

A2 Bean and Ebbsfleet Junction Improvements Environmental Statement Volume 2 – Appendix D Vulnerability to Major Accidents or Disasters February 2019

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**Volume 2 –
Appendix D
Vulnerability to
major accidents or
disasters**

Appendix D. Vulnerability to major accidents and disasters

D.1 Long list of major accidents or disasters

Table D.1: Vulnerability to major accidents or disasters

Disaster type	Relevant to the Scheme	Source of disaster	Potential receptors	Consequence	Addressed in ES (Yes/No and where)	Covered outside of ES (Yes/No and where)	Embedded mitigation	Additional mitigation to reduce risk
Geological disasters								
Avalanches and landslides	No	Due to the topography of the Scheme and the surrounding area, large scale landslide/avalanche disasters are considered an unlikely risk to the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A
Earthquakes	No	The site is not in a geologically active area and as such earthquakes are not considered to be a risk or serious possibility.	N/A	N/A	N/A	N/A	N/A	N/A
Volcanic eruptions	No	The site is not in a geologically active area and as such volcanic eruptions are not considered to be a risk or serious possibility.	N/A	N/A	N/A	N/A	N/A	N/A
Sinkholes	Yes	Due to the geology underlying the scheme (Chalk) and historical mining/quarrying activities there is a possibility that sink holes may form within the vicinity of the Scheme.	Road users, infrastructure and property, surrounding environment	Casualties, damage to infrastructure and property, disruption to services.	Yes - Geology and Soils chapter (Chapter 10).	No	Yes – within the Ground Investigation and Scheme design. The risk can be mitigated through design. There is a risk that the cost of construction may increase due to additional mitigation.	No
Ground instability	Yes	Instable ground from geological units / Made Ground/Fill and historical mining causing instability of the ground surrounding the Scheme.	Road users, infrastructure and property, surrounding environment.	Casualties, damage to infrastructure and property, disruption to services.	Yes - Geology and Soils chapter (Chapter 10).	No	Yes – within the Ground Investigation and Scheme design. The risk can be mitigated through design. There is a risk that the cost of construction may increase due to additional mitigation.	No
Hydrological disasters								
Floods	Yes	Both the vulnerability of the Scheme to flooding, and its potential to exacerbate flooding, are covered in the Flood Risk Assessment and are also reported in EIA terms in the Road Drainage and the Water Environment chapter of the ES (Chapter 8). Both assessments address the risk to the Scheme and increased risk due to the Scheme. A Flood Risk Assessment has concluded the Scheme will be at an acceptable level of fluvial, surface water and groundwater flood risk. Mitigation included in the Scheme design will ensure the risk is acceptable.	N/A	N/A	N/A	N/A	N/A	N/A
Tsunami/Storm surge	No	The Scheme is located 1.4 km away from the River Thames which is tidal and 800 m from the River Ebbsfleet which is Main River watercourse and tributary to the River Thames. An increase in tidal level above the design level of the existing defences may result in flooding outside the	N/A	N/A	N/A	N/A	N/A	N/A

Disaster type	Relevant to the Scheme	Source of disaster	Potential receptors	Consequence	Addressed in ES (Yes/No and where)	Covered outside of ES (Yes/No and where)	Embedded mitigation	Additional mitigation to reduce risk
		flood risk zone but due to the location of the Scheme it is considered unlikely to be a risk the Scheme.						
Limnic eruptions	No	Sawyers Lake, located 1 km north of the Scheme, does not exhibit the characteristics of a potential limnic eruption. i.e. a source of carbon dioxide within the lake; deep enough to have large amounts of dissolved carbon dioxide; and a stratified water column.	N/A	N/A	N/A	N/A	N/A	N/A
Major change to groundwater levels	No	The vulnerability of the Scheme to flooding and its potential to exacerbate flooding, are covered in the Flood Risk Assessment. The Flood Risk Assessment has concluded the Scheme will be at an acceptable level of groundwater flood risk. Mitigation included in the Scheme design will ensure the risk is acceptable. The vulnerability of the Scheme to groundwater flooding and its potential to exacerbate groundwater flooding is therefore considered low.	N/A	N/A	N/A	N/A	N/A	N/A
		Due to the extent of the development relative to current conditions the Scheme is not considered likely to affect groundwater recharge rates and therefore will not affect groundwater levels.	N/A	N/A	N/A	N/A	N/A	N/A
Meteorological disasters								
Blizzards	Yes	Blizzard conditions could cause road users to be trapped on the road, however the risk is no different from other roads/road users in the UK, and as such is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Cold waves	Yes	A rapid fall in temperature within a defined time period can cause a cold wave, affecting road users if they become trapped due to bad weather. The Scheme is not considered to be at any greater risk of a cold wave than other roads/road users and is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Cyclonic storms	Yes	Cyclonic storms could cause high winds and heavy rain causing damage to infrastructure and property. However the risk is no different from other roads/road users in the UK, and as such is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Droughts	No	Droughts are only considered as a disaster due to water shortages for essential services and where there are indirect impacts on food production, loss of soils etc. The Scheme is not considered to be vulnerable to drought.	N/A	N/A	N/A	N/A	N/A	N/A
Thunderstorms	Yes	As the junction interchange is elevated, some consideration is given to the potential risk of lightning strikes, though the risk is not considered to be any greater than any other road bridges.	N/A	N/A	N/A	N/A	N/A	N/A

Disaster type	Relevant to the Scheme	Source of disaster	Potential receptors	Consequence	Addressed in ES (Yes/No and where)	Covered outside of ES (Yes/No and where)	Embedded mitigation	Additional mitigation to reduce risk
Hailstorms	Yes	The risk of hailstorms is no different from other roads/road users in the UK and as such is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Heat waves	Yes	Extreme heat for a prolonged period can cause tarmac to melt, a higher risk of fires to the surrounding vegetation and road users to dehydrate. The Scheme is not considered to be at any greater risk of a heat wave than other roads/road users and is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Tornadoes	No	Although there are tornadoes in the UK, their destructive force tends to be much less than in other parts of the world and the Scheme is not particularly vulnerable to any potential effects.	N/A	N/A	N/A	N/A	N/A	N/A
Wildfires	Yes	There may be some potential for bush, scrub, grassland or heather fires, though the risk is no greater than the existing road and is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Poor air quality episode	Yes	Although relevant, as vehicle emissions can contribute to poor air quality, it is not considered necessary to undertake any more assessment than is already being undertaken for the Air quality assessment of the EIA, in the Air quality chapter of the ES (Chapter 5).	N/A	N/A	N/A	N/A	N/A	N/A
High wind events	Yes	High wind events are usually linked to storm events that have been considered above. The risk of the Scheme to high wind events is no greater than other roads/road users and is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Space disasters								
Geomagnetic storms	Yes	Solar wind shock waves can interact with the earth's magnetic field causing disruption to electrical systems, communications and GPS. The Scheme is considered to be no more vulnerable than any other development and is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Solar flare	Yes	Solar flares can interrupt radio and other electronic communications. The Scheme is considered to be no more vulnerable than any other development and is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Astronomical object collision	Yes	An impact from an astronomical object can cause effects such as shock waves, heat radiation and craters. The Scheme is considered to be no more vulnerable than any other development and is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Transport								
Road accidents	Yes	A major traffic accident leading to the closure of the road for a prolonged period. The risk posed by spillage from hazardous loads as a result of a road traffic accident e.g. fuel tankers is considered in the Road Drainage and Water Environment chapter (Chapter 8). Mitigation included in the Scheme design ensures the risk is acceptable.	N/A	N/A	N/A	N/A	N/A	N/A

Disaster type	Relevant to the Scheme	Source of disaster	Potential receptors	Consequence	Addressed in ES (Yes/No and where)	Covered outside of ES (Yes/No and where)	Embedded mitigation	Additional mitigation to reduce risk
		Diverted traffic onto local roads following a road accident can cause a change in air quality emissions and noise levels in the surrounding area. There is not considered to be any increased risk to the Scheme and road users than currently exists and is not considered further.						
Rail accidents	No	Ebbsfleet International Railway Station is location 1.2 km north of the Ebbsfleet Junction. There is not considered to be any increased to the Scheme and road users than currently exists and is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Aircraft disasters	No	London City and Southend airports are not located within 2 km of the Scheme and there is not considered to be any increased risk to the Scheme and road users than currently exists and is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Maritime disasters	No	The River Thames is the closest navigable river, located to north of the Scheme. There is not considered to be any increased risk to the Scheme than currently exists and is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Engineering Accidents/Failures								
Bridge failure	Yes	The existing bridges and overbridges that form part of the Scheme design as well as the new overbridge at Bean Junction for the Scheme. There is not considered to be any increased risk to the Scheme as a result of the existing bridges than currently exists and the new overbridge is will be designed to Highways England standards and is therefore not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Flood defence/reservoir failure	Yes	The Flood Risk Assessment considers the risk of flooding should a designated reservoir fail. No reservoirs are located close enough to the Scheme for the potential reservoir flooding area to affect the Scheme. Similarly there are no areas protected by flood defences which would affect the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A
Mast and tower collapse	Yes	Existing masts and towers could collapse on the road. There is not considered to be any increased risk to the Scheme than currently exists and is therefore not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Building failure or fire	No	No large buildings are located close by the Scheme to cause a risk greater than currently exists.	N/A	N/A	N/A	N/A	N/A	N/A
Utilities failure (gas, electricity, water, sewage, oil, communications)	Yes	Numerous utility routes cross the A2 adjacent area could fail and cause damage to the Scheme. The required diversion of some utility routes during construction due to the Scheme increases the risk of failure during diversion.	Road users, local residents, property, surrounding environment.	Potential for fire/explosion, pollution incident, injury.	No	No	No	All utilities companies have plans and arrangements in place to deal with supply disruptions and failures.

Disaster type	Relevant to the Scheme	Source of disaster	Potential receptors	Consequence	Addressed in ES (Yes/No and where)	Covered outside of ES (Yes/No and where)	Embedded mitigation	Additional mitigation to reduce risk
Industrial Accidents								
Defence industry	No	No defence industries are located within 2 km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A
Energy industry (fossil fuel)	No	No energy industries are located within 2 km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A
Nuclear power	No	No nuclear power plants are located within 2 km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A
Oil and gas refinery/storage	No	No oil and gas refinery/storage facilities are located within 2 km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A
Food industry	No	No food industries are located within 2 km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A
Chemical industry	No	No chemical industries are located within 2 km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturing industry	No	No manufacturing industries are located within 2 km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A
Mining industry	Yes	Historical mining activities have been identified within the Chalk, there is potential that unknown excavations exist that could collapse cause ground instabilities/sink holes to form.	Road users, infrastructure and property, surrounding environment.	Casualties, damage to infrastructure and property, disruption to services.	Yes - Geology and Soils chapter (Chapter 10).	No	Yes – within the Ground Investigation and Scheme design. The risk can be mitigated through design. There is a risk that the cost of construction may increase due to additional mitigation.	No
Terrorism/Crime/Civil unrest								
Bomb/vehicle attack on people	Yes	The Scheme is unlikely to be any more of a target for this attack than currently exists and is therefore not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Bomb/vehicle attack on infrastructure	Yes	The Scheme is unlikely to be any more of a target for this attack than currently exists and is therefore not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Mass shooting	No	Unlikely to occur in the vicinity of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A
Chemical/gas attack	Yes	Unlikely to be any more of a target for this attack than currently exists and is therefore not considered further.	N/A	N/A	N/A	N/A	N/A	N/A
Rioting	No	Unlikely to occur due to no target locations/businesses in the vicinity of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A
Cyber attack	Yes	The increased number of roadside technology and increasing reliance on this technology could render the Scheme more vulnerable to a cyber attack.	Road users	Accidents due to information boards displaying incorrect information, fatalities.	No	No	The roadside technology is designed to Highways England security arrangements to mitigate the effects of cyber attacks.	No

Disaster type	Relevant to the Scheme	Source of disaster	Potential receptors	Consequence	Addressed in ES (Yes/No and where)	Covered outside of ES (Yes/No and where)	Embedded mitigation	Additional mitigation to reduce risk
War								
Conventional	No	No more vulnerable than any other infrastructure.	N/A	N/A	N/A	N/A	N/A	N/A
Chemical	No	No more vulnerable than any other infrastructure.	N/A	N/A	N/A	N/A	N/A	N/A
Nuclear	No	No more vulnerable than any other infrastructure.	N/A	N/A	N/A	N/A	N/A	N/A
Disease								
Human disease	No	No more vulnerable than any other infrastructure.	N/A	N/A	N/A	N/A	N/A	N/A
Animal disease	No	No more vulnerable than any other infrastructure.	N/A	N/A	N/A	N/A	N/A	N/A
Plant disease	No	No more vulnerable than any other infrastructure.	N/A	N/A	N/A	N/A	N/A	N/A
Animal infestation	Yes	An animal infestation event could impact the Scheme although this is no more likely to occur than currently exists and is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A

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