

Risk Assessment Register

Project				Register reference				Lööps			
Hyperloop				Job number				Date at latest revision			
				1				22/10/19			

Package/Topic				File reference				File A			
EOI Updated											

L = Likelihood (1-5) C = Cost (1-5) P = Programme (1-5) H = Welfare Health & Safety (1-5) 1 = Low 5 = High Risk (C, P, H) = Likelihood (L) x Severity (C, P, H)

Cat	Hazard Keyword	Risk No.	Risk	Prior to RCM							Risk control measure (RCM)	RCM Owner	Post RCM							Actions
				L	Severity			Risk					L	Severity			Risk			
					C	P	H	C	P	H				C	P	H	C	P	H	
1a.	Emissions	1	High emissions output from construction and operation of project, polluting the environment (large carbon footprint)	2	3	2	4	6	4	8	Using renewable energy	Company owned	1	2	2	2	2	2	2	Install solar panels. Use local renewable energy sources such as wind turbines. Order materials closer to the construction site to reduce the carbon footprint. Or order from local tradespeople to help support the local communities to reduce the effect it may have on businesses.
1b.	Environmental	2	Building on green belt, affecting flora and fauna. Natural Ecosystems	4	4	4	5	16	16	20	Extensive planning and using most efficient methods to build quickly.	Company project planner.	2	3	5	3	6	10	6	Plan logistics and site placement to make it as efficient as possible with little impact. Plan limited deliveries and deforestation.

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											Ensure damage is as little as possible.								Look for offsite storage.	
2a.	Physical Disturbance	3	Disturbing other modes of transport.	4	1	3	3	4	12	12	Plan extensively to ensure that there is minimal disruption to the transport infrastructure Ensure that passengers of over modes are well aware of the oncoming disruptions.	Company Project Planner.	3	1	3	3	3	9	9	Ensure that helplines are on call to ensure passengers about any concerns or complaints they may have
2b.	Economic Disturbance	4	Affecting business of other transport methods (everyone takes new mode of transport, trains would not be as profitable)	4	1	3	3	4	12	12	We would be decongesting already busy forms of transport, allowing them to run more smoothly and provide a better service.	Company Project planner.	2	1	4	2	2	8	4	Allow ample room in new form of transport. Increase the ticket tariff if it gets too congested.
2c.	Local Economic Disturbance	5	Affecting local businesses	5	1	1	1	5	5	5	Make sure business owners know in advance of the projects	Company owned solution	3	2	1	1	6	3	3	Hire people from local communities to help support the economy locally to improve the image of the project

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											existence and how it may affect them economically								Use locally sourced materials to reduce transporting material costs	
2d	Noise Pollution	6	The project may be loud disturbing the population and causing noise pollution.	3	3	5	3	9	15	9	Working during convenient hours (9-5) when in proximity of residential areas.	Company Project Planner	2	2	3	2	4	6	4	Identify areas of construction that will be in proximity of residential areas. Limit the use of equipment that produces large noise vibrations Use equipment that is noise-friendly where possible
3a	Sightline	7	The project may ruin the landscape and heritage of the land,	3	1	2	2	3	6	6	Don't design it to call attention to itself or look jarring. Ensure that the design is minimal and sleek with consideration of space.	Company owned. Specifically designer	2	2	3	1	4	6	2	Source polymers that can be made in a colour to suit the location it is in. Also helps reflect heat to reduce internal tunnel temperatures Use material that is local to the communities. Make communication with locals.
4a	Delivery on Time	8	There may be unaccounted for delays on the design process	3	3	3	3	9	9	9	Ensure that a schedule is implemented which will establish deadlines of work that needs to be completed	Company owned	2	2	2	2	2	2	2	Regular progress meetings and and delivery updates Design a gantt chart to ensure that we are on progress

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5a	Quality	9	Quality is not up to standard leading to further problems	2	2	3	2	4	6	4	Quality control checks on a regular basis to ensure that the design are up to the required standard	Company owned	1	1	2	1	1	2	1	Qualified QC inspector.
6a	Politics	10	Due to the uncertainty surrounding Brexit, prices could fluctuate in the market for raw resources and consumer spending habits	2	2	3	1	4	6	2	Ensure Client is aware of possible fluctuations in cost and has provided a budget to ensure everything runs smoothly	Cost controller	2	2	1	1	4	2	2	Qualified Cost controller
6b	Boycott	11	Negative feedback / people are against the idea of it and boycott it	2	4	4	1	8	8	2	Make sure the public understands the importance of this project and the advantages of this.	Media manager	1	4	4	1	4	4	1	Ensure it is advertised well on social media as well as in traditional methods of media sharing. Start introducing incentives to help persuade consumers
6c	Budget	12	Client pulls from the budget.	2	5	5	1	10	10	2	Ensure proper budgeting and allow for a 10% cost inflation such that even if the Client pulls from the budget there is	Cost controller	2	5	2	1	10	4	2	Qualified cost controller. Consist weekly review of the budget is carried out to ensure that the project is within the budget

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											still enough money to finish the project									
7a	Completion	13	Contractors fail to meet estimated project completion time.	4	3	4	1	12	16	4	Ensure proper time tabling and plan ahead for any delays	Project planner	2	3	3	1	6	6	2	Make sure all deliveries are planned and have another supplier ready incase delivery goes wrong or is delayed. Devise a gantt chart to ensure that the project is on target to finish on time
7b	Excess spending	14	Money - we exceed what we need	3	5	5	1	15	15	3	Ensure proper budgeting and allow for a 10% cost inflation such that even if we exceed the budget there is still enough money to finish the project	Cost controller	1	5	5	1	5	5	1	Qualified cost controller. Again consistent review of the budget cost weekly
7c	Criteria	15	Design fails to meet the criteria set by the client.	2	3	4	3	6	8	6	Ensure structural design elements are all followed, and make sure the Client is aware of all changes	Civil Engineer/Architect	1	2	2	3	2	2	3	Qualified Engineers and architects, good communication between company and supplier. Cross check work - potentially hiring an independent company to check work

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											required to be made to the project to ensure the safety and stability of the structure.									
7d	EOI	16	Fail to deliver the EOI	2	3	5	5	6	10	10	Make the EOI realistic and reasonable and plan accordingly	CEO	1	3	5	5	3	5	5	Make sure to get various opinions on whether the companies proposition to the EOI is realistic Cross checking work with an individual company
8a	Land Cuts	17	Land owners not agreeing to our plans if we cut across their land	3	4	5	2	8	20	4	Make sure that landowners are aware of the proposed route. Buy the land for a higher asking price	Cost controller, Company negotiator /relations manager	1	3	2	2	3	2	2	Hire Qualified company relations manager
8b	Environment	18	Environmental pressure - wildlife conservatives reject the idea and discredit it	2	2	3	4	4	6	8	Ensure route is made to minimise wildlife habitat destruction and minimal amounts of greenspace is built upon	Geographer	1	3	2	3	3	2	3	Make sure proper land clearance to build is given by its respective owners. Make sure a review of the current wildlife existing is carried out by an expert to understand any species in danger Make sure that correct planning is implemented to reduce the effect.

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9a	Law	19	Issues with the law	4	4	4	1	16	16	4	Ensure workers are aware of the law and follow it. Ensure you have a lawyer hired if a lawsuit were to take place against the project	Lawyer/CEO	2	2	2	1	4	4	2	Have a Qualified lawyer. Hire Qualified workers with no unspent convictions in the past.
9b	Government	20	Issues with government clearance.	3	2	4	1	6	12	3	Ensure that meetings are held with the local council/ Scottish Government to ensure that the proposal of the route, is legal Make sure that planning permission is sought after. Planning documents are up to date	CEO/ Project planner	1	1	2	1	1	2	1	Hire a Qualified project planner, or a team of project planners. Hold regular meetings / constant contact to prevent any time delays Work alongside local council / scottish government to propose a feasible design
10a	Geotechnics	21	Problems with the geotechnics underground	3	2	4	5	6	12	15	Ensure that the site investigation is planned out thoroughly to understand the	Geotechnical Engineer	2	2	2	5	4	4	10	Hire a geotechnical engineer for specialist advice

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										contents of the ground beneath										
10b	Pricing	22	Supplier pricing changes	4	3	2	1	12	8	4	Ensure proper budgeting and allow for a 10% cost inflation such that even if prices fluctuate there is still enough money to finish the project under different supply prices.	Cost Controller	2	3	2	1	6	4	2	Hire an accountant firm to review all costs
11a	Politics	23	General politics disturbing economics	2	3	4	1	6	8	2	Ensure Client is aware of possible fluctuations in cost and has provided a budget to ensure everything runs smoothly	CEO/Cost controller	1	2	2	1	2	2	1	Have frequent meetings with the client and discuss the economy and what it will mean for the funding available and if it will change it.
11b	Competition	24	Competitive modes of transport proposed at the same time	2	3	4	1	6	8	2	Make sure that the design and proposal of the route caters towards the target market. Start introducing media	Company Media Manager/ Manager/ Company Media Manager	1	2	2	1	2	2	1	Make sure there is regular advertisement of this in all forms of media, ie. social media and physical media such as Television broadcast ads, billboards and newspapers.

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											campaigns to promote our proposed project and improve public image									Provide incentives to use our proposed project to entice more consumer use
12a	Design	25	Over Engineered - Our proposal is under used as a result of over-engineered assumptions i.e. using maximum values of capacity and flow which will cause the design to be over accommodating then its actual use leading to a waste of land usage	3	4	4	4	8	8	8	Ensure that estimated figures for capacity are up to date and the pod capacity has been adequately measured. Ensure that there are considerations to a realistic approach rather Cross check work to ensure that opinions on design is discussed	Company design team, Project Planner	1	2	4	3	2	4	3	Use an independent company to check the suitability of our design Frequent regular meetings with the design team to analyze the suitability of the design Use reliable traffic sources- contact Transport Scotland for further information and statistics
12b	Under Engineered	26	Capacity Exceeded/ Too many people want to travel and not enough capacity to accommodate them.	2	3	4	3	6	8	6	Ensure that estimated figures for capacity are up to date and the pod capacity	Project planner	1	3	4	3	3	4	3	Do updated calculations regularly. Use reliable sources of traffic data. Collect your own data.

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											has been adequately measured. Ensure that there are considerations to a realistic approach rather cross-check work to ensure that opinions on design is discussed								take into account changes in population over the years.	
13b	Lack of attraction to the zones	28	Not enough people want to travel to the location of the zones	3	4	3	2	12	9	6	Ensure the zones are in suitable locations with enough public interest	Project planner Company Media Manager	1	4	3	2	4	3	2	Investigate and research the proposed zones to ensure they are in prime locations with opportunities for future development Advertise the location of the project, as well as the hyperloop itself to enhance public engagement and anticipation Use OD Matrix to find approximate attraction to the zones
14a	Unknown errors in the census	29	Inaccurate census data will throw off the results of the OD Matrix, resulting in a potential under or over-estimation of	3	3	4	3	9	12	9	Ensure there is sufficient data to show demand	Project planner Market researcher	2	2	3	2	4	6	4	Conduct additional research to get a better understanding of the level of demand

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