized and simplified as far as possible.	1 1	,	5	Tidal working on an exposed coast that a heightened risk of drowning and loss of equipment due to un-expected storms or wavelcurrent regime.	Contractor Buildability/Method Statement [this is not a Jacobs document]	Contractor	Phase 4		ONGOING	Contractor to bottain idial information to be able to plan work accordingly.  Contractor to have competent experience of working in state environment.  Contractor to develop sale systems of work in intentidal areas including the provision of appropriate PPE and identification of access portis. Obtain frequent wearther reports to predict idial conditions. Tidal monitoring to be undertaken.	HSA
5 design Stage Review	Undermining/stability of exis structures leading to collap	Collapse of existing structures and or crushing/injury to personnel and plant.  ging terms of the control of th	Staff	3 5	15	Civil / Structural	ll Hazard not eliminated at this Concept design Stage.	The proposed Concept design solutions can be adjusted to reduce the risk following res of the GI and geotechnical analysis, during detailed design.	ults 1 5		5	Undermining/stability/overloading of existing structures leading to damage/collapse. Assessment of access routes and temporary works (by Contractor).	Drawings & Documents (to be prepared at DD stage)  Contractor Buildability/Method Statement (this is not a Jacobs document)	designer / Contractor	Phase 4		ONGOING	Risk to be updated following completion GI and geotechnical analysis. These data and visual dilapidation combined will support the determination of the tolerable loading.	HSA
6 5: design Stage Review	C Excavations and Foundation		Staff	2 5	10	Civil / Structural	l Hazard not eliminated at this Concept design Stage.	The toe excavations have been avoided for the required structure stability where practica. The proposed Concept design solutions can be adjusted to reduce the risk following res of the GI and geotechnical analysis, during detailed design.	i. ults 1 6	5	5	Rapid ingress of water, causing possible entrapment leading to injuryldrowning of site personnel.	Drawings [to be prepared at DD stage]  Contractor Buildability/Method  Statement [this is not a Jacobs  document]	designer / Contractor	Phase 4		ONGOING	Contractor to prepare method statement and safe systems of work and plan works to minimise access to the excavated area.	HSA
7 5: design Stage Review	C Insitu concrete pouring	Risk of unstable formwork and falsework on existing sloping concrete revelment.	Staff	2 5	10	Civil / Structural	ll Hazard not eliminated at this Concept design Stage.	The design prioritises use of prefabrecated elements to result working time on site to minimise the volume of insitu concrete and replace formwork and falsework on slope to permanent precast element.	1 1		5	Risk of unstable formwork remains. Contractor to undertake temp works design and consider staging the concrete pours at detailed design stage.	Contractor Buildability/Method Statement [this is not a Jacobs document] & Temporary works design	designer	Phase 4		ONGOING	designer to minimise volume of insitu concrete during detailed design.  Contractor to provide thorough method statement and safe system of work.	HSA
8 5: design Stage Review	C Lifting operations. Lifting of pl materials (i.e. precast units) be carried out in gusty win		Staff	3 5	15	Civil / Structural	Il Hazard not eliminated at this Concept design Stage.	Approximate weights and approximate centre of gravity of precast units to be shown in detailed design drawings.	1 8	5	5	There is a risk of the lifted item becoming out of control with the risk of crushing of personnel. Damage to properly and injury to / death of personnel from overhead loads and falling objects.	Drawings [to be prepared at DD stage]  Contractor Buildability/Method Statement [this is not a Jacobs document]	designer / Contractor	Phase 4		ONGOING	Contractor to prepare method statement of lifting and safe temporary working platform. Contractor to check the unit weight and centre of gravily before any lifting is carried out. Contractor to obtain frequent weather reports and be proactive in the	HSA
9 5: design Stage Review	C Brittle failure of precast un	Sudden failure of precast unit. Crushing / impact injuries to site operatives	Staff	3 5	15	Civil / Structural	Il Hazard not eliminated at this Concept design Stage.	Approximate weights and approximate centre of gravity of precast units to be shown in detailed design drawings.	1 4	;	5	Crushing / impact injuries to site operatives	Drawings [to be prepared at DD stage]  Contractor Buildability/Method Statement [this is not a Jacobs document]	designer / Contractor	Phase 4		ONGOING	assessment of weather conditions and added accordinally.  Contractor to prepare method statement of litting and safe temporary working platform.  Contractor to check the unit weight and centre of gravity before any litting is carried out.  Contractor to provide thorough method statement and safe system of work.	HSA
0 5: design Stage Review	C Failure of lifting anchors	Dumage to properly and injury to / death of personnel from overhead leads and falling objects.	Staff	2 5	10	Civil / Structural	Il Hazard not eliminated at this Concept design Stage.	Approximate weights and approximate centre of gravity of precast units to be shown in detailed design creaming.	1 1		5	Damage to properly and injury to / death of personnel from overhead loads and falling objects.	Drawings (to be prepared at DD stage) Contractor Buildability/Method Statement (this is not a Jacobs document)	designer / Contractor	Phase 4		ONGOING	Contractor to undertake lifting anchor design and include additional anchor point strengthening requirements, if required, it is normal practice for the contractor to undertake temporary words design.  Contractor to check the unit weight and centre of gravity before any lifting is carried out.  Contractor to provide thorough method statement and sale system of work.	HSA
11 5: design Stage Review	C Transportation of precast u	Damage to property and injury to / death of personnel from overhead loads and falling objects.	Public	2 5	10	Civil / Structural	ll Hazard not eliminated at this Concept design Stage.	Units to be designed to fit the train carriages.	1 8	5	5	Damage to property and injury to / death of personnel from overhead loads and falling objects.	Drawings [to be prepared at DD stage]  Contractor Buildability/Method Statement [this is not a Jacobs document]	designer / Contractor	Phase 4		ONGOING	Contractor to provide thorough method statement and safe system of work.	HSA
12 5: design Stage Review	C Stability of wall raising duri construction	Collapse of the wall during construction, either due to wave overtopping or general instability of the walls during the temporary state.	Staff	2 5	10	Civil / Structural	ll Hazard not eliminated at this Concept design Stage.	Transient state to be considered during detailed design Stage	1 6		5	Collapse of the wall stems during construction	Drawings (to be prepared at DD stage)  Contractor Buildability/Method  Statement (this is not a Jacobs  document)	designer / Contractor	Phase 4		ONGOING	Contractor to provide thorough method statement and safe system of work.	HSA
23 5: design Stage Review	Wave overtopping onto the footpath	Injury from large waves overtopping the seawalls onto the footpath	Public	2 5	10	Civil / Structural	Hazard not eliminated at this Concept design Stage.	Risk reduced by designing front wave walls to minimise overtopping onto footpaths, Footpath heights raised to provide the majority of the public with a clear view of the sea. Overtoocing rates onto the footpath to be reviewed during detailed design development.	1 1		5	Injury due to waves	Drawings & Documents [to be prepared at DD stage]	designer	Phase 4		ONGOING	designer to undertake further analysis of wave overtopping and geometry of structures during design development	HSA

Project Name: Project Number: East Coast Railway - Phase 3 - CCA1

D3658302

Client: Iarnród Éireann Irish Rail

### DESIGN HAZARD ELIMINATION & RISK REDUCTION **SET UP PAGE**

PERSON AT RISK	DESIGNER (Amend to suit)
Construction	Architect
Commissioning	Mechanical/ Electrical
Operations	Process
Maintenance	Civil / Structural
Decommissioning	Environmental
Demolition	Control & Instrumentation
Public	Piping
User Entry	HVAC
User Entry	Commissioning
	Non Jacobs Designer
	Client
	User entry
	User entry
	User entry
	All Disciplines

Review List
1: Design
2: Interactive Design Safety Session
3: HAZOP Meeting
4: HAZID Meeting
5: Routine Design Team Meeting
6: Design Stage Review
7: Pre-Tender Design Review
8: Construction Phase Design Revision
9: HSE in Design Review

	Phase List
Р	Pre-construction
C	Construction
Μ	Maintain / Clean
U	Use as a workplace
D	Demolish/Decommission

	Severity of Injury
1	Nil or slight injury / illness, property damage or environmental issue.
2	Minor injury / illness, property damage or environmental issue.
3	Moderate injury or illness, property damage or environmental issue.
4	Major injury or illness, property damage or environmental issue.
5	Fatal or long term disabling injury or illness. Massive property damage or environmental issue.
10	Multiple fatality and catastrophic event

Residual Risk	
Yes	
No	

Probability	
1	Highly Unlikely
2	Unlikely
3	Possible
4	Likely
5	Highly Likely

### **DE5IGN HAZARD WHEEL**

The de5ign Hazard Wheel has been developed to assist technical design teams identify health, safety and environment in design hazards, considering the asset's whole lifecycle.

Refer to the <u>de5ian Manual</u> to download the most up to date interactive version of this tool.

