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Business Management System Guideline		Document No: IB-TE-PR-3100-IB-G-04	Page: 1 of 8
Design Hazard Elimination and Risk Register (DEHERRR)		Effective Date: 26-Oct-2023	4
Issuing Process: Engineering and Technical Services	Process Owner: P&PS ES&T Process Owner	Date Last Reviewed: 22-Sep-23	

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Date 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

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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 Date	Revision Description	Prepared By	Checked By	Reviewed By	Approved By
A.1	05-Jan-24	Draft for Concept Stage	David Thomas	Rita Martins	Jill Gambrill	Jon Denner
A.2	07-Oct-24	Emerging Preferred Scheme Concept	Emily Marshall	Jill Savory (nee Gambrill)	Jill Savory	Jon Denner
A	15-Aug-25	FIRST ISSUE	Matt Colley	Oliver Gill	Jill Savory	Damien 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 • Hazop Meeting • Hazid Meeting • Routine Design Team Meeting • Design Stage 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 • Maintenance • Decommissioning • 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
Column 8	Worst Potential Severity (WPS)	Determine the Worst Potential Severity (WPS) of the **unmitigated** Hazard (from pull down 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. • 10 - Multiple fatalities and catastrophic event
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	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 • All Disciplines
Column 11	Design Measures To Eliminate Hazard	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 **residual risk** from the hazard (from pull down menu). Selection per column 7
Column 14	Residual WPS	Determine the Severity of the **residual risk** 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
Column 17	Included in Drawing No(s)	List the documents where the Residual Risk has been communicated to those using the 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:	Iarnród Éireann Irish Rail

DESIGN HAZARD ELIMINATION & RISK REDUCTION
REGISTER OF DESIGN REVIEWS

DESIGN REVIEW DESCRIPTION	DATE HELD	MINUTES REFERENCE

CRITICAL RISK SUMMARY REPORT

Jacobs

Project Number: D3658302 **Project Title: East Coast Railwav - 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.

Comments		Residual Risk Summar	
. Number of completed Mitigation Actions over latest reporting period		Number of 'High' risks	13
. Number of revised Mitigation Actions over latest reporting period		Number of 'Medium' risks	4
. Number of new risks over latest reporting period		Number of 'Low' risks	16
. Number of closed risks over latest reporting period			
. Number of risks with modified scores over latest reporting period			

Suggested areas / topics for comment:
. Involvement and competency of project team members with risk management
. Tabling and review of risk register at monthly design team meeting
. Quality and quantity of design mitigation actions in place

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 Risk	Residual Risk Description	Action By (Name or Role)	Tracker Status	Comments
1	Use of vehicles/plant on site - 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.	Access points to be identified and to be incorporated during design development.	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	ONGOING	Contractor to include appropriate traffic management and works segregation in method statements with mitigation and reduction measures to separate vehicles and public .
2	Use of vehicles/plant on site - Construction Staff	Transportation over foreshore and access ramps, etc. Potentially leading to potential injury/death to Construction staff resulting	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	Transportation over foreshore and access ramps, etc. Potentially leading to potential injury/death to Construction staff resulting from vehicles overturning.	Contractor	ONGOING	Contractor to include site access routes and working areas with mitigation and reduction measures in method statements. detailed design to consider access restrictions (e.g. ramp loadings)
4	Existing Services	Damage to existing services during construction leading to death or injury to site	Full services survey to be undertaken during detailed design development.	Damage to existing services during construction leading to death or injury to site personnel.	designer / Contractor	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.
5	Unforeseen services present	Striking of live services causing electrocution, explosion, flooding and / or	Full services survey to be undertaken during design development.	Striking of live services causing electrocution, explosion, flooding and / or	Contractor	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
7	Unstable ground conditions	Potential for site operatives or plant to become stuck in pockets of soft or lose ground. Instability of plant working in area of low soil strength. Risk of suffocation, crash injuries from sinking into ground/loss or damage to	Inform contractor of risk of soft ground from GI and geotechnical analysis in detailed design.	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 suffocation, crash injuries from sinking into ground/loss or damage to plant.	designer / Contractor	ONGOING	Contractor to prepare method statement and safe systems of work. Risk to be updated following completion GI and geotechnical analysis.
8	In temporary state the elements of the construction will be subject to wave and tidal conditions	Failure of partially completed works leading to damage of surrounding structures. Potential failure in temporary condition leading to injury to workers.	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 detailed design Stage. These are considered to be minimal due to the new works adding to existing structures, with no intentional damage to existing structures.	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	designer / Contractor	ONGOING	Contractor to have competent experience of working in tidal environment. Contractor to develop safe 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 temporary works design to include storm conditions.
12	Use of concrete or other potentially contaminating materials	Contamination of the environment. Injury to site operatives.	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, joints to be spaced closely spaced to allow for preparation, casting and	Contamination of the environment.	Contractor	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.
13	Use of concrete or other potentially contaminating materials	Injury of operatives (burns,...)	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	Injury of operatives (burns,...)	Contractor	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 safe system of work.
15	Works between construction phases	Risk of cutting, trip hazard. The precast construction may involve dowel bars on the ground or starter bar protruding out from	Minimise insitu rebar connections by using precast.	Risk of cutting, trip hazard. The precast construction may involve dowel bars on the ground or starter bar protruding out from	designer / Contractor	ONGOING	designer to design and minimise dowel connections during detailed design stage. Contractor to provide coloured plastic caps to every protruding bar.
17	Lifting operations	Risk of plant overturning during moving or lifting on slope.	The proposed Concept design 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.	Risk of plant overturning on slope or temporary working platform - Contractor to undertake safe working practices	designer / Contractor	ONGOING	designer to assess the bearing capacity of the existing concrete structures. Contractor to prepare method statement of lifting and safe temporary working platform.
22	Transportation of precast units	Striking of live services overhead rail cables causing electrocution,	Known services identified on drawings	Striking of live services overhead rail cables causing electrocution, and/or	Contractor	ONGOING	Client to agree procedures for cable isolation. Contractor to provide thorough method statement and safe system of work.
23	Transportation of precast units	Striking of live services overhead rail cables damaging cables and causing train cancellations	Known services identified on drawings	Striking of live services overhead rail cables damaging cables and causing train cancellations	Contractor	ONGOING	Client to agree procedures for cable isolation. Contractor to provide thorough method statement and safe system of work.
25	Working within a designated site	The risk of environmental damage through movement of material, placement of pre-cast units	Correct permissions etc obtained in order to complete works. Conditions of permit to be followed	Environmental damage.	designer / Contractor	ONGOING	Contractor to provide thorough method statement and safe system of work. EIA provided at detailed design stage.
26	Noise/vibration impacts on marine habitat	Disruption to wildlife due to site/plant activities, in relation to noise and vibration caused.	Correct permissions etc obtained in order to complete works. Conditions of permit will allow for protection of habitat/wildlife if required. Works are generally high up the beach and therefore present less of a concern for	Disruption to marine life.	designer / Contractor	ONGOING	Contractor to provide thorough method statement and safe system of work. EIA provided at detailed design stage.
27	Managing public access to works	Potential for public to become injured if gaining access to site works while heavy plant etc are	At detailed design stage, contractor to address public access concerns as part of method statement.	Risk of injury to public due to access gained to site.	designer / Contractor	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.
32	Public accessing beach areas during storm conditions	Risk of drowning	designer to advise Client that warning signs should be installed at the access points to the coastal defence (i.e. at access points through the flood wall onto the	Risk of drowning	designer / Client	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
33	Proximity to Trainline	Risk of construction next to trainline - collisions, vibrations, noise	New structures are to be constructed outwith rail track safety clearances where conditions allow. Strict regulatory guidelines must be followed. Worker training provision required to advise on hazards of working near	Collision with train, vibrations from train causing rock fall	designer / Client	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

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design HAZARD ELIMINATION AND RISK REDUCTION REGISTER

Latest Meeting Date:

Update Critical Risk Summary Tab

Phase	
P	Pre-construction
C	Construction
M	Maintain/Clean
U	Use as a Workplace

Project Name:	East Coast Railway - Phase 3 - CCA1
Project Number:	D3658302
Client:	Iarnród Éireann Irish Rail

Probability

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

Worst Potential Severity (WPS) of Impact

1: Nil or slight injury / illness, property damage or environmental issue.

2: Minor injury / illness, property damage or environmental issue.

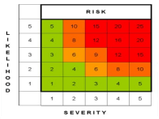
3: Moderate injury or illness, property damage or environmental issue.

4: Major injury or illness, property damage or environmental issue.

Risk Rating

NOTE: The purpose of Risk Rating is to determine which risks are significant. It is a subjective assessment and not an absolute or precise determination

High	HSEID risk resulting from design is unacceptably high.
Medium	HSEID risk resulting from design is permitted with
Low	HSEID risk resulting from design is permitted.



13 Total high risks

4 Total med risks

16 Total low risks

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Risk ID.	design Hazard Review Stage Description	Phase	Activity	Potential Hazard	Person(s) Most at Risk	Prob	WPS	Initial Risk Rating	designer	design Measures to Eliminate Hazards	design Measures to Reduce Risk	Residual Prob	Residual WPS	Residual Risk Rating	Residual Risk Description	Included on Drawing No(s) or other doc. (give ref.)	Action By (Name or Role)	Target Date	Revised Target Date	Date Action Complete	Tracker Status	nts	Primary Legislation
#####	5: design Stage Review	C	Transportation of precast units	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	5	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 drawings. Hazard not eliminated at this Concept design Stage.	Full services survey to be undertaken during detailed design development.	3	5	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 present	Striking of live services causing electrocution, explosion, flooding and / or disruption of services.	Staff	3	5	15	Civil / Structural	Hazard not eliminated at this Concept design Stage.	Full services survey to be undertaken during design development.	3	5	15	Striking of live 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 units	Striking of live services overhead rail cables damaging cables and causing train cancellations and delays.	Client	3	5	15	Civil / Structural	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	U	Public accessing beach areas during storm conditions	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 the coastal defence (i.e. at access points through the flood wall onto the promenade)	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 site - 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	5	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 site - Construction Staff	Transportation over foreshore and access ramps, etc. Potentially leading to potential injury/death to Construction staff resulting from 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	5	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 design to consider access restrictions (e.g. ramp loadings\	HSA
3	5: design Stage Review	C	Unstable ground conditions	Potential for site operatives or plant to become stuck in pockets of soft or lose ground. Instability of plant working in area of low soil strength. Risk of suffocation, crash injuries from sinking into ground/loss or damage to plant.	Staff	3	5	15	Civil / Structural	Hazard not eliminated at this Concept design Stage.	Inform contractor of risk of soft ground from GI and geotechnical analysis in detailed design.	2	5	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 suffocation, crash injuries from sinking into ground/loss 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 safe 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 potentially contaminating materials	Contamination of the environment. Injury to site operatives.	Staff	3	4	12	Civil / Structural	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, joints to be spaced closely spaced to allow for preparation, casting and adequate curing within tides.	2	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 potentially contaminating materials	Injury of operatives (burns,...)	Staff	3	4	12	Civil / Structural	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 exposure.	2	5	10	Injury 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 safe system of work.	HSA
6	5: design Stage Review	C	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 results of the GI and geotechnical analysis. Allowable bearing capacity of slope revetment to be checked and shared with Contractor for temporary works design.	2	5	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 works	Potential for public to become injured if gaining access to site works while heavy plant etc are working.	Public	2	5	10	Civil / Structural	Hazard not eliminated at this Concept design Stage.	At detailed design stage, contractor to address public access concerns as part of method statement.	2	5	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	Risk of construction next to trainline - collisions, vibrations, noise	Staff	2	5	10	Civil / Structural	Risk not eliminated at this Concept design Stage.	New structures are to be constructed outwith rail track safety clearances where conditions allow. Strict regulatory guidelines must be followed. Worker training provision required to advise on hazards of working near trainlines.	2	5	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
9	5: design Stage Review	C	In temporary state the elements of the construction will be subject to wave and tidal conditions	Failure of partially completed works leading to damage of surrounding structures. Potential failure in temporary condition leading to injury to workers.	Construction	3	4	12	Civil / Structural	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 detailed design Stage. These are considered to be minimal due to the new works adding to existing structures, with no intentional damage to existing structures.	2	4	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 safe 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 temporary works design to include storm conditions.	HSA
10	5: design Stage Review	C	Works between construction 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	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. Contractor to provide coloured plastic caps to every protruding bar.	HSA
11	5: design Stage Review	C	Working within a designated site	The risk of environmental damage through movement of material, placement of pre-cast units etc.	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 to be followed	2	3	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 thorough method statement and safe system of work. EIA provided at detailed design stage.	HSA
12	5: design Stage Review	C	Noise/vibration impacts on marine habitat	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 allow for protection of habitats/wildlife if required. Works are generally high up the beach and therefore present less of a concern for marine life.	2	3	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
13	5: design Stage Review	C	Risk of discovery of Unexploded Ordnance (UXO)	Possible presence on site of unexploded ordnance. Loss of life, injury (including hearing damage) due to explosion.	Staff	1	5	5	Civil / Structural	Hazard not eliminated at this Concept design Stage.	UXO Desk study to be undertaken during detailed design development	1	5	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
14	5: design Stage Review	C	Working on the coast. Working in the tidal range. Incoming tide level 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	Hazard not eliminated at this Concept design Stage.	The design prioritises use of prefabrecated elements to result working time on site. However, construction in tidal zone unavoidable, but minimized and simplified as far as possible.	1	5	5	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.	Contractor Buildability/Method Statement [this is not a Jacobs document]	**Contractor**	Phase 4			***ONGOING***	Contractor to obtain tidal information to be able to plan work accordingly. Contractor to have competent experience of working in tidal environment. Contractor to develop safe systems of work in intertidal areas including the provision of appropriate PPE and identification of access points. Obtain frequent weather reports to predict tidal conditions. Tidal monitoring to be undertaken.	HSA
15	5: design Stage Review	C	Undermining/stability of existing structures leading to collapse	Collapse of existing structures and or crushing/injury to personnel and plant.	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 results of the GI and geotechnical analysis, during detailed design.	1	5	5	Undemining/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
16	5: design Stage Review	C	Excavations and Foundations	Rapid ingress of water, causing possible entrapment leading to injury/drowning of site personnel.	Staff	2	5	10	Civil / Structural	Hazard not eliminated at this Concept design Stage.	The toe excavations have been avoided for the required structure stability where practical. The proposed Concept design solutions can be adjusted to reduce the risk following results of the GI and geotechnical analysis, during detailed design.	1	5	5	Rapid ingress of water, causing possible entrapment leading to injury/drowning 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
17	5: design Stage Review	C	Insitu concrete pouring	Risk of unstable formwork and falsework on existing sloping concrete revetment.	Staff	2	5	10	Civil / Structural	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	5	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
18	5: design Stage Review	C	Lifting operations. Lifting of plant or materials (i.e. precast units) may be carried out in gusty winds	There is a risk of the lifted item becoming out of control with the risk of crushing of personnel. Damage to property and injury to / death of personnel from overhead loads and falling objects.	Staff	3	5	15	Civil / Structural	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	5	5	There is a risk of the lifted item becoming out of control with the risk of crushing of personnel. 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 prepare method statement of lifting and safe temporary working platform. Contractor to check the unit weight and centre of gravity before any lifting is carried out. Contractor to obtain frequent weather reports and be proactive in the assessment of weather conditions and adapt accordingly.	HSA
19	5: design Stage Review	C	Brittle failure of precast units	Sudden failure of precast unit. Crushing / impact injuries to site operatives	Staff	3	5	15	Civil / Structural	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	5	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***	Contractor to prepare method statement of lifting and safe temporary working platform. Contractor to check the unit weight and centre of gravity before any lifting is carried out. Contractor to provide thorough method statement and safe system of work.	HSA
20	5: design Stage Review	C	Failure of lifting anchors	Damage to property and injury to / death of personnel from overhead loads and falling objects.	Staff	2	5	10	Civil / Structural	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	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 undertake lifting anchor design and include additional anchor point strengthening requirements, if required. It is normal practice for the contractor to undertake temporary works design. Contractor to check the unit weight and centre of gravity before any lifting is carried out. Contractor to provide thorough method statement and safe system of work.	HSA
21	5: design Stage Review	C	Transportation of precast units	Damage to property and injury to / death of personnel from overhead loads and falling objects.	Public	2	5	10	Civil / Structural	Hazard not eliminated at this Concept design Stage.	Units to be designed to fit the train carriages.	1	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
22	5: design Stage Review	C	Stability of wall raising during 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	Hazard not eliminated at this Concept design Stage.	Transient state to be considered during detailed design Stage..	1	5	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	U	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. Overtopping rates onto the footpath to be reviewed during detailed design development	1	5	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

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Project Name:	East Coast Railway - Phase 3 - CCA1
Project Number:	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	
P	Pre-construction
C	Construction
M	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

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

Residual Risk
Yes
No

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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 de5ign Manual to download the most up to date interactive version of this tool.